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UNIVERSITY OF STRATHCLYDE
DEPARTMENT OF MARKETING
STRATHCLYDE INTERNATIONAL BUSINESS UNIT

COMPARATIVE STUDY OF INTERNATIONAL MARKETING STRATEGY
OF JAPANESE AND TAIWANESE CNC MACHINE TOOL INDUSTRY
IN THE ASEAN REGION

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As I reflect upon the scope of coverage of this four-year investigation for the doctoral thesis, I realised that the themes addressed at the corporate sphere are equally relevant in the personal realm: money and values; competition and survival; sustained success and continuous improvement; change and learning; networking and relationships. In the midst of these tensions, the individual, like the corporation, must follow his vision/mission defined by his personal intents. To this end, I am grateful to my parents who constantly reminded me of the need to cope by reengineering myself in all dimensions - mentally, physically, emotionally, and spiritually.

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CONTENTS

	<u>PAGE</u>
ABSTRACT	i
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	xiv
LIST OF FIGURES	xxii
LIST OF ANNEXES	xxxii
ABBREVIATIONS AND ACRONYMS	xxxiii
<u>CHAPTER 1: Preface: Setting the Scene</u>	1
1.1 In Perspective	2
1.2 International Business Reality	3
1.3 Summary	8
References	13
<u>CHAPTER 2: Overview: Background, Research Objectives, and Plan of Thesis</u>	16
2.1 A Comparative Study of International Marketing Strategy of Japanese and Taiwanese CNC Machine Tool Industry in the ASEAN Region	17
2.1.1 The Wheel of Competition of Asian Producers	19
2.1.2 Flexible Intelligent Relationship Management Strategy (<i>FIRMS</i>)	21
2.1.3 Reasons for Success	25
2.2 Research Objectives	26
2.3 Literature Review	28
2.4 Scope of Study/Research Methodology	30
2.5 Plan of Thesis	34
2.6 Summary	35
References	43

	<u>PAGE</u>
<u>CHAPTER 3: The Changing International Business Environment: 1940s to 1990s</u>	50
3.1 The Nature of International Business	51
3.2 Historical Perspective of International Business	63
3.3 Geo-Political and Geo-Economic Realities in International Business	71
3.3.1 The Dynamism of the East Asian Economies	73
3.3.2 The Trends Towards Regionalization	81
3.4 Socio-Cultural-Technological Environments	87
3.5 Conclusion	105
References	118
<u>CHAPTER 4: Competitive Dynamics of Japanese and Taiwanese CNC Machine Tool Industry: Battlefield in the ASEAN Region</u>	131
4.1 Importance of Manufacturing Industry	132
4.2 The Computer Numerically Controlled Machine Tool Industry Environment	148
4.3 Comparative Advantage, Value Added and Competitive Advantage in the CNC Machine Tool Industry	182
4.3.1 The New Formula for Competitive Advantage/Business Advantage	182
4.3.2 Impact of Significant World Events on the Machine Tool Industry	188
4.4 Critical Success Factors for Japanese and Taiwanese CNC Machine Tool Industry	198
4.4.1 Rise of Japan's Success in World Markets	198
4.4.2 Reality or Myth Behind Japan's Success in International Business: Scholars' Contentions	199

	<u>PAGE</u>	
4.4.3	Comparative Analysis of Japanese and Taiwanese Manufacturing Success: The Machine Tool Industry	201
4.4.4	The New Formula for Business Success	215
4.5	Competitive Strategy for Regionalization by Japanese and Taiwanese Machine Tool Manufacturers	231
4.5.1	The Three World-Class Japanese Machine Tool Producers in the ASEAN Market	238
4.5.2	The Three World-Class Taiwanese Machine Tool Producers in the ASEAN Market	241
4.6	Summary	251
4.7	Conclusion	258
	References	267
<u>CHAPTER 5:</u>	<u>The Wheel of Competition of Producers in the Asian Machine Tool Industry in ASEAN Region</u>	280
5.1	Introduction	281
5.2	Total Quality Business Paradigm: The Imagery of a Bicycle	284
5.3	Total Quality Business Paradigm: Combination of Parameters of the Wheel of Competition and FIRMS	287
5.4	Socio-Cultural Belief Systems	287
5.5	Sun Tzu's Art of War Strategy	291
5.5.1	Sun Tzu's Art of War and its Implications for Strategic Management and Thinking in Business	294
5.6	Confucianism	303
5.7	The Notion of Competitive Nations and Communitarian Ideology	308

	<u>PAGE</u>	
5.8	Business and Management Ethos	315
5.9	World-Class Status	316
5.10	The Concept of Globalisation	326
	5.10.1 Keys to a Successful Total Global Strategy	346
	5.10.2 Global Players in Competition	347
	5.10.3 Competitive Advantage of Nations	348
5.11	Commonsense Nations	354
5.12	Summary	360
5.13	Conclusion	369
	References	382
<u>CHAPTER 6:</u>	<u>Flexible Intelligent Relationship Management Strategy</u>	388
6.1	Introduction to the Flexible Intelligent Relationship Management Strategy (<i>FIRMS</i>) : The Chain of Relationships	389
6.2	Justification of <i>FIRMS</i>	395
6.3	Properties of <i>FIRMS</i>	403
6.4	Goals of <i>FIRMS</i>	404
6.5	Summary	439
6.6	Conclusion	447
	References	461
<u>CHAPTER 7:</u>	<u>Research Methodology</u>	472
7.1	Introduction	473
7.2	A Pragmatic Approach: Qualitative - Quantitative Mix	475

	<u>PAGE</u>
7.3	Data Sources 483
7.4	Case Studies as a Research Strategy: Some Theoretical Considerations 486
7.4.1	Functions of Case Studies 487
7.4.2	Criticisms of Case Studies 488
7.4.3	Case Studies Research Design 489
7.4.4	Components of Research Design 489
7.4.5	Research Questions 489
7.4.6	Research Propositions 489
7.4.7	Unit of Analysis 490
7.4.8	Selecting a "Case" 490
7.4.9	Sampling Plan for Questionnaires 490
7.4.10	Data Processing and Analysis for Questionnaires 491
	7.4.10.1 Data Processing 491
	7.4.10.2 Data Analysis 492
7.4.11	Sampling Plan for Case Studies 498
7.4.12	Linking Data to Propositions 502
7.4.13	Criteria for Interpreting Findings 502
7.4.14	Validity and Reliability Tests for Case Studies 502
7.4.15	Techniques to Improve the Quality of Case Studies 505
7.4.16	Sources of Evidence 505
7.4.17	Personal Interview as Data Collection Method 507
7.4.18	Limitations of Personal Interviews 509

	<u>PAGE</u>
7.4.19	The Need to Justify the Selected "Cases" 512
7.5	Design and Methodology 514
7.5.1	Phase 1 Empirical Research: Case Study of Three Japanese and Three Taiwanese Producers 516
7.6	Presentation of Qualitative Data 533
7.6.1	Phase 2 Empirical Research: Survey of End-Users in the ASEAN Region 535
7.7	Summary and Conclusion 542
	References 546
<u>CHAPTER 8:</u>	<u>Empirical Research of the Author</u> 550
8.1	Introduction 551
8.2	Case 1: Profile of Okuma Corporation 552
8.2.1	Capital Assets and Manufacturing Facilities of Okuma 555
8.2.2	Sales Performance of Okuma 557
8.2.3	Business Management Philosophy 558
8.2.4	The ASEAN Market 561
8.2.5	Analysis of <i>FIRMS</i> in Okuma Corporation 561
8.2.6	Summary 595
8.3	Case Two: Profile of Yamazaki-Mazak Corporation 603
8.3.1	Capital Assets and Manufacturing Facilities of Mazak 603
8.3.2	Business Management Philosophy 607
8.3.3	The ASEAN Market 611
	8.3.3.1 Preparing for the Future in South East Asia 611

		<u>PAGE</u>
	8.3.3.2 Features of Yamazaki Mazak CIM Factory	612
	8.3.4 Analysis of <i>FIRMS</i> in Yamazaki Mazak Corporation	616
	8.3.5 Summary	641
8.4	Case Three: Profile of Mori Seiki Company Limited	644
	8.4.1 Capital Assets and Manufacturing Facilities of Mori Seiki	644
	8.4.1.1 The Nara Plant	646
	8.4.1.2 The Iga Plant	646
	8.4.1.3 R&D Centre, Japan	647
	8.4.2 Sales Performance of Mori Seiki	648
	8.4.3 Management Business Philosophy	649
	8.4.4 Analysis of <i>FIRMS</i> in Mori Seiki Company Limited	654
	8.4.5 Summary	659
8.5	Case Four: Profile of Taichung Machinery Works Company (TMWC)	663
	8.5.1 Capital Assets and Manufacturing Facilities of Taichung Machining Works Company	663
	8.5.2 Sales Performance of Taichung Machinery Works Company	670
	8.5.3 Business Management Philosophy of Taichung Machinery Works Company	672
	8.5.4 The ASEAN Market	675
	8.5.5 Summary	680
8.6	Case Five: Profile of Leadwell CNC Machine Manufacturing Corporation	682

	<u>PAGE</u>	
8.6.1	Capital Assets and Manufacturing Facilities of Leadwell CNC Machines Manufacturing Corporation	683
8.6.2	Sales Performance of Leadwell CNC Machines Manufacturing Corporation	686
8.6.3	Business Management Philosophy of Leadwell CNC Machines Manufacturing Corporation	688
	8.6.3.1 Concept	688
	8.6.3.2 Product	688
	8.6.3.3 Service	688
	8.6.3.4 People	688
	8.6.3.5 Management	689
8.6.4	The ASEAN Market	689
8.6.5	Summary	698
8.7	Case Six: Profile of Fair Friend Enterprise Company Limited	700
	8.7.1 Organizational of Fair Friend Enterprise Company Limited	702
	8.7.2 Business Management Policy	703
	8.7.3 The ASEAN Market	704
	8.7.4 Summary	708
8.8	Survey Research on the Wheel of Competition	710
	8.8.1 Data Analysis for the Wheel of Competition of Producers	710
8.9	Summary and Conclusion	729
	References	738

	<u>PAGE</u>
<u>CHAPTER 9:</u> <u>Phase Two Empirical Research: Survey of the End-Users in the ASEAN Region</u>	739
9.1 Introduction	740
9.2 Problems Encountered in International Survey Research	740
9.3 Results of Statistical Analysis using SPSS Software	743
9.4 Interpretation of Statistical Analysis	749
9.5 Summary of the ASEAN Market	756
9.6 Organizational Buying Behaviour (OBB) in the ASEAN Market	760
9.7 Summary/Conclusion	769
References	775
<u>CHAPTER 10:</u> <u>Summary and Recommendations of the Study Research Objectives and Main Conclusions</u>	776
10.1 Introduction	777
10.2 Study Recommendations	785
10.3 Limitations of Study	787
10.4 Suggestions for Further Research	787
References	789

LIST OF TABLES

		<u>PAGE</u>
<u>CHAPTER 1</u>		
Table 1-1	Relationships of Comparative Advantage, Value Added, and Competitive Advantage	5
<u>CHAPTER 2</u>		
Table 2-1	Examples of Some Recent Winning Business Strategies	24
Table 2-2	Comparative Management Style of Eastern and Western Companies	40
Table 2-3	Generic Comparison of Western, Japanese and Offshore Chinese Methods of Decision Making and Management	41
Table 2-4	The Most Important Negotiator Characteristics according to Various Managers in Three Nations	42
<u>CHAPTER 3</u>		
Table 3-1	Changing Trends in International Business Environment from the 1945 to the 1990s	52
Table 3-2	Three Ways to Straddle the World	56
Table 3-3	Convergences of Communications and Computing Technologies	61
Table 3-4	Major Developments and Issues in International Business Strategy from the 1980s	69
Table 3-5	Historical Perspective of International Business: The Actors in the International Business Environment	70
Table 3-6	Examples of Deregulations and Privatisation	72
Table 3-7	Japan's Direct Investments in the Asian Countries	76
Table 3-8	Main Sources of the US Trade Deficit: Non-Seasonally Adjusted (1989 - 1992)	78
Table 3-9	Summary Tables of GDP Growth Rates and Inflation Rates in the Asian NIEs and ASEAN Countries	79
Table 3-10	Japanese and Asian NIEs' Share of Total Foreign Investment in the ASEAN Four, 1987 - 1990	82

LIST OF TABLES

		<u>PAGE</u>
Table 3-11	Major Multinational Company Investments in Eastern Europe and the Former Soviet Union	83
Table 3-12	Methods of Expansion: Examples of Companies engaged in Licensing Franchising, Joint Ventures, Take-Overs and Greenfield Investments, 1989 - 1992	86
Table 3-13	The Four Waves: Towards Business in the 21st Century	89
Table 3-14	Evolution of the Corporation	92
Table 3-15	Competent Manager in the International Environment	101
Table 3-16	The 21st-Century Expatriate Manager Profile	102
Table 3-17	Elements of an International Manager	104
Table 3-18	Changing Pattern of Industrial Leadership	106
Table 3-19	Four Strong Market Forces that Create Change	109
Table 3-20	Hallmarks of a Changing World	110
Table 3-21	Some Common Dualities in Today's Complex Organizations	111
Table 3-22	Highlights of Significant Events on the Operations of IB	113
Table 3-23	Megatrends 2000	115
 <u>CHAPTER 4</u>		
Table 4-1	OECD's Share of the World market in Manufactured Goods (As Percentage Market Share)	133
Table 4-2	Value Added as a Percentage of GDP	135
Table 4-3	Competitive Positions as Measured by Relative Unit Labour Costs in Manufacturing	136
Table 4-4	Macro Perspective of International Business	145
Table 4-5	Selected Countries Reflecting the Importance of Manufacturing Versus Service Industry	147
Table 4-6		173

LIST OF TABLES

		<u>PAGE</u>
Table 4-7	Industry/Environmental Characteristics in the Machine Tool Industry	183
Table 4-8	Machine Tool Production Share in Japan by NC-Type and Non-NC Machines	193
Table 4-9	Number of NC/CNC Machine Tools Produced in Japan	195
Table 4-10	Reasons Underlying Japan's Success	202
Table 4-11	Sectoral Distribution of Members of Taiwan Association of Machinery Industry	212
Table 4-12	Taiwan's Machinery Exports by Type of Product (1986 - 1988)	213
Table 4-13	Development of Machine Tools	216
Table 4-14	Evolution of Basic Factors of Production	220
Table 4-15	World Competitiveness Scoreboard (Computed on the Basis of 326 Criteria)	222
Table 4-16	Continued Growth of Manufactured Imports from ASEAN Countries to Japan	236
Table 4-17	Strategic Analysis of Taiwan's Machinery Industry	243
Table 4-18	Stages of Manufacturing Automation	254
Table 4-19	Advantages of Different Types of Computerised Manufacturing Systems	255
Table 4-20	List of Strategic Options for World-Class Manufacturing Companies Adocated by Different Scholars	260
Table 4-21	Major Forms of Corporate Restructuring	263
Table 4-22	The Stages of Post-1945 Economic Development and Implications for Manufacturing	264
 <u>CHAPTER 5</u>		
Table 5-1	Pioneers of the Theoretical Concepts in the Wheel of Competition	289
Table 5-2	Varying Translations of Sun Tzu's Chapter Titles	293
Table 5-3	Summary of Sun Tzu's Art of War Strategy	295

LIST OF TABLES

		<u>PAGE</u>
Table 5-4	SWOT Analysis	298
Table 5-5	Top Five Competitive Priorities in the Next five Years	323
Table 5-6	Most Important Improvement Programs in the Next Two Years	324
Table 5-7	Summary of the Twenty Characteristics of World-Class Manufacturing Companies	329
Table 5-8	Characteristics of World-Class Manufacturing Companies	330
Table 5-9	History of the Multinational Enterprise	334
Table 5-10	Business Characteristics of Global Exporter, Multinational, Multilocal, and Global Companies	336
Table 5-11	The Industrial Globalization Drivers, Global Strategy Levers and Global Organisation Factors	345
Table 5-12	Representative Sample of Competitive Industries	352
Table 5-13	Examples of Practical Advice and Commonsense Guide for Managers	355
Table 5-14	Action Summary of Commonsense Business Strategy	357
Table 5-15	Performance Measures by Level of Analysis	365
Table 5-16	Comparative Industrial Leadership of the USA and Japan	366
Table 5-17	Elements of the Wheel of Competition of Asian Producers	370
Table 5-18	Values Attributed to the Japanese and Their Manifestation Within the Company	372
 <u>CHAPTER 6</u>		
Table 6-1	Modern Strategic Corporate Management	399
Table 6-2	The Properties of <i>FIRMS</i>	405
Table 6-3	Measures of the Quality of Customer Service Experience	411
Table 6-4	The Lean Supply Model of Customer-Supplier Relationships	420
Table 6-5	Relationship Maturity Grid	422

LIST OF TABLES

		<u>PAGE</u>
Table 6-6	The Interdependence of Manufacturing Strategy and Marketing Strategy	430
Table 6-7	The Major Characteristics of Craft Production, Mass Production and Lean Production in the Automobile Industry	432
Table 6-8	Marketing Best Practices in the 70's, 80's and 90's	435
Table 6-9	Relative Skills Emphasis in the Age of the Customer	444
Table 6-10	Summary of the Five Goals of <i>FIRMS</i>	446
Table 6-11	Comparison of Management Philosophies Between Best Practices in Japanese Companies Against Typical US Companies	448
Table 6-12	A Chronology of Manufacturing, Marketing and Management Theories	454
Table 6-13	Milestone/Evolution of Management, Marketing and Manufacturing	455
Table 6-14	The Route to Business Goal of Profit/Market Share	458
Table 6-15	Strata of Relationship Management Towards <i>FIRMS</i>	460
 <u>CHAPTER 7</u>		
Table 7-1	Different Types of Research Methodology	477
Table 7-2	Strengths and Weaknesses of Qualitative and Quantitative Research Approaches	479
Table 7-3(A)	When to Use Qualitative and Quantitative Methods	481
Table 7-3(B)	Soft (Qualitative) and Hard (Quantitative) Methods	481
Table 7-4	Qualitative Versus Quantitative Research	482
Table 7-5	Four Methods of Obtaining Primary Data	484
Table 7-6	Appropriateness of Open-Ended Questions Versus Close-Ended Questions	485
Table 7-7	Labels Assigned to Each Variable	493
Table 7-8	List of Procedures for SPSS Release 5.0.2	494

LIST OF TABLES

		<u>PAGE</u>
Table 7-9	Sales Figures of the Top Ten Machine Tool Manufacturers from Taiwan (1987 - 1994)	503
Table 7-10	Validity and Reliability Tests for Case Study	506
Table 7-11	Three Groups of Personal Interviews	508
Table 7-12	Primary Data Collection: Mail Method	510
Table 7-13	Primary Data Collection: Personal Interview Method	511
Table 7-14	The Advantages and Disadvantages of Different Types of Interviews	534
 <u>CHAPTER 8</u>		
Table 8-1	Characteristics of Okuma's Development Manager	570
Table 8-2	The Okuma Mind (Shared Corporate Philosophy)	571
Table 8-3	Okuma Employee Development (Kaizen)	573
Table 8-4	Range of Activities in the Marketing of CNC Machine Tools	587
Table 8-5	Sales Performance from 1984 to 1994	593
Table 8-6	Comparison of Products and Services	598
Table 8-7	Zero Defects and Zero Defections	599
Table 8-8	Business-to-Business Marketing Mix of Okuma Products in ASEAN Market	601
Table 8-9	Analysis of <i>FIRMS</i> in Okuma Corporation	602
Table 8-10	Company Profile of Yamazaki Mazak Corporation	604
Table 8-11	Yamazaki-Mazak Corporation : Awards	609
Table 8-12	Yamazaki Mazak Group	619
Table 8-13	Analysis of <i>FIRMS</i> in Yamazaki Mazak	643
Table 8-14	Corporate Profile of Mori Seiki Co. Ltd (As of November 1993)	645
Table 8-15	Analysis of <i>FIRMS</i> in Mori Seiki	660

LIST OF TABLES

		<u>PAGE</u>
Table 8-16	History of Taichung Machinery Works Company	665
Table 8-17	Products and Services, Range of Markets, and the Internationalization of Operations	667
Table 8-18	Sales Breakdown from 1986 to 1990	671
Table 8-19	Taichung's Market Distribution	673
Table 8-20	Contribution to Total Gross Profit	674
Table 8-21	Local PIM Exports	677
Table 8-22	Analysis of <i>FIRMS</i> in Taichung Machinery Works Company	681
Table 8-23	Major Markets and Projects	685
Table 8-24	World-Wide Sales of Leadwell Corporation (Up to December 31, 1992)	687
Table 8-25	Analysis of <i>FIRMS</i> in Leadwell CNC Machines Manufacturing Corporation	699
Table 8-26	Analysis of <i>FIRMS</i> in Fair Friend Enterprise Company Limited - Machine Tool Division	709
Table 8-27	Summary of the One-Way ANOVA Test	713
Table 8-28	Summary of the Six World-Class CNC Machine Tool Producers in Search of <i>FIRMS</i> for Profit/Market Share	734
 <u>CHAPTER 9</u>		
Table 9-1	Respondents Interpretations of the Characteristics of a World-Class Manufacturing Company	742
Table 9-2	Summary of the Kolmogorov-Smirnov (K-S) Test	744
Table 9-3	Cronbach's Reliability Measures	746
Table 9-4	Summary of the Chi-Square Test	747
Table 9-5	Summary of the One-Way ANOVA Test	748
Table 9-6	Mean Attribute Importance of Key Characteristics of World-Class Manufacturing Companies	750

LIST OF FIGURES

	<u>PAGE</u>
<u>CHAPTER 1</u>	
Figure 1.1	Interaction of Different Subsystems in the Nation 9
Figure 1.2	Cycle of Total Quality Learning 11
<u>CHAPTER 2</u>	
Figure 2.1	Determinants of National Competitive Advantage 18
Figure 2.2	The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region 20
Figure 2.3	Architecture of Win-Win Relationships for Business Success 23
Figure 2.4	A Framework for the Comparative Study of International Marketing Strategy of Japanese and Taiwanese CNC Machine Tools Industry in the ASEAN Region 29
Figure 2.5	Scope of Thesis: In Search of International Corporate Competitive Advantage in International Business 32
<u>CHAPTER 3</u>	
Figure 3.1	Environmental Forces in International Business 55
Figure 3.2	Transition of the World Economy (1960s to 1990s) 57
Figure 3.3	Drivers of Change in Global Competition and Technology 59
Figure 3.4	World Flows in Inward Direct Investment 74
Figure 3.5	Japanese Investments Worldwide and in ASEAN 80
Figure 3.6	"Top Gun" International Manager 103
Figure 3.7	Current Issues in International Business 117

LIST OF FIGURES

	<u>PAGE</u>
<u>CHAPTER 4</u>	
Figure 4.1	Total Research and Development Expenditure as Percentage of \GDP 137
Figure 4.2	Cyclical Demand Variations for CNC Machine Tools from the derived Demand for Road Haulage Service 140
Figure 4.3	The Challenge of National Business: A Macro Perspective 142
Figure 4.4	The Challenge of International Business: A Macro Perspective 143
Figure 4.5	The Challenge of Global Business: A Macro Perspective 144
Figure 4.6	Machine Tools Produce Tools and Machines for Manufacturing All Types of Products: A Distinct Class of Machinery 149
Figure 4.7	Business Cycles in the USA from 1919 to 1990 152
Figure 4.8	Historical Development of Conventional Machine Tool (At the Threshold of the NC Era) 153
Figure 4.9	Machine Accuracies of Various Types of Machine Tools 154
Figure 4.10	Interrelation of the Various Technological and Economic Factors in the Manufacturing System 155
Figure 4.11	The Progress in the Fusion of Computers and Telecommunications 157
Figure 4.12	Historical Development of NC Technologies (1952 - 1980) 159
Figure 4.13	Operational Differences between NC and CNC 163
Figure 4.14	Computer-Aided Manufacturing and Product Development 165
Figure 4.15	Four Production Types Related to Quantity and Product Variation 167
Figure 4.16	Overview of Computer-Aided Engineering for Manufacturing 168
Figure 4.17	Annual Production of NC Machines in Selected Countries 169
Figure 4.18	NC Technology as Basic Innovation in the Field of Manufacturing 171

LIST OF FIGURES

		<u>PAGE</u>
Figure 4.19	Total systems Approach to Factory Automation	172
Figure 4.20	Development of CNC Machine Tool to FA/CIM	174
Figure 4.21	An Example of Trends in Manufacturing Systems	175
Figure 4.22	Critical Success Factor for World-Class Status in Manufacturing Industry	177
Figure 4.23	Chronology of Manufacturing Trends	178
Figure 4.24	Impact of the Nature of the Economy on the Evolution of Technology in the CNC Machine Tool Industry	179
Figure 4.25	Development in Machine-Based to Knowledge-Based Manufacturing	180
Figure 4.26	Four Generations of CIM	181
Figure 4.27	The Adaptive-Integrative-Derivative-Evaluative Mode	186
Figure 4.28	Total Quality Business Paradigm (TQBP)	187
Figure 4.29	1970s to 1990s: Three Decades of Tumultuous Events	189
Figure 4.30	Market Development of CNC Machine Tools	190
Figure 4.31	NC/CNC Machine Tool Share in Japan (1975 - 1992)	192
Figure 4.32	World Machine Tool Production (Metal-Cutting Type)	197
Figure 4.33	The Relationship between Japanese Government Intervention and Stage in the Industry Life-Cycle	200
Figure 4.34	Reasons Given for Japan's Economic Success, Classified into Four Areas Related to a Country's Economic Competitiveness	205
Figure 4.35	The Relationship between Japan's Corporate Culture, Corporate Policies, and Economic Success	206
Figure 4.36	Total Quality Business Paradigm	207

LIST OF FIGURES

		<u>PAGE</u>
Figure 4.37	Critical Success Factors for Japanese Machine Tool Industry	208
Figure 4.38	Critical Success Factors for Taiwanese Machine Tool Industry	209
Figure 4.39	Value Added Chain of Individual Company	226
Figure 4.40	Orders for Seven Major Japan Machine Tool Builders	233
Figure 4.41	Forces Driving Industry Competition in ASEAN Region	235
Figure 4.42(a)	Production Export and Import Value of Machine Tools in Taiwan	244
Figure 4.42 (b)	Production Export and Import Value of CNC Machine Tools in Taiwan	244
Figure 4.43	The Growth of Computer Applications in Manufacturing	256
Figure 4.44	Role of Computers in Factory Automation	257
Figure 4.45	Strategy Development Template	259
Figure 4.46	Decline of Manufacturing Strategy	262
 <u>CHAPTER 5</u>		
Figure 5.1	Total Quality Business Paradigm: Imagery of a Bicycle	285
Figure 5.2	Fish Bone Diagram of the Wheel of Competition for Producer and FIRMS: The Total Quality Business Paradigm	288
Figure 5.3	General Framework in Sun Tzu's Art of War	296
Figure 5.4	General Framework in Strategic Thinking for Success	297
Figure 5.5	Different Virtues are the Moral Standards of Actions in Different Relationships	306
Figure 5.6	Schein's Three Levels of Culture	317
Figure 5.7	The "Onion Diagram": Manifestations of Culture at Different Levels of Depth	318

LIST OF FIGURES

		<u>PAGE</u>
Figure 5.8	The McKinsey Seven "S" Diagram	319
Figure 5.9	Industrialists' View of the Criteria for Defining World-Class Performance	321
Figure 5.10	Performance Improvements, 1986 - 1989	322
Figure 5.11	Basic Ingredients of Success for World-Class Company	327
Figure 5.12	The Basis of a Sound Strategic Plan for World-Class Manufacturing Competitiveness	328
Figure 5.13	Framework for World-Class Manufacturing Company	331
Figure 5.14	Manufacturing Business Pyramid	332
Figure 5.15	Global Exporter Business Attributes	339
Figure 5.16	Multinational Business Attributes	340
Figure 5.17	Multilocal Business Attributes	341
Figure 5.18	Sources of Strategic Excellence	343
Figure 5.19	The Globalization Triangle	344
Figure 5.20	National Competitiveness of Japan in the Machine Tool Industry	349
Figure 5.21	National Competitiveness of Taiwan in the Machine Tool Industry	350
Figure 5.22	Micro Level of World-Class Manufacturing Company	361
Figure 5.23	Macro Level of World-Class Manufacturing Company/Integrative Manufacturing Company	362
Figure 5.24	The New Paradigm for International Business	367
Figure 5.25	Western and Asian Management	374
Figure 5.26	R&D Spending and Patent Activity in Europe, USA and Japan	375
Figure 5.27	Comparative Economic Data Amongst EU, USA and Japan	376

LIST OF FIGURES

	<u>PAGE</u>
Figure 5.28	Interrelated Models of Competitiveness 379
 <u>CHAPTER 6</u>	
Figure 6.1	The Tree of FIRMS 390
Figure 6.2	Total Systems Diagram in <i>FIRMS</i> 392
Figure 6.3	Systems Diagram for the Five Goals in <i>FIRMS</i> 393
Figure 6.4	Three Levels of Strategy: The Case of Okuma Corporation 397
Figure 6.5	Strategic Options of Core Competencies and Key Capabilities 401
Figure 6.6	Synergy in <i>FIRMS</i> 402
Figure 6.7	Fishbone Diagram of Total Quality Customer Satisfaction (TQCS) 407
Figure 6.8	The "Virtuous Circle" Underlying Japan's Industrial Performance based on Ouchi's Theory Z 414
Figure 6.9	Position Tool Concept for Supply Chain Management 421
Figure 6.10	Manufacturing -Marketing Strategy Framework 428
Figure 6.11 (A)	Relationship between Strategic Options and Techniques 438
Figure 6.11(B)	Relationship between Trends and Capabilities 438
Figure 6.12	Synergy in <i>FIRMS</i> 441
Figure 6.13	The Logic of Profit and Market Share (Virtuous Circle) 452
Figure 6.14	The Sandcone Model in Development of World-Class Manufacturing Company 459
 <u>CHAPTER 7</u>	
Figure 7.1	Statistical Tests Performed 496

LIST OF FIGURES

		<u>PAGE</u>
Figure 7.2	Sales Figures for Top Five Taiwanese CNC Machine Tool Producers (March 1987 to March 1994)	501
Figure 7.3	Research Process	504
Figure 7.4	The International Research Process	515
Figure 7.5	Approach to Machine Tool Producers	517
Figure 7.6	The Normal Case Writing Process	518
Figure 7.7	A Classification of Scaling Techniques	520
Figure 7.8	Qualitative Research Procedures for Case Study and Survey Research	521
Figure 7.9	Procedure for Developing A Questionnaire	537
Figure 7.10	Approach to End-Users	538
Figure 7.11	Overview of the Stages of Data Analysis	544
 <u>Chapter 8</u>		
Figure 8.1	Strategic Analysis of the ASEAN Market	562
Figure 8.2	Strategic Market Planning for Okuma	563
Figure 8.3	Okuma's Corporate Mission	568
Figure 8.4	Okuma's Production Planning and Control System	577
Figure 8.5	Okuma's Production Priority Control System	578
Figure 8.6	Okuma's Production Monitoring System	579
Figure 8.7	Okuma's ASEAN-Communication Network	588
Figure 8.8	Generic FIRMS (Flexible Intelligent Relationship Management Strategy)	597

LIST OF FIGURES

		<u>PAGE</u>
Figure 8.9	Yamazaki Mazak's Corporate Symbol	626
Figure 8.10	Sales Performance from 1986 to 1990	650
Figure 8.11	Sales Performance (Export) from 1986 to 1990	651
Figure 8.12	Sales Performance: End-Users (Domestic) for Year 1990/1991	652
Figure 8.13	Sales Performance: End-Users (Export) for Year 1990/1991	653
Figure 8.14	Stages in Total Quality Customer Satisfaction	656
Figure 8.15	Time-Based New Product Development Team Structure Driven by Customer Needs	662
Figure 8.16	Company Organization of Taichung Machinery (TMWC)	664
Figure 8.17	Company Development (in the Past Ten Years)	666
Figure 8.18	Leadwell Corporation Organization Chart	684
Figure 8.19	World-Class Status	714
Figure 8.20	Global Player	715
Figure 8.21	National Competitiveness of Japan in the Machine Tool Industry (Factor Conditions)	716
Figure 8.22	National Competitiveness of Japan in the Machine Tool Industry (Demand Conditions)	717
Figure 8.23	National Competitiveness of Japan in the Machine Tool Industry (Related and Supporting Industries)	718
Figure 8.24	National Competitiveness of Japan in the Machine Tool Industry (Firm Strategy, Structure and Rivalry)	719
Figure 8.25	National Competitiveness of Taiwan in the Machine Tool Industry (Factor Conditions)	720
Figure 8.26	National Competitiveness of Taiwan in the Machine Tool Industry (Demand Conditions)	721

LIST OF FIGURES

		<u>PAGE</u>
Figure 8.27	National Competitiveness of Taiwan in the Machine Tool Industry (Related and Supporting Industries)	722
Figure 8.28	National Competitiveness of Taiwan in the Machine Tool Industry (Firm Strategy, Structure and Rivalry)	723
Figure 8.29	Commonsense Nations	724
Figure 8.30	Communitarianism	725
Figure 8.31	Confucianism	726
Figure 8.32	Art of War	727
Figure 8.33	Business and Management Ethos	728
Figure 8.34	Strategic Management of Manufacturing Model	730
Figure 8.35	Integrative Matrix of Generic Manufacturing Strategy in the Model of <i>FIRMS</i>	733
 <u>CHAPTER 9</u>		
Figure 9.1	Survey of End-Users in Malaysia Market	751
Figure 9.2	Survey of End-Users in the Philippines Market	753
Figure 9.3	Survey of End-Users in Indonesia Market	754
Figure 9.4	Survey of End-Users in Singapore Market	755
Figure 9.5	Survey of End-Users in Thailand Market	757
Figure 9.6	Survey of End-Users in the ASEAN Market (One Hundred and Thirty-Three Respondents)	758
Figure 9.7	End-Users' Preference for Machines by Country of Origin	761
Figure 9.8	Influence of Brands on Organizational Buying Behaviour	762
Figure 9.9	Art of War Strategy by Japanese Machine Tool Manufacturer	764

LIST OF FIGURES

		<u>PAGE</u>
Figure 9.10	Art of War Strategy by Taiwanese Machine Tool Manufacturer	766
Figure 9.11	Regional Positioning (Micro Level)	767
Figure 9.12	Regional Positioning (Macro Level)	768
Figure 9.13	Time Magazine Pan-Europe Product Image Survey	770
Figure 9.14	Consumers' Rating of Twelve Countries in the Quality League	771
Figure 9.15	Survey of the Six Machine Tool Producers	774
 <u>CHAPTER 10</u>		
Figure 10.1	Empirical Research: Phase One and Phase Two	778
Figure 10.2	Present and Future Order of Priorities of Customers' Needs	787

LIST OF ANNEXES

	<u>PAGE</u>
ANNEXES	790
ANNEX 1	791
References	797
ANNEX 2	799
ANNEX 3	801
ANNEX 4	809
ANNEX 5	814
ANNEX 6	820
ANNEX 7	827
ANNEX 8	844
ANNEX 9	857
ANNEX 10	865
ANNEX 11	866
ANNEX 12	878
ANNEX 13	894
Figure A1.1	795
Differentiation	
Figure A5.1	805
System Concept of a Manufacturing System	

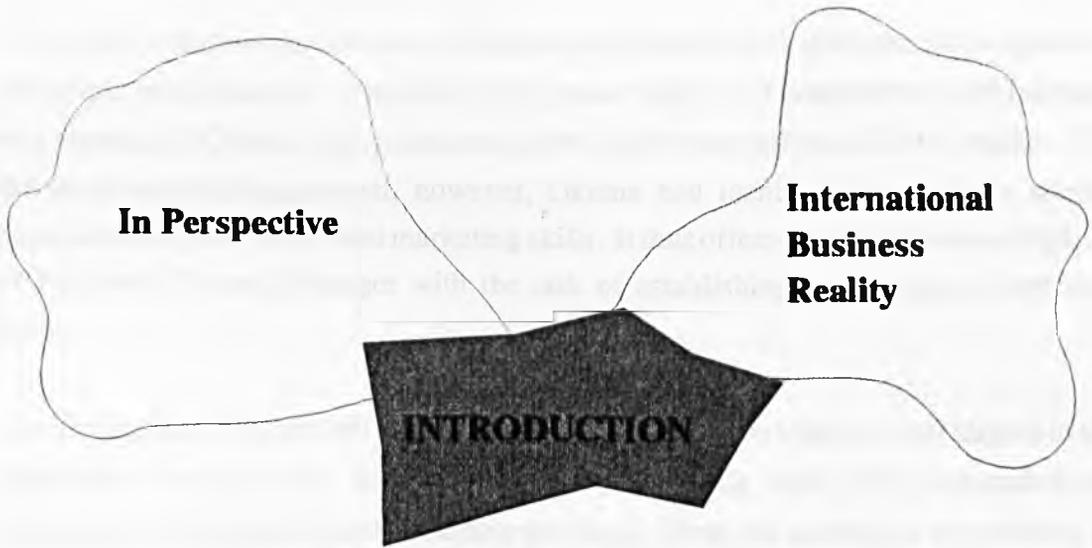
ABBREVIATIONS AND ACRONYMS

AACSB	=	American Assembly of the Collegiate School of Business
AFTA	=	ASEAN Free Trade Area
AIB	=	Academy of International Business
APEC	=	Asia-Pacific Economic Cooperation
ASEAN	=	Association of Southeast Asian Nations (Its members are: Singapore, Malaysia, Thailand, Indonesia, the Philippines, and Brunei)
CEO	=	Chief Executive Officer
CNC	=	Computerised Numerically Controlled
EAEC	=	East Asian Economic Caucus
EEA	=	European Economic Area
EFTA	=	European Free Trade Association
EIBA	=	European International Business Association
EU	=	European Union
GNP	=	Gross National Product
IB	=	International Business
IBM	=	International Business Machines
IMS	=	Intelligent Manufacturing System

LAMBDA	=	Lancaster University Marketing DataBase
Mazak	=	Yamazaki-Mazak (Headquarters in Nagoya, Japan)
MNCs	=	Multinational Corporations
MNEs	=	Multinational Enterprises
NIEs	=	Newly Industrialised Economies
NAFTA	=	North American Free Trade Area
Okuma	=	Okuma Corporation (Headquarters in Nagoya, Japan)
SEM	=	Single European Market
SIBU	=	Strathclyde International Business Unit
SMEs	=	Small- and Medium-sized Enterprises
US	=	United States (adjective)
USA	=	United States of America (noun)
UK	=	United Kingdom

CHAPTER ONE

PREFACE: SETTING THE SCENE



CHAPTER ONE

PREFACE: SETTING THE SCENE

1.1 In Perspective

In 1979, the author graduated from the former Cranfield Institute of Technology (now Cranfield University) with an MSc degree in Industrial Engineering and Production Management.

In October 1980, the 600 Group of Companies in the UK invited him to take charge of its Far East desk in Singapore. The Singapore office was responsible for the marketing and sales of all the Group's engineering products, including CNC machine tools. It was also the distributor for two leading Japanese manufacturers, Mitsui Seiki and Okuma.

By 1983, it had become obvious to Okuma that the exclusive distributorship agreement had met with limited success. It decided that a greater degree of commitment and independence was essential if Okuma were to succeed in the highly competitive ASEAN market. Through the distributorship agreement, however, Okuma had identified the author's strengths in manufacturing know-how and marketing skills. It thus offered him, in October 1983, the post of Regional General Manager with the task of establishing its Singapore Representative Office.

As the Regional General Manager, the author received from Okuma clear targets in terms of penetration levels in the ASEAN market. Achieving such goals demanded stronger conceptual abilities and clearer strategic thinking. Given his training in engineering and his qualification as a Chartered Production Engineer, he had to transcend the narrow boundaries of his academic discipline as his responsibilities moved increasingly away from technical / operational aspects to general management, marketing and sales. In recognition of this, the author enrolled as an MBA Distance Learning student with Strathclyde Graduate Business School, one of Europe's leading Business Schools (*The Economist*, 1988), and graduated after two years in November 1990, being the first Southeast Asia Strathclyde Distance Learning MBA Graduate (McArthur, 1991).

The conventional approach to manufacturing and marketing strategy has been to design, manufacture and sell by offering competitive products which satisfy customers' needs. Merely fulfilling customers' basic needs will no longer provide a source of competitiveness when

doing so leads to a sense of disappointment. Instead, more and more customers are delighted and attracted to only those companies which exceed their ever expanding expectations, because once a company achieves this it sets the benchmark by which others will be assessed in future (Vandermerwe, 1993).

Experiential marketing is thus critical, both from the company's perspective and from the customers' perception. Factor endowments may vary from country to country, but customers, once they have experienced a particular delight, use that as their benchmark irrespective of such differences.

Taking cognizance of these new realities, in November 1990, the author decided to undertake doctoral studies and enrolled with the University of Strathclyde's Department of Marketing, Strathclyde International Business Unit.

As a senior executive with Japan's leading CNC machine tool builder, the author has a vested interest in ensuring the prolonged success of his corporation. Sustained prosperity demands not only close attention to domestic rivals, but increasingly to competitors emerging from the NIEs, including Korea and Taiwan (McDermott and Young, 1989; McDermott, 1991a; 1991b). Thus, he has chosen as his doctoral dissertation topic, "Comparative Study of International Marketing Strategy of Japanese and Taiwanese CNC Machine Tool Industry in the ASEAN Region". (Whilst Korean machine tool industry is a threat to be reckoned with, the Japanese perceive the Taiwanese industry as posing the main threat because of its longer history and ability to offer quality with low cost. In 1991, Taiwan's machine tool industry ranked ninth in the world; Korea's industry ranked twelfth).

1.2 International Business Reality

In tracing the historical development of international business, both as a form of human endeavour and as an evolving academic discipline, there is a definite gap in theory and in practice. The building of elegant, abstract models in traditional academia is in sharp contrast to the messy reality of international business, which is real, live, immediate, dynamic, responsive to any inkling of change in the environment (Syrett, 1993). Thorelli (1990) stressed the fact that the international business environment is in constant flux and the company has to continually react, interact, and proact for the sake of survival. Generally, the academic community with its unidisciplinary approach lagged behind this reality; a difficult reality which has to take into account the micro (ie company) level and the macro (ie national) level

of operations in the modus operandi of the practitioners; a difficult reality compounded by regional and global developments (eg Gulf War, end of the Cold War). Often, realities do not and cannot fit neatly into models and paradigms, which are based on abstract categories. Reality is far more complex and messy than many of the grander themes and explanations tend to suggest (Dicken, 1992). Inputs by practitioners are thus necessary to examine, revise and develop theoretical models in international business to bring some sense to the chaos.

International marketing is a key function in international business. Despite growing interest in international marketing, both theoretical and empirical research endeavours have lacked considerably compared to domestic marketing research (Kaynak, 1984). Export and comparative marketing are two critical areas which are much neglected in research and writing. Thus, these two crucial areas are the focus of the author's research interests in the international marketing of CNC machine tool business.

Japan understands the importance of manufacturing in creating value added products (their only viable export) and producing national wealth. Manufacturing is vital to the principle of comparative advantage to gain that competitive edge, ie exporting what it is good at making and importing what it is less good at making. In other words, **Competitive Advantage = Comparative Advantage + Value Added**. Further, Porter (1993) affirmed that being competitive today is all about innovation and productivity. The most competitive nation and company is the one that innovates, not just in technology in the narrow scientific sense but also in ways of marketing, product positioning, providing service and so on. (See Table 1-1 and Annex 1).

In the eighteenth century, trade was a complementary partnership in which countries sold each other items that the buyers could not produce. The mid-nineteenth century brought a shift to competitive trade, aimed at creating a customer. Today, we have adversary trade, aimed at dominating an industry. The business strategist thus has to seek the right balance among five forces: customers, competitors, fixed costs, currency, and country. Information technology makes national boundaries increasingly irrelevant and makes the consumers the kings of today's borderless world as they know exactly what they want and what they can expect from products (Ohmae, 1990). In order to maintain the competitive costs of products, parts are sourced on a global basis. Therefore, the country of origin has become of secondary importance. What customers care about most is the product's quality, price, design, value, and appeal. This is equally true for industrial products¹. Export-based strategy on a worldwide

TABLE 1-1 RELATIONSHIPS OF COMPARATIVE ADVANTAGE, VALUE ADDED, AND COMPETITIVE ADVANTAGE

Industry	Country	Comparative Advantage (Economic Success)	Value Added (Marketing Success)	Competitive Advantage (Business Success)
Machine Tools	Japan	. Manpower (skilled labour) . Methods (technology intensive, productivity)	. Features (quality) . Convenience (service)	. Segmentation (differentiation)
	Taiwan	. Materials (castings) . Manpower (low wage)	. Convenience (delivery speed, service)	. Segmentation (cost leadership)
	USA	. Methods (technology intensive) . Money (lower exchange rate)	. Performance (process capability)	. Differentiation
	Germany	. Methods (technology intensive)	. Performance (process capability) . Convenience (service)	. Differentiation
Automobiles	Japan	. Machines (capital intensive) . Methods (technology intensive, productivity)	. Features (quality) . Performance (reliability)	. Segmentation (cost leadership)
	South Korea	. Manpower (labour intensive, low wage)	. Convenience (delivery speed)	. Segmentation (cost leadership)
	USA	. Methods (technology intensive) . Money (lower exchange rate)	. Features (luxury) . Performance (speed)	. Differentiation
	Germany	. Machines (capital intensive) . Methods (technology intensive)	. Features (quality) . Performance (reliability, safety, speed)	. Differentiation
Computers	Japan	. Methods (technology intensive) . Materials (large-scale integrated circuits, integrated circuits)	. Performance (reliability) . Convenience (delivery speed)	. Segmentation (differentiation)
	Taiwan	. Manpower (labour intensive, low wage, skilled labour) . Materials (integrated circuits)	. Performance (reliability) . Convenience (delivery speed)	. Segmentation (cost leadership)
	USA	. Methods (technology intensive) . Manpower (skilled labour) . Money (lower exchange rate)	. Features (quality, flexibility) . Performance (state-of-the-art hardware, software superiority)	. Differentiation
	Germany	. Methods (technology intensive) . Manpower (skilled labour)	. Performance (reliability) . Convenience (user friendly, tailor-made software)	. Segmentation (differentiation)
Consumer Electronics (Camera, TV, Hi-Fi, Calculators)	Japan	. Manpower (skilled labour) . Methods (technology intensive, productivity)	. Features (quality, state-of-the-art product, product variety) . Performance (reliability)	. Segmentation (cost-leadership)
	Taiwan	. Manpower (labour intensive, low wage)	. Convenience (delivery speed)	. Segmentation (cost leadership)
	USA	. Methods (technology intensive) . Money (lower exchange rate)	. Features (quality, brand name) . Performance (durability)	. Segmentation (differentiation)
	Germany	. Methods (technology intensive) . Manpower (skilled labour)	. Features (quality, brand name) . Performance (reliability)	. Segmentation (differentiation)
	Korea	. Manpower (labour intensive, low wage)	. Convenience (delivery speed)	. Segmentation (cost leadership)

Footnote : See Annex 1 for elaboration on the concepts of Comparative Advantage, Value Added, and Competitive Advantage.

Source: Author

basis may, indeed, become more important in the future in some industries, as business success stems from international sourcing and manufacturing flexibility combined with close customer contacts for marketing, sales and service. In a world where more and more products and services are created by cross-national teams, joint ventures, partnerships, and through foreign subsidiaries, the competitive edge goes to those who can turn cultural differences into economic advantages (Hampden-Turner and Trompenaars, 1993).

¹
Footnote: For example, Yamazaki-Mazak has extensive export operations. It has manufacturing facilities in the UK, USA, Japan and China. In the past, it only manufactured for distribution within the respective national boundary. Now, this insular mode of operations is outdated as customers have full access to the best and cheapest goods available, regardless of where they happened to be made. Customers will exert their option to buy from any Mazak manufacturing centre as long as the purchase price provides best value for money. This is made possible by low transportation costs and the facility to trade in a number of foreign currencies to alleviate the effect of foreign exchange fluctuations. Every manufacturing centre is export-oriented to meet the challenge (*Financial Times*, December 3, 1993).

Another area of concern in international marketing is the apparent communications gap between the buyers and the sellers, manufacturers and agents/distributors (Young, 1990). In most cases, each party uses its own frame of reference without striving toward commonalities in communication. Also, few studies have been undertaken on the behavioural problems in exporter-importer relationships, although the management of international channels is accepted as being difficult because of "psychic distance" (Vahlne and Wiedersheim-Paul, 1977). As an initial step, studies on comparative marketing could place such difficulty in its proper perspective. Thus, in his investigation of export marketing of CNC machine tools, the author uses a comparative approach to identify similarities or differences across similar industrial sectors, among companies of different sizes and within the regional context.

This comparison makes it possible to identify similarities and differences in relationships, in patterns, or in causes and effects (Jeannet and Hennessey, 1992). By carrying out comparative analysis of different countries, the company should be able to develop a market intelligence system. The development of an effective market intelligence system could be a competitive advantage of the international company, as it has been for the Japanese Trading Companies (Terpstra and Sarathy, 1994). If world trade is to survive and flourish, we all need to know more about the differences in marketing globally rather than the similarities (Joynt, 1993).

According to Cundiff and Hilger (1989) and Kaynak (1991), the marketing principles, concepts and techniques for domestic or international marketing are universal. They agreed that despite great similarities between domestic and international marketing, there are also areas where there may be acute differences between the domestic and international markets. The areas where these differences exist are generally more pronounced in the socio-economic, cultural and legal political environments (Czinkota and Ronkainen, 1993). It is this differential of environment that distinguishes international marketing from domestic marketing (Cateora, 1993; Usunier, 1993). These environments contain certain conditions that limit the scope of activity, shape the operating decisions and affect the organisational structure of the international marketing company. For effective marketing strategy preparation for international markets, decision makers need to study various aspects of these environmental variables and make proper adaptation to them. In the same vein, Fubara (1991) stated that the unique dimensions of international marketing are that they involve responding to both "controllables" and "uncontrollables" in the various countries of operation and one can imagine

that these factors could not be the same in all countries. Among other things, the characteristics peculiar to each national market would be different, politically, culturally and otherwise.

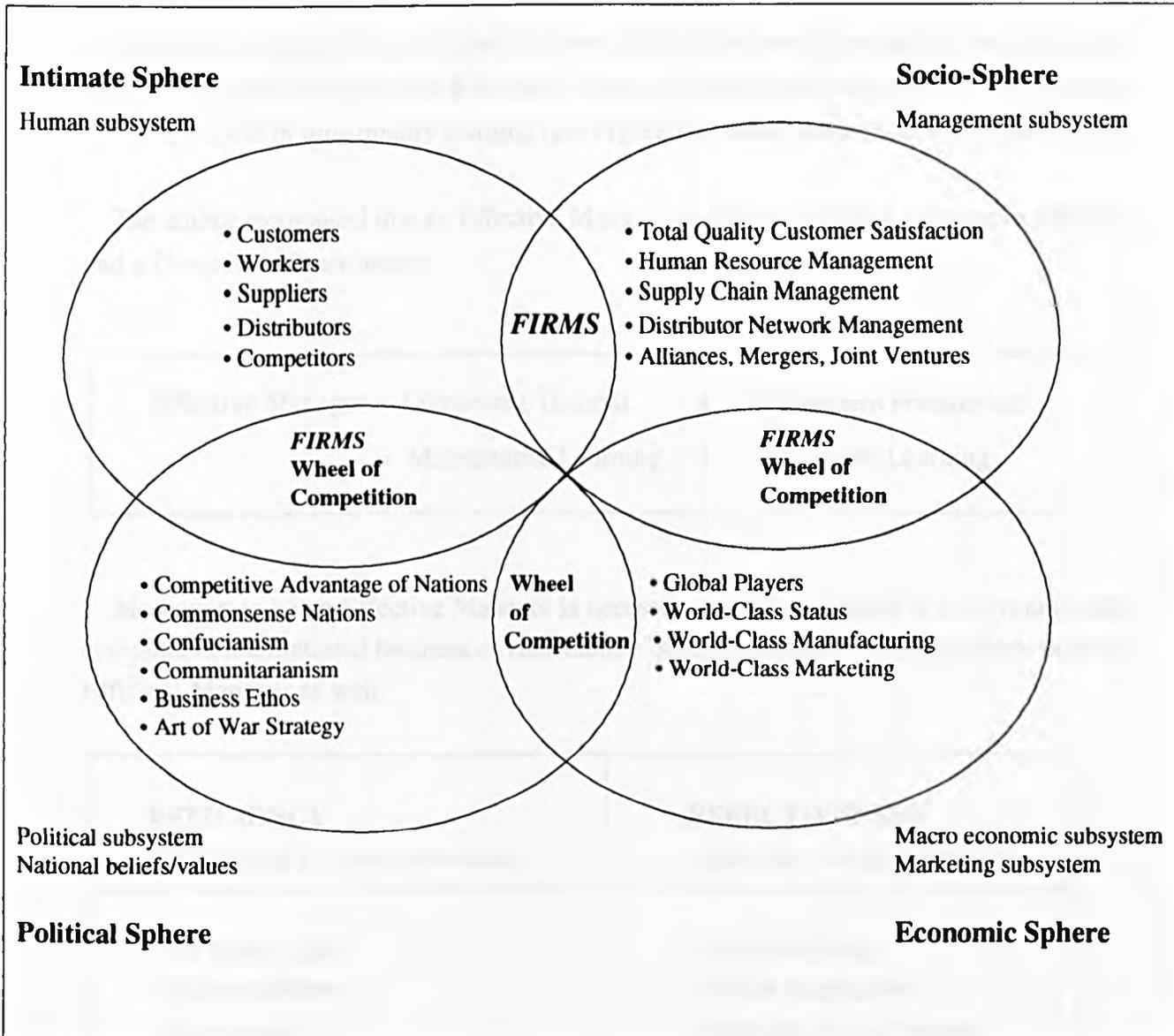
So far, comparative marketing analysis in the machine tool industry has focused on the USA (Collis, 1988; Holland, 1989) and Europe (Rendeiro, 1985; Young and Dunlop, 1992). There are no works done on comparative analysis of international marketing strategy of CNC machine tool manufacturers in the ASEAN region. As part of a total business system, marketing must be viewed as a subsystem of the total societal system. As part of the total societal system, business acts and interacts, influences and is influenced by forces within the larger context of the nation (Kaynak and Savitt, 1984). See Figure 1.1 which delineates the areas of investigation in this dissertation. An overview of the "Wheel of Competition of Asian Producers in the CNC Machine Tool Industry" and the model of "Flexible Intelligent Relationship Management Strategy" (*FIRMS*) is in Chapter 2.

1.3 Summary

As a practitioner, the author has a vested interest in international business, in particular, competition in international marketing in the specific areas of export marketing and comparative marketing. Also, experience has reinforced his original belief that marketing and manufacturing of industrial products are two wheels of a bicycle working in tandem towards total customer satisfaction for that competitive edge. Information technology serves as the chain to the two wheels which is imperative to achieve world-class status. His ultimate contribution is in the development of a *Total Quality Business Paradigm* to achieve and sustain that elusive competitive edge. A purely technology-driven strategy is unlikely to result in corporate success (Newby, 1993). A profile of the successful entrepreneur (*POSE*) is the ability to develop an imaginative combination of technical and market possibilities; corporate strategies should be neither wholly technology or market-driven but achieve a balance between the two (Copper, 1985; Roberts, 1991; Rothwell, 1992; Berry, 1993).

Practitioners must accept a continual learning mode because new markets pose new challenges and risks that cannot be fully met with old knowledge and expertise. Businessmen cannot and should not extrapolate from current trends and conditions in their planning for the future. Marketing competence is indeed dynamic (Kaynak, 1991). In reality, the analytical job of zeroing in on superior strategies is that of the practitioner as much as of the theorist (Thorelli, 1990). For synergy, you need both the doer and the thinker. It is simplifying the problem too much to say that the education authorities will deal with the theory and industry

FIGURE 1.1 INTERACTION OF DIFFERENT SUBSYSTEMS IN THE NATION



Source: Author

with the practice. That, in theory, might be an administrative formula. But, in fact, each side of the programme is woven into the other.

Academic studies can be and should be cross-fertilized by new ideas gelled from action and experience-based learning in the workplace. Hence, the author addresses the five "W", and one "H" of the cycle of total quality learning (see Figure 1.2) in his pursuit of the doctoral degree.

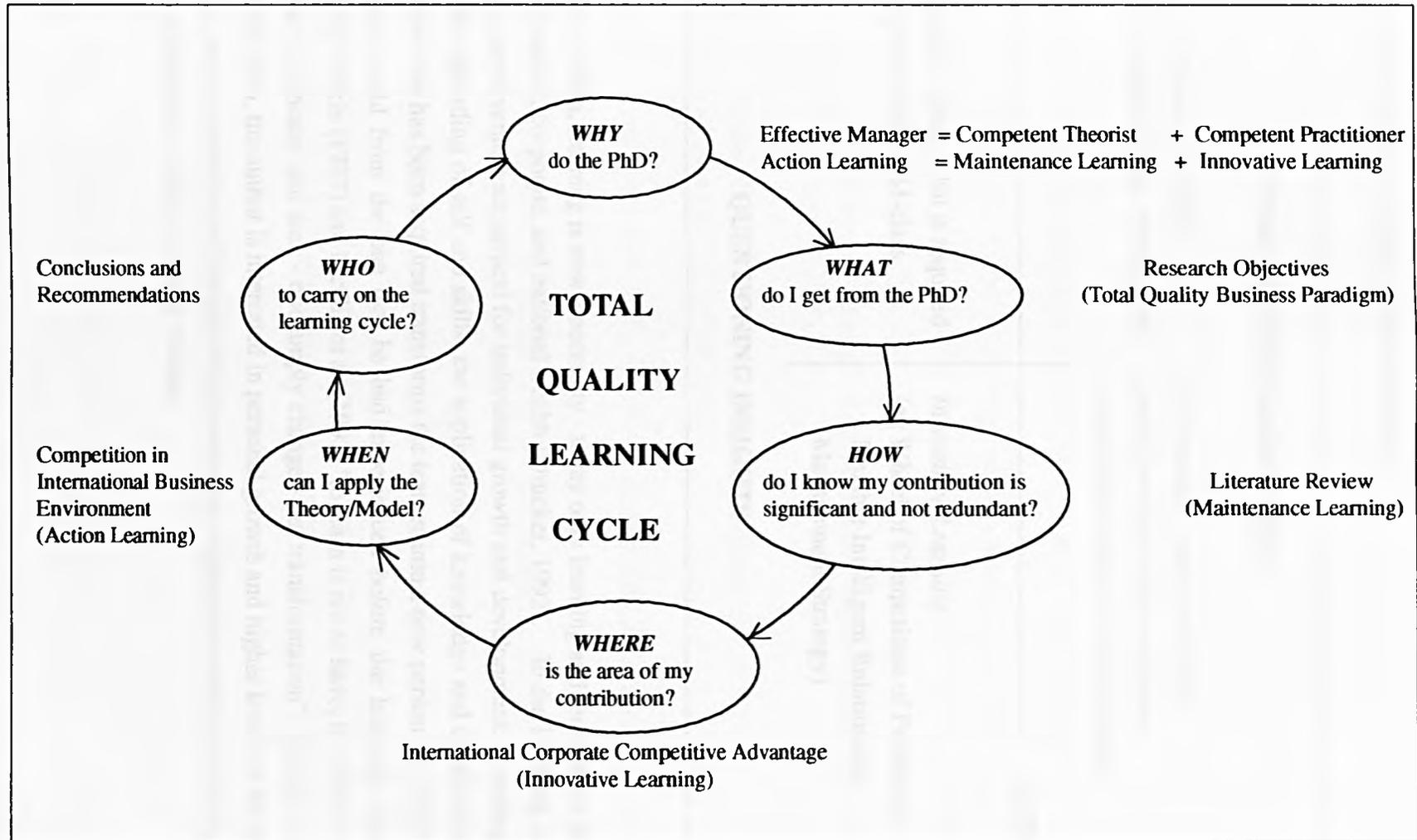
The author recognised that an Effective Manager needs to be both a *Competent Theorist* and a *Competent Practitioner*:

<p>Effective Manager = Competent Theorist + Competent Practitioner = Maintenance Learning + Innovative Learning</p>
--

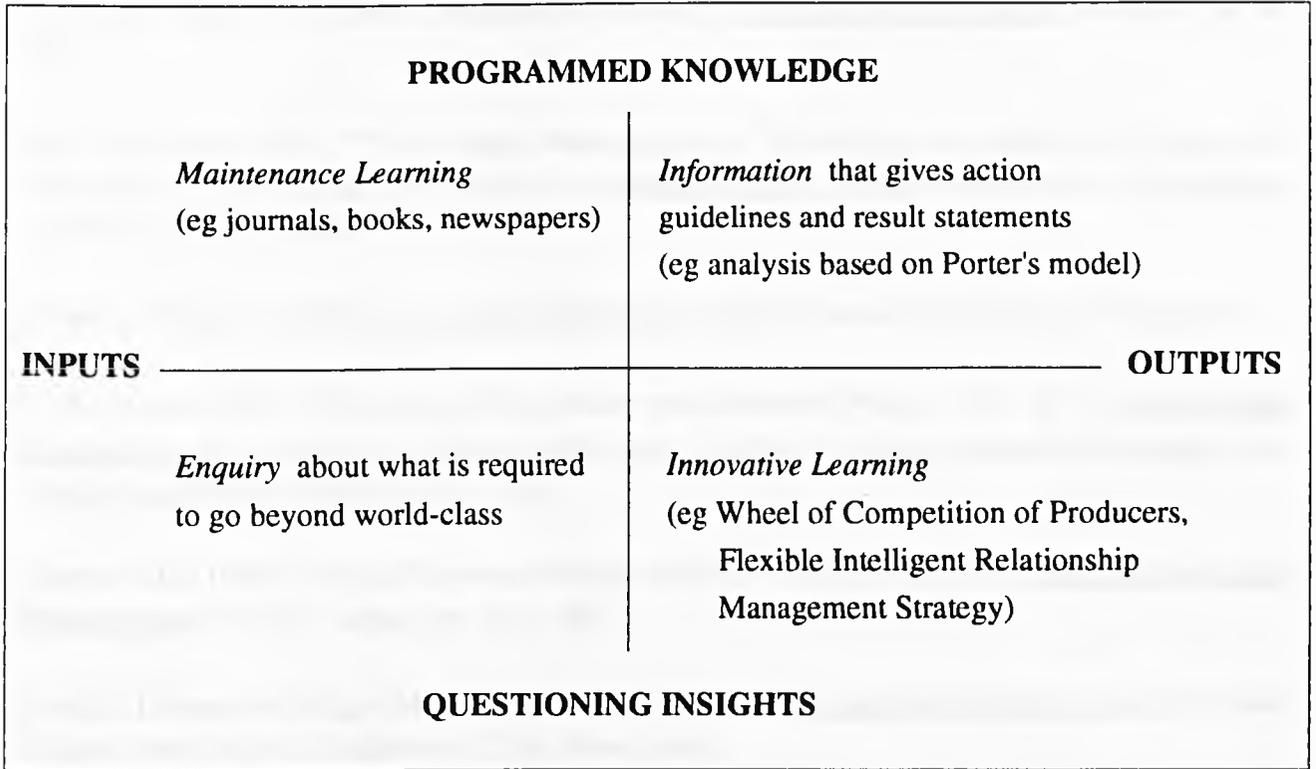
Moreover, to be an Effective Manager is necessary but not sufficient in the dynamic and competitive international business environment. Thus, the Effective Manager needs to be an Efficient Manager as well:

EFFICIENCY <i>(MANAGER : Activity-Oriented)</i>	EFFECTIVENESS <i>(LEADER : Goal-Oriented)</i>
<ul style="list-style-type: none"> • Do things right • Solve problems • Save means • Fulfil duties • Reduce costs 	<ul style="list-style-type: none"> • Do right things • Create alternatives • Make the best of means • Get results • Increase profits

FIGURE 1.2 CYCLE OF TOTAL QUALITY LEARNING



The author's learning process is depicted below:



Once an option, learning is now a necessity - today only learning and knowledge hold the keys to personal, corporate, and national wealth (Drucker, 1992). In the learning context, action and involvement are critical for individual growth and development. Learning must lead to the upgrading of self and skills, the application of knowledge and experience. The information that has been acquired transforms the learner into a new person (he experiences a different world from the one that he had experienced before the learning occurred). According to Akin (1987) and McGill et al. (1992) "to learn is not to have, it is to be" and "it is to accept, embrace, and seek - not simply change - but transformation". Finally, like the *Humanistic Man*, the author is interested in personal growth and higher levels of awareness, so that he can now move beyond simple critical analysis to wholesome synthesis for intelligent problem solving and quality decision making.

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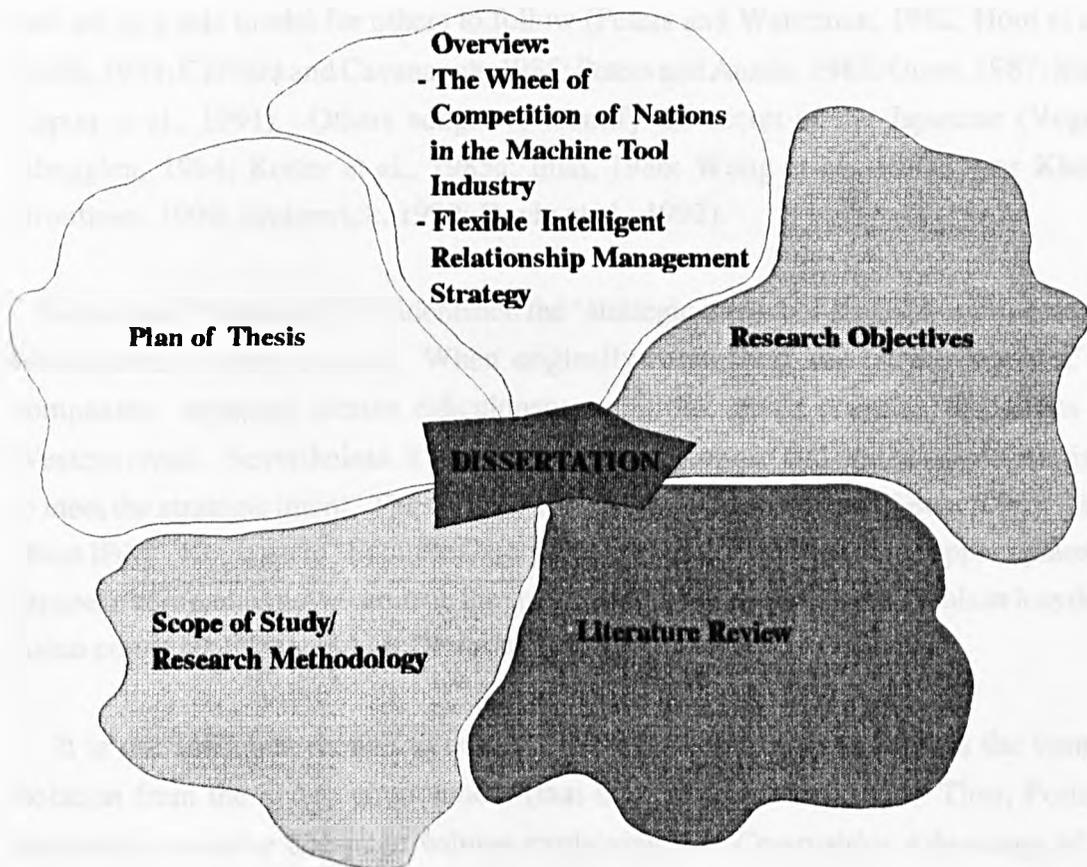
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CHAPTER TWO

OVERVIEW:

BACKGROUND, RESEARCH OBJECTIVES, AND PLAN OF THESIS



CHAPTER TWO

OVERVIEW: BACKGROUND, RESEARCH OBJECTIVES, AND PLAN OF THESIS

2.1 A Comparative Study of International Marketing Strategy of Japanese and Taiwanese CNC Machine Tool Industry in the ASEAN Region

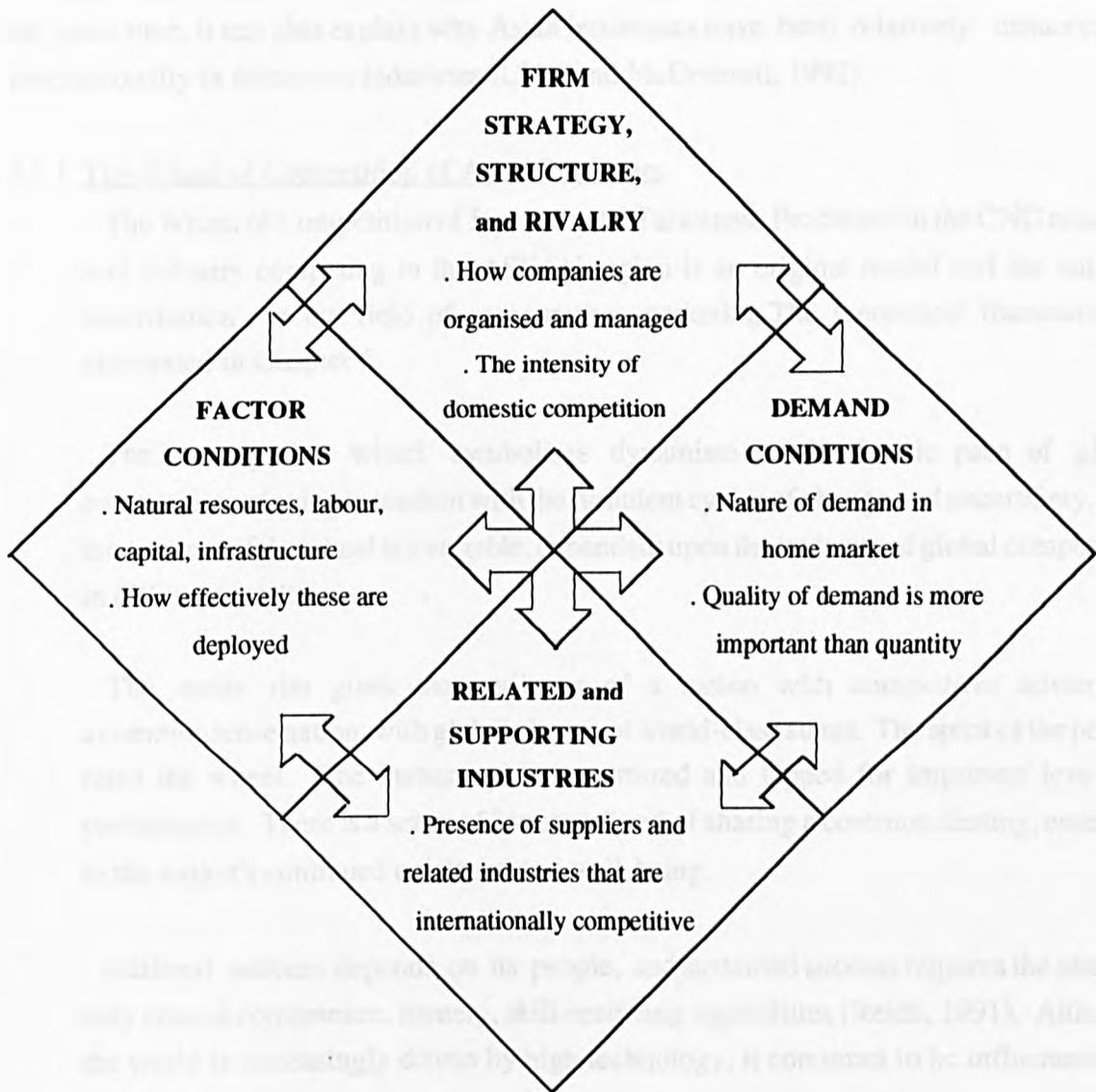
By the early 1980s, it had become clear in several basic global industries such as automobiles, chemicals, electronics, machine tools, steels, and textiles, that Japanese companies were rapidly winning market share at the expense of the once dominant Western multinationals. The initial response of academics was to focus on the micro level, the company itself and its functional and strategic management. Some scholars chose to focus on US companies arguing that with their "excellence" they could withstand the Japanese onslaught, and act as a role model for others to follow (Peters and Waterman, 1982; Hout et al., 1982; Buffa, 1984; Clifford and Cavanaugh, 1985; Peters and Austin, 1985; Gunn, 1987; Starr, 1988; Capon et al., 1991). Others sought to identify the secret of the Japanese (Vogel, 1979; Abegglen, 1984; Kotler et al., 1985a; Imai, 1986; Wong et al., 1986; Amr Kheir, 1990; Brouthers, 1990; Enderwick, 1990; Doyle et al., 1992).

Hamel and Prahalad (1989) identified the "strategic intent" of Japanese companies as being fundamental to their success. When originally formulated, the "strategic intent" of these companies appeared almost ridiculously ambitious, given resource disparities between Western rivals. Nevertheless, it provided clarity of purpose and united employees in a desire to meet the strategic intent. Thus, Canon devised a strategic intent to "Beat Xerox", Fujitsu to "Beat IBM", Komatsu to "Encircle Caterpillar". Today, such objectives appear plausible, and Japanese companies now feature in the strategic intent of much smaller rivals in less developed Asian countries (Chan and McDermott, 1992).

It is not sufficient though to consider the micro environment (that is the company) in isolation from the macro environment (that is the national industry). Thus, Porter (1990) produced a massive 855-page volume explaining *The Competitive Advantage of Nations*. Porter concluded that irrespective of country or industry, the determinants of national competitive advantage are company strategy; structure and rivalry; factor conditions; demand conditions; and related and supporting industries (see Figure 2.1).

Ultimately, international business has to be understood in the context of environmental forces (at both industry and societal levels) as well as strategic, organisational and managerial factors (at both the company and intra-company levels)(Bartlett and Ghoshal, 1991).

FIGURE 2.1 **DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE**



THE "DIAMOND"

Footnote: Nations are most likely to succeed in industries where the diamond - a dynamic system made up of four determinants above - is the most favourable

Source: Adapted from Porter, Michael E. (1990), The Competitive Advantage of Nations. The Free Press, New York.

Figure 2.2 gives a conceptual structure developed by the author and attempts to analyse the critical success factors underlying the performance of Japan's and Taiwan's machine tool industry. The manufacturing strategy and marketing strategy are forged within the peculiar Asian socio-cultural milieu. This gives the approach a broader base from which to tackle the explanation and prediction of the key phenomena of the Japanese and Taiwanese economy. At the same time, it can also explain why Asian businesses have been relatively unsuccessful internationally in numerous industries (Chan and McDermott, 1992).

2.1.1 The Wheel of Competition of Asian Producers

The Wheel of Competition of Japanese and Taiwanese Producers in the CNC machine tool industry competing in the ASEAN region is an original model and the author's contribution to the field of comparative marketing. The theoretical framework is elaborated in Chapter 5.

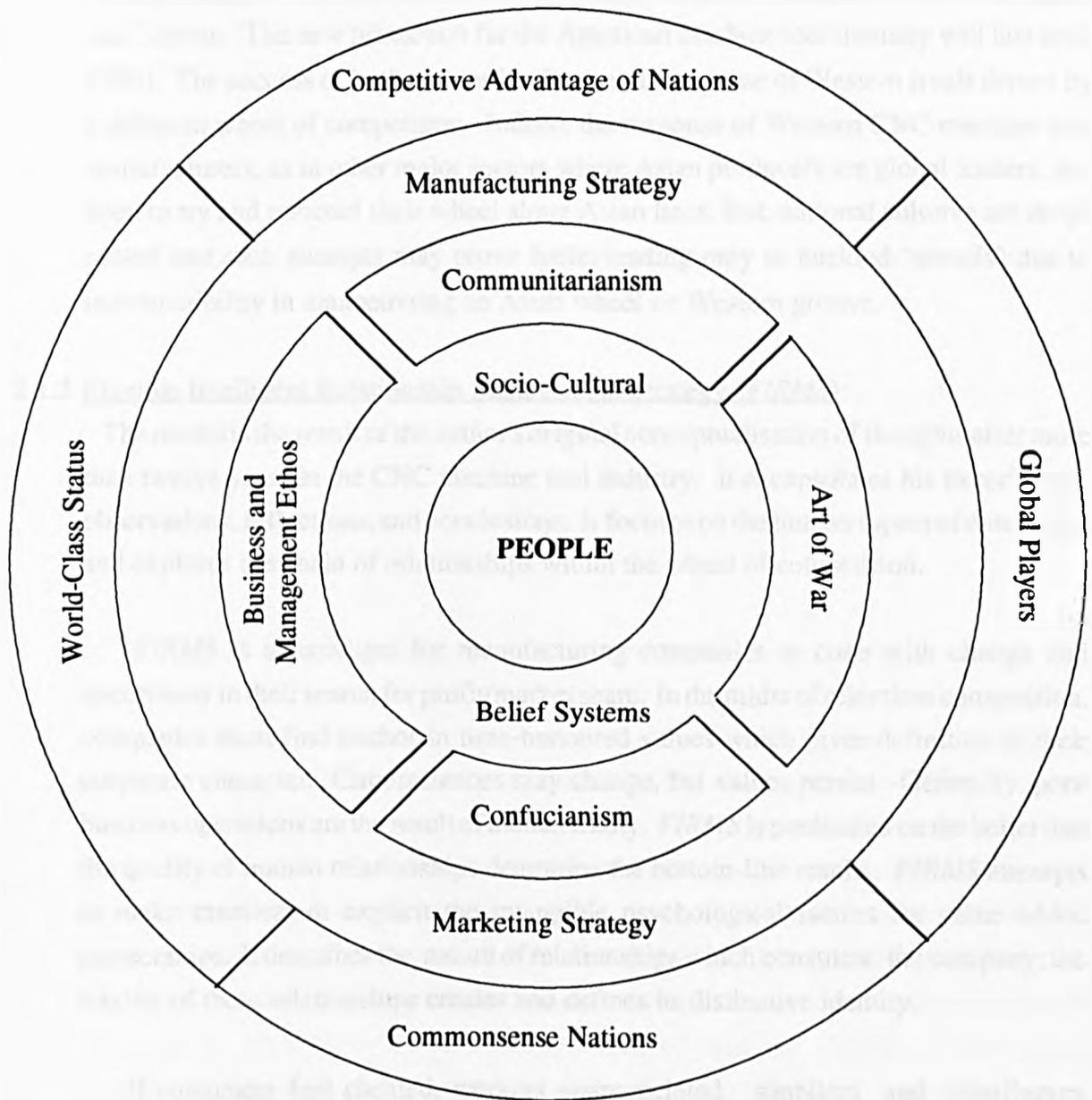
The ever-spinning wheel symbolises dynamism in the frantic pace of global competition, moving in tandem with the turbulent cycles of change and uncertainty. The momentum of the wheel is a variable, dependent upon the intensity of global competition in different markets.

The outer rim gives the attributes of a nation with competitive advantage, a commonsense nation, with global players of world-class status. The spirit of the people turns the wheel. The human spirit is nurtured and tapped for improved levels of performance. There is a sense of "oneness" and of sharing a common destiny, essential to the nation's continued existence and well-being.

National success depends on its people, and sustained success requires the one and only crucial competence, namely, skill-renewing capabilities (Reich, 1991). Although the world is increasingly driven by high technology, it continues to be influenced and managed by high spirits - by human drive, emotions, and energy, which in turn are rooted in socio-cultural belief systems. Finally, the interface between manufacturing strategy and marketing strategy propels the wheel in a common direction. The wheel serves as a framework for explaining the global success of Japanese and Taiwanese CNC machine tool manufacturers.

In the early 1980s, Japanese producers established themselves as the industry leaders

FIGURE 2.2 **THE WHEEL OF COMPETITION OF ASIAN PRODUCERS IN THE CNC MACHINE TOOL INDUSTRY IN ASEAN REGION**



Source: Author

and they have since retained their dominant position. By the end of the decade, Taiwan ranked as the world's ninth largest CNC machine tool producer. (The US's 1986 tool restrictions retained the five-year caps on imports from Japan and Taiwan to the USA. President Bush ordered continued restrictions on imports of machine tools from Japan and Taiwan. The new protection for the American machine tool industry will last until 1994). The success of both nations has been at the expense of Western rivals driven by a different wheel of competition. Indeed, the response of Western CNC machine tool manufacturers, as in other major sectors where Asian producers are global leaders, has been to try and remodel their wheel along Asian lines. But, national cultures are deep-rooted and such attempts may prove futile, leading only to buckled "wheels" due to incompatibility in manoeuvring an Asian wheel on Western groove.

2.1.2 Flexible Intelligent Relationship Management Strategy (FIRMS)

The model is the result of the author's original conceptualisation of thoughts after more than twelve years in the CNC machine tool industry. It encapsulates his experiences, observations, reflections, and conclusions. It focuses on the human aspect of enterprise, and explores the chain of relationships within the wheel of competition.

FIRMS is a paradigm for manufacturing companies to cope with change and uncertainty in their search for profit/market share. In the midst of relentless competition, companies must find anchor in time-honoured values which gives definition to their corporate character. Circumstances may change, but values persist. Generally, poor business operations are the result of human frailty. *FIRMS* is predicated on the belief that the quality of human relationships determine the bottom-line results. *FIRMS* attempts to make manifest or explicit the intangible psychological factors for value added partnerships. It describes the nature of relationships which constitute the company; the totality of these relationships creates and defines its distinctive identity.

If customers feel cheated, workers unappreciated, suppliers and distributors exploited, and competitors suffer from perceived unfair competition, then the foundation of business is not built on solid grounds. *FIRMS* is based on five goals of mutually acceptable (Win-Win) relationships for profit/market share, ie customers get value for money, workers' hierarchy of needs are satisfied, suppliers and distributors have reliable and expanding business, and competitors have the motivation to benchmark and strive for business excellence. The principle of the positive sum game explains why *FIRMS*

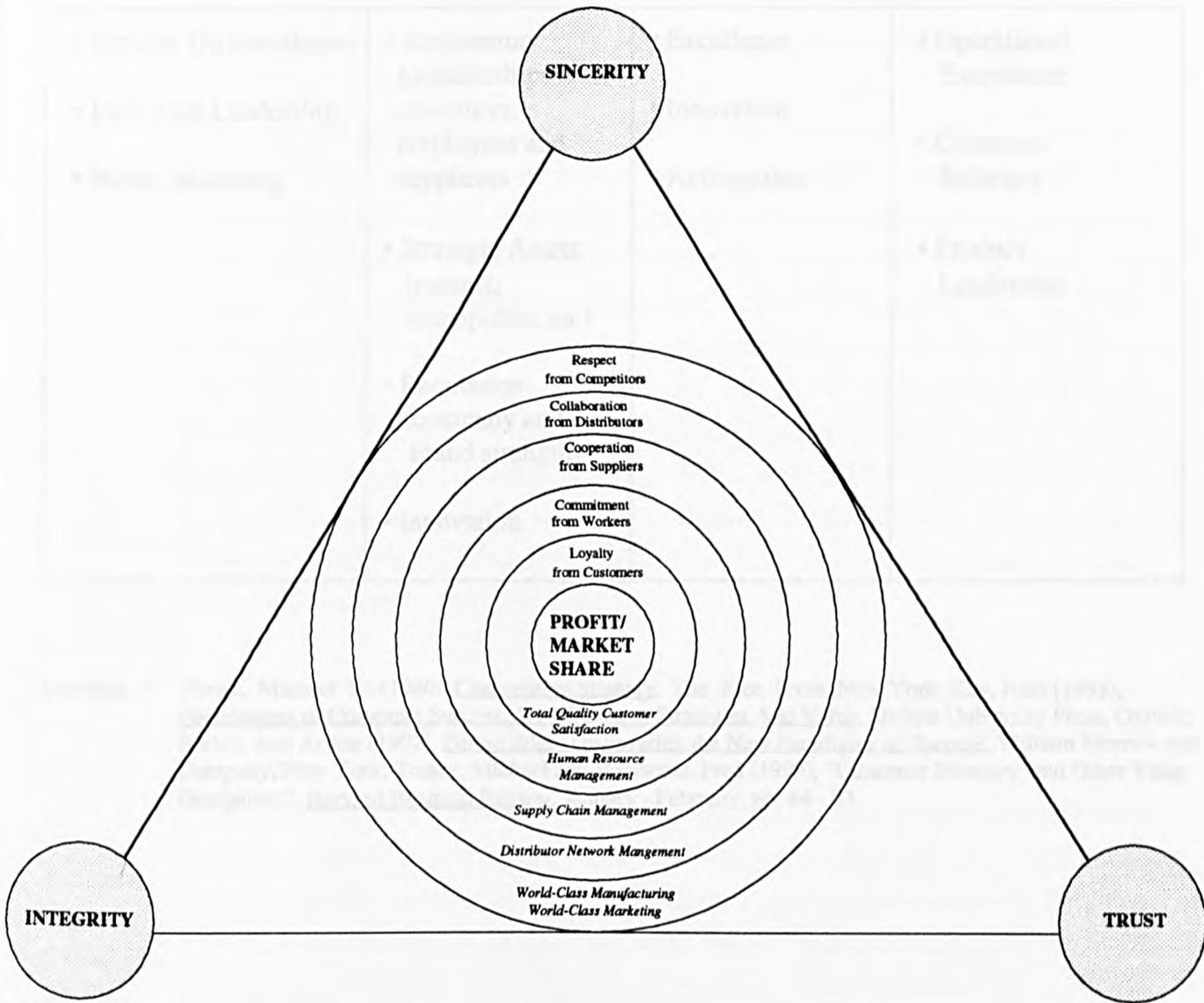
is a Win-Win situation from which all parties obtain substantial benefits. A conceptual model of *FIRMS* is shown in Figure 2.3. Its concerns and aims are as follows:

CONCERNS	AIMS	GOALS
Value for Money	Right Focus	Goal 1 : Loyalty from Customers
Meeting Hierarchy of Needs	Right Attitude	Goal 2 : Commitment from Workers
Expanding and Reliable Business	Right Connections	Goal 3 : Cooperation from Suppliers
Expanding and Reliable Business	Right Channels	Goal 4 : Collaboration from Distributors
Setting Standards for Business Excellence	Right Strategies	Goal 5 : Respect from Competitors

The motivation of *FIRMS* is to create values for *all* stakeholders. It is an holistic, people-oriented approach because it recognises that although the world is driven increasingly by high technology, it continues to be influenced and managed by high spirits of the people (customers, workers, suppliers, distributors, competitors). The philosophical core of *FIRMS* is action learning and teamworking based on sincerity, integrity, and trust in inter-personal relationships, or, as Covey (1991) called it, the "Principle-Centered Relationships". In the real world, these are the roots of success in relationships reflected in the bottom-line results of business. *FIRMS, in essence, is Relationship Management for synergy.* To quote Drucker (1993), "You have to develop relationships and partnerships. You cannot operate by command. People have to work together." See Table 2-1 on today's winning business strategies.

The company is a set of relationships between its various stakeholders - customers, workers, suppliers, distributors, and even competitors. It adds value through the distinctive character of the relationship it establishes and which gives the company a

FIGURE 2.3 ARCHITECTURE OF WIN-WIN RELATIONSHIPS FOR BUSINESS SUCCESS



Model of Flexible Intelligent Relationship Management Strategy (*FIRMS*)

Source: Author

TABLE 2-1 EXAMPLES OF SOME RECENT WINNING BUSINESS STRATEGIES

Michael Porter *	John Kay *	Joel Arthur Barker *	Treacy & Wiersema *
<ul style="list-style-type: none"> • Product Differentiation • Low Cost Leadership • Niche Marketing 	<ul style="list-style-type: none"> • Architecture (relationships with customers, employees and suppliers) • Strategic Assets (patents, monopolies, etc) • Reputation (company and brand strength) • Innovation 	<ul style="list-style-type: none"> • Excellence • Innovation • Anticipation 	<ul style="list-style-type: none"> • Operational Excellence • Customer Intimacy • Product Leadership

Footnote : * Porter, Michael E. (1980). Competitive Strategy. The Free Press, New York; Kay, John (1993), Foundations of Corporate Success: How Business Strategies Add Value. Oxford University Press, Oxford; Barker, Joel Arthur (1992), Future Edge: Discovering the New Paradigms of Success. William Morrow and Company, New York; Treacy, Michael and Wiersema, Fred (1993), "Customer Intimacy and Other Value Disciplines", Harvard Business Review. January - February, pp. 84 - 93.

Source: Kotler, Philip (1994), "Winning Through Value-Oriented Marketing", Seminar held at Dynasty Hotel organised by the Marketing Institute of Singapore. January 28, pp. 4.

distinctive capability - something it can do which its competitors cannot copy. In identifying the foundations for corporate success, Kay (1993) recognised that outstanding businesses derive their strength from a distinctive structure of relationships with employees, customers, and suppliers; and continuity and stability in these relationships is essential for a flexible and cooperative response to change.

The *FIRMS* paradigm is in stark contrast to Porter's (1980) model of competitive strategy (five forces) which reinforces the view that business is a zero-sum game, eg it portrays buyers and suppliers as hostile groups caught in adversarial relationship with Win-Lose outcome. *FIRMS* believes in relationship management, eg buyers and suppliers are in complementary relationships within the extended family network (relationship marketing). This makes possible strategic alliances (competitive cooperation) instead of mergers and acquisitions. As Kefalas (1990) pointed out, "Porternomics" preached the improvement of one's own performance at the erosion of one's competitors, but this is an unhealthy business philosophy. The alternative to the competitive zero-sum strategy is found in the model of Perlmutter and Heenan (1986) which calls for collaborative strategic partnerships in which the tension between cooperation and competition is balanced.

FIRMS is a dynamic, living, and heuristic-learning model. (This model is expounded in Chapter 6). There is intelligence in the corporate strategy because it applies commonsense, wisdom, creative systems thinking and synergy to ensure longevity in corporate life for sustainable competitive advantage. *FIRMS* attempts to balance Porter's concerns about the economic development of nations, the development of individual company and the national economy, innovation and wealth creation with the inner dynamics of development of the individuals and the organizations, the process of learning and individualization within the Asian socio-cultural context.

2.1.3 Reasons for Success

Given the geographical proximity and historical associations between Japan and Taiwan, it is hardly surprising that the two countries share similar cultural and ideological values, which in turn have been shaped by each nation's physical environment.

Many leading entrepreneurs in Japan and Taiwan, not to mention others in Asia, like

Hong Kong and South Korea, founded and managed businesses that became world-class despite having very limited formal education. According to Richardson (1992), their management style is based on commonsense, and growth comes from natural momentum and intuition. Western companies suffer from "paralysis by analysis" as they ritually resort to sophisticated, time-consuming management tools to reach decisions taken quickly by Asian counterparts using commonsense (Chan, 1991a; 1991b).

To Naisbitt and Aburdene (1990), we live in an age of analysis, in a world where events and ideas are analysed to the point of lifelessness. De Bono (1990) recognised that all institutes of education, especially at the higher level, put almost all the intellectual emphasis on analysis. Analysis is essential but inadequate in that it fails to recognise cultural conditioning which may prevent either acknowledgement of the root problem and solution, or alternatively, implementation of the measures necessary to correct the problem. It is necessary to remove either the problem or minimise its impact. The management literature recognises this in selected areas such as the divestment decision (Boddewyn, 1983; McDermott, 1989), but further research is required to address not just barriers to exit, but barriers in other key decision making processes (Smith et al., 1992). In either case, analytical thinking needs to be supplemented by creative thinking and sensitivity to the culture and values of the organisation, and *all* its stakeholders (ie shareholders, customers, suppliers and employees). This is especially true in an international business context (Flood and Jackson, 1991).

2.2 Research Objectives

Responding to the critique by Boddewyn (1981) [for more works on *comparative marketing*], by Albaum/Peterson (1984) [for a *multidisciplinary approach*], by Dunning (1989), Bartlett and Ghoshal (1991) [for a *multilevel theory*], and by Katsikeas/Piercy (1991) [for even more *innovative approaches*], the following research objectives have been pursued:

1. To explore and link concepts like "World-Class Status", "Competitive Advantage of Nations", "Commonsense Nations", and "Global Players" as propounded by academics/practitioners and as exemplified by Japan and Taiwan.
2. To explore the Wheel of Competition of Asian Producers and the Model of *FIRMS* in the success of CNC machine tool business to go beyond world-class status.

3. To identify the critical success factors as subscribed and applied by the Japanese and Taiwanese contributing to their conquest of the ASEAN market.
4. To identify common values and practices in the socio-cultural belief systems which are the driving forces behind the Japanese and Taiwanese competitiveness in the machine tool industry in the ASEAN market.

The historic rate at which Japan's and Taiwan's CNC machine tool industry penetrated the ASEAN market justifies the pursuit of these objectives. The *Wheel of Competition* and the Model of *FIRMS* focus attention on the particular roots and attributes of the success of Japan and Taiwan. (The author recognises that the socio-cultural scanning exercises associated with identifying and assessing underlying social beliefs and attitudes are less amenable to quantitative analysis. Marketing research tended to be mechanistic and statistical, rather than psychological and attitudinal). Thus, the thesis attempts to cover the quantitative ("hard") and qualitative ("soft") aspects of marketing because, marketing in reality is both a management process (the activities conducted to ensure a fit between what the organization supplies and what its customers want) and a business philosophy (often called the "marketing concept") that should guide the approach of the entire organization (Hooley and Saunders, 1993). The author's *Total Quality Business Paradigm* embeds the management process in the manufacturing/marketing milieu using the systems approach.

Readers of this thesis may gain a better understanding of the Japanese and Taiwanese managerial realities of doing international business in the ASEAN market, the commonalities and the differences. It will also enhance the performance (effectiveness and efficiency) of managers of international business to deal systematically with the strategic, tactical and operational issues, problems, and opportunities of doing business in the ASEAN region. Without understanding the culture, values and ethos behind the facts and figures, managers cannot possibly hope to make informed decisions. As stated by Soldner (1977), in the comparative scenario, the researcher is concerned with the development of an understanding of and an ability to better solve problems of international marketing. As reiterated by Cavusgil and Nevin (1981), the purpose of the comparative marketing approach is to seek an understanding of the integrative dynamics of socio-economic, cultural, governmental, demographic, and technological systems in the context of two or more countries.

The author shares the observation of Dunning (1989), Corley (1992), Aliber and Click

(1993) that in an ever increasingly complex world of international business dominated by rapid and far-reaching changes in technology and by environmental turbulence, rarely, in seeking to identify the reasons for business achievement, is one able to find a common denominator. Success is founded on some amalgam of factors. All countries have much to learn from the Japanese and Taiwanese CNC machine tool industry. There is an especial urgency as Thurow (1992) had identified the robotics and machine tool industry as one of the seven vital industries essential in determining the high standard of living in the twenty-first century.

A schematic presentation of the author's thought processes in his approach to the doctoral thesis is in Figure 2.4.

2.3 Literature Review

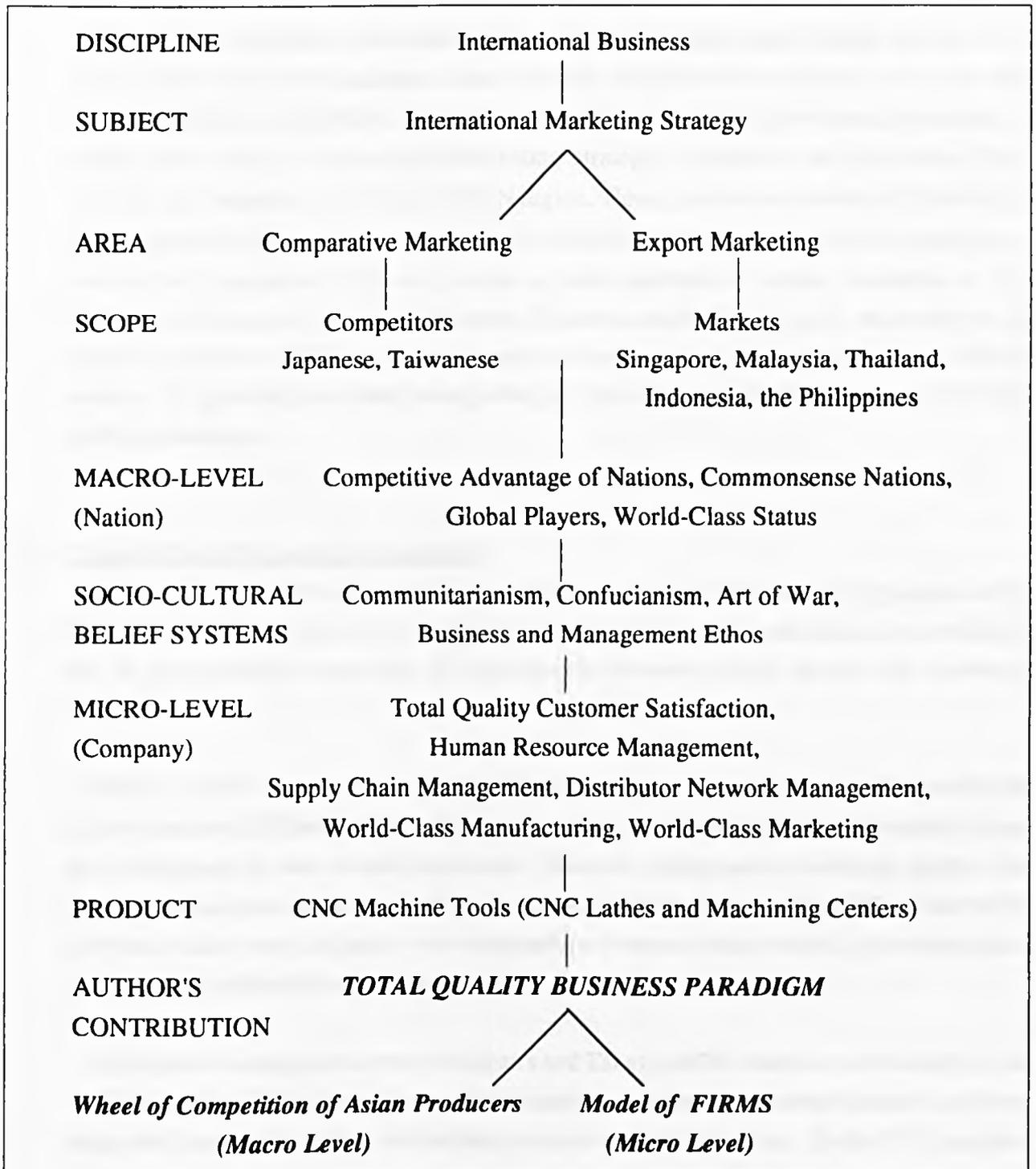
This thesis adopts a multidisciplinary approach. As a corollary, the literature review is necessarily of a very diverse nature, covering a range of academic inquiries in the following disciplines:

- International Business
- Regional Economics
- Political Science
- Sociology
- Philosophy
- Marketing
- General Management
- Operations and Manufacturing Management

The secondary sources of information are:

- Books
- Unpublished Theses
- Conferences and Seminar Papers
- Journals, Periodicals, Magazines, Handbooks
- Publications of Governments, Institutions, Associations, Companies
- Private communications with pundits in their respective fields
- Reputable Newspapers

FIGURE 2.4 A FRAMEWORK FOR THE COMPARATIVE STUDY OF INTERNATIONAL MARKETING STRATEGY OF JAPANESE AND TAIWANESE CNC MACHINE TOOL INDUSTRY IN THE ASEAN REGION



Source: Author

As events in the environment of international business are changing so rapidly and radically, newspapers and current journals, periodicals and magazines are especially useful to supplement and update knowledge gleaned from the books.

From both the manual and on-line computer literature search (eg Cavusgil and Li, 1992; Lom, 1992; Manchester Business School Library and Information Service, etc., and ABI/INFORM, GEAC, LAMBDA, etc.), there is no publication in the author's area of research, ie comparative study of international marketing strategy of Japanese and Taiwanese CNC machine tool manufacturers in the ASEAN region. Hence, the primary source of information is through field survey and research by face-to-face depth interviews with top executives of twenty-five companies (end-users) across a wide spectrum of similar industries in five countries (Singapore, Indonesia, Malaysia, Thailand, and the Philippines). According to the survey by Lasserre (1993), newspapers, personal contacts and in-house surveys are reliable sources for gathering and interpreting strategic intelligence in Japan, Taiwan and the five ASEAN countries.

2.4 Scope of Study/Research Methodology

Heede (1984) found that very little work had been done on macro marketing issues across cultures and/or nations; and that scholars are no longer interested in estimation and prediction but in understanding, especially the relationship between societal beliefs and marketing science.

Bartels (1968) viewed comparative studies as not simply a description of either marketing or environmental differences but rather a comparison of relationships between marketing and its environment in two or more countries. However, comparative marketing studies are frequently disappointing in terms of theorising. As pointed out by Arndt (1985), to start with, very few studies were designed to test relationships between some marketing phenomena and particular properties of the societal system.

This thesis is a comparative study of Japan's and Taiwan's CNC machine tool industry in the ASEAN market. The primary focus of investigation is on the Japanese machine tool industry, using the Taiwanese machine tool industry as a source for comparison. (In the CNC machine tool industry circle, the Taiwanese is well-known for imitating the Japanese product range by the application of reverse engineering. Ironically, the Japanese employed the same strategy

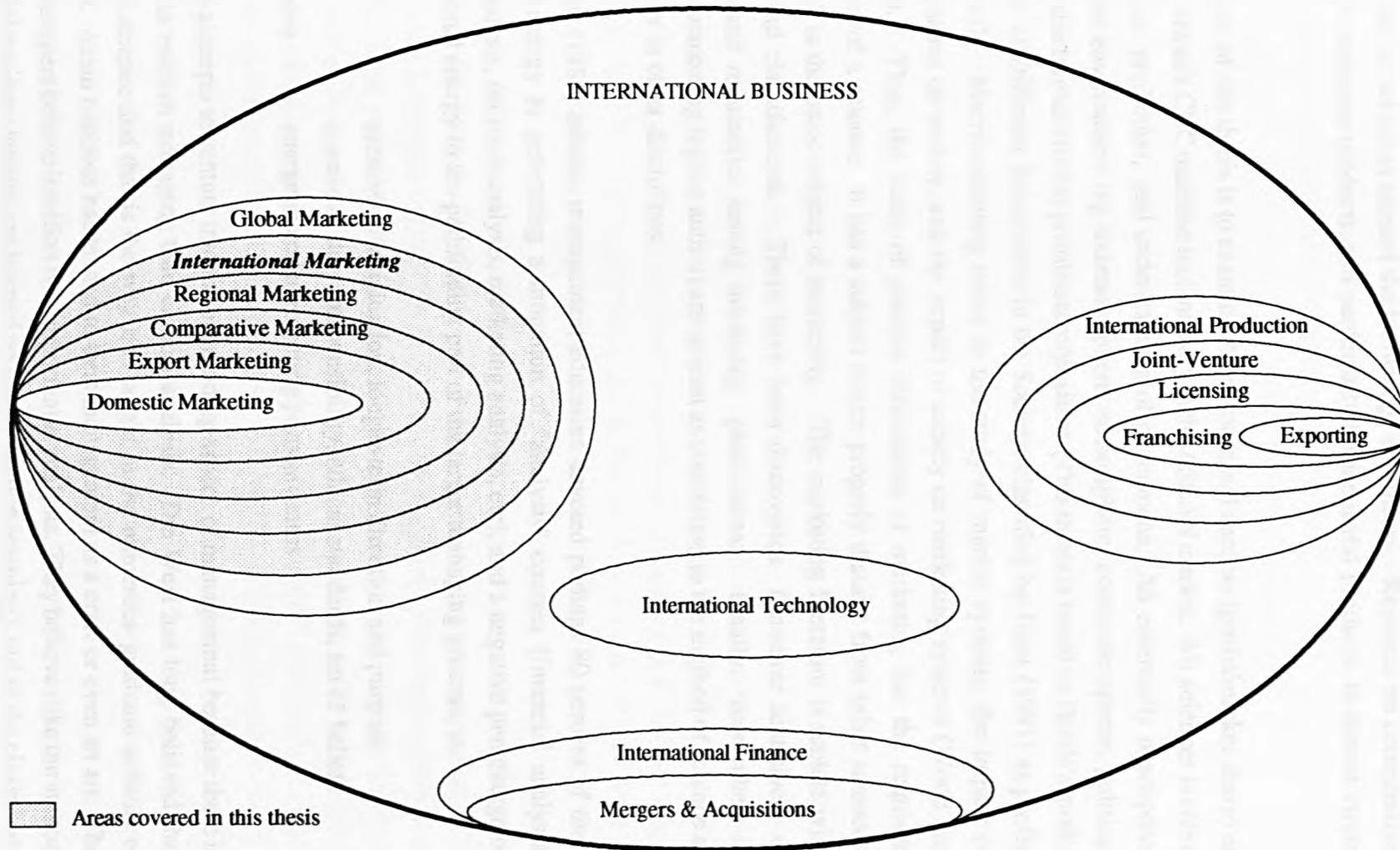
after World War II for American, German, and Swiss product lines). It traces the historic development of Japan's and Taiwan's CNC machine tool industry from post World War II to the early 1990s. The aim is to identify similarities and differences in this parallel development. The common battlefield for business is the ASEAN market and hence the strategic perception of the ASEAN market and the operational approach to business opportunities as adopted by the Japanese and Taiwanese CNC machine tool manufacturers will be examined. At the micro-level, this involves three case studies of Japanese machine tool builders, and three case studies of Taiwanese machine tool builders. A detailed description of the research methodology is provided in Chapter 7.

The ASEAN market comprises of Singapore, Malaysia, Indonesia, Thailand, and the Philippines. Brunei is excluded because it is essentially an agrarian economy. These ASEAN countries are undergoing rapid economic development and playing a growing role in international trade and investments in global competition. Kotler et al. (1985b) predicted that even if the Japanese have shown signs of slowing down in their invasion of world markets, the same thrust will continue but will come from the "Gang of Four", ie Korea, Taiwan, Singapore and Hong Kong. Following this will be the "Gang of Five", ie India, Indonesia, Thailand, Malaysia, and the Philippines. This segmentation of the regional market is based on economic criteria [see Day, Fox and Huszagh (1988) for a framework based mainly on economic criteria for segmenting the global market for industrial goods like machine tools].

International businessmen must take cognizance of these environments - domestic, foreign, regional and global. The environment scanning exercise within the scope of this study will focus on the environmental forces in international business in the ASEAN region within the Asian context, and the world at large. As such, an attempt is made to trace the changing trends in the international business environment from 1945 to the 1990s and its impact on the machine tool industry (see Chapter 4).

The scope of marketing is unquestionably broad. The main subject area in this thesis is international corporate competitive advantage, which is explored through comparative marketing and export marketing (see Figure 2.5). Comparative analysis of Japan's and Taiwan's CNC machine tool industry in the ASEAN market can provide interesting insights, and more importantly, give the foundation for future hypotheses as the field continues to develop. (To-date, there is virtually no research work done in this area). As indicated by Boddewyn (1981), at the current level of development in comparative marketing, researchers

FIGURE 2.5 SCOPE OF THESIS : IN SEARCH OF INTERNATIONAL CORPORATE COMPETITIVE ADVANTAGE
IN INTERNATIONAL BUSINESS



need some base on which to expand the knowledge and theory. Research on comparative marketing for consumer products, and particularly for industrial products, is almost virgin territory.

The purpose of this thesis is to examine the phenomenal success (profit/market share) of Japan's and Taiwan's CNC machine tool industry in the ASEAN market. All sciences involve the explanation, prediction, and understanding of phenomena. An essentially descriptive analysis of the environment (eg intimate sphere, socio-sphere, economic sphere, political sphere) may also be classified as profit/macro/positive. [This thesis is based on Heede's model of Interaction of Different Subsystems in the Society, classified by Hunt (1991) as profit/macro/positive]. Macromarketing refers to the study of market systems, the impact of marketing systems on society, and the impact of society on marketing systems (Wood and Vitell, 1986). Thus, the study of positive dimensions of marketing has the requisite characteristics of a science. It has a subject matter properly distinct from other sciences. "Transaction" is the basic subject of marketing. The marketing literature is replete with description and classification. There have been discoveries (however tentative) of uniformities and regularities among marketing phenomena. Finally, researchers in international marketing (eg the author) are at least as committed to the method of science as are researchers in other disciplines.

As Leavitt (1989) admits, management educators devoted perhaps 80 percent of their pedagogical energy to generating a mountain of "analysis" courses (financial analysis, economic analysis, decision analysis, marketing analysis, etc), and a negative percentage of their educational energy to the pathfinding part of the larger managing process, ie:

- Vision : creativity, imagination, longer-term direction and purpose
- Values : a sense of duty, responsibility, ethical standards, set of beliefs
- Determination : energetic and unrelenting purposiveness

This thesis attempts to venture into the pathfinding aspect of management because there is much more to modern managing than clinical analysis. The West has long believed that business is a science and that is the way it is taught in the numerous graduate schools of management. Asian business has tended to treat management as a craft or even an art. The best Asian managers believe intuition is as important as analysis. They believe (like the author) that the crucial business lessons are learned on the job (action learning), not in the classroom.

In the most successful Asian businesses, the distinction between thinkers and doers is blurred (Bennis, 1993). Hence, the need to transcend the limitations of "pure" science - after all management can be considered as both a science and an art.

2.5 Plan of Thesis

The plan of this thesis is as follows:

In Perspective gives a profile of the author to enable readers to gain an understanding of his mindset and values so that they may better appreciate his motivation for undertaking this thesis. According to Clutterbuck and Crainer (1990), the key to understanding ideas is to understand the person behind them. The next section introduces the realities in the field of international business and makes a plea for the academics (the thinkers) and the practitioners (the doers) to cooperate to bridge the gap in theory and in practice.

Chapter Two emphasizes the problems, opportunities, and significance of undertaking research in comparative marketing and export marketing - the key issues in international marketing strategy. The research objectives, scope of study, and plan of thesis are delineated. A schematic outline of the author's thought process in this undertaking is presented. The author's original contribution to the field of international business is highlighted. Further, there is an overview of his *Wheel of Competition of Asian Producers* and his model of *Flexible Intelligent Relationship Management Strategy (FIRMS)*.

Chapter Three discusses the changing international business environment during the post-war period (ie 1945 to date), tracing developing trends in geo-politics, geo-economics, and the socio-cultural-technological environments. The underlying premise is based on the reality that change is rapid, radical, discontinuous and unpredictable. As a corollary, greater instability fuelled by fast-changing markets is contributing to business turmoil. It highlights the need for the pace of learning to exceed that of change and a belief in individual action learning for managerial competence within the business world as a learning community.

Chapter Four offers a scenario of the machine tool industry from its birth in the 1800s to the present, highlighting the impact of significant world events on international machine tool business. It applies the concepts of comparative advantage, value added, and competitive advantage to explain the performance and achievement of Japanese and Taiwanese producers in the highly competitive ASEAN market.

Chapter Five (*The Wheel of Competition of Asian Producers* in the CNC machine tool industry in the ASEAN region) and Chapter Six (*Flexible Intelligent Relationship Management Strategy*) are the author's theoretical frameworks for his research propositions, seeking to approach his undertaking from both the macro-level (*The Wheel* with country focus) and micro-level (*FIRMS* with company focus). This is the basis for his field research, analysis, findings and conclusions.

Chapter Seven on research methodology discusses the various approaches, techniques and designs in research work; the ultimate research mix is dependent upon the nature of the investigation. The author needs to apply both qualitative and quantitative approaches to meet his research objectives. His research design is delineated. SPSS software package is used for analysis of the primary and secondary data.

Chapter Eight captures the empirical study by the author as he operationalises and tests the parameters in the *Wheel of Competition* and *FIRMS*. Field works are done in the five ASEAN countries, Japan and Taiwan. It presents the findings as Chapter Nine will then analyse, interpret and evaluate the results of his investigations. Conclusions /recommendations are given in Chapter Ten.

2.6 Summary

In the radically changing international business scene, the world is now a common battlefield for markets. The author hopes to make realistic and useful links between theory and practice; to inject managerial pragmatism based on sound theory. Realities now dictate an holistic and a more rigorous multidisciplinary systems approach to correct the business myopia in the international marketing arena. Good business cannot be narrow-minded. International business has now clearly emerged as a subject in its own right and one which is best understood from a multidisciplinary perspective (Buckley, 1992). With this perspective, the author examines similar themes as those addressed by Buckley and Brooke (1992). The four themes in his research in the field of international business are:

i. Comparative Studies

Essentially, comparative research is the study of competitiveness, a comparative concept par excellence (Buckley, Pass and Prescott, 1988). Many of today's key issues require analysis in a comparative framework. One primary example is competitiveness that carries within itself the notion of comparability - competitiveness relative to whom?

The most illuminating and often the most intractable is the international comparison (Buckley, 1991).

In this thesis, the author attempts to study the relative competitiveness of the Japanese and Taiwanese machine tool industry in the ASEAN market through the comparative approach. The focus is on international marketing strategy. It is a fact that much of core international business theory concerns competitive strategies in the (changing) world economy (Buckley, 1990). Further, part of the attention has focused on the (presumed) differing nature of competition and cooperation, an issue also addressed in the thesis.

ii. Interdisciplinary/Multidisciplinary

Though international business is evolving in teaching and research, it has undoubtedly grown as an interdisciplinary/multidisciplinary subject. In his approach to the thesis, the author is trying to transcend his core discipline in industrial engineering and to adopt purposefully a crossdisciplinary consciousness, essential to the understanding of the intricacies of business.

iii. Innovation

The study of international business has been innovative in many dimensions. Notably, it has included many variables that are not conventionally covered in the functional areas of business studies. Most notable is the embracing nature of "culture." The influence of national culture and history on business practice and the challenges this presents to those operating in the international domain are more recent topics. The author addresses this challenge in his study on socio-cultural belief systems.

iv. Integration

The study of international business can play a major integrative role in two dimensions:

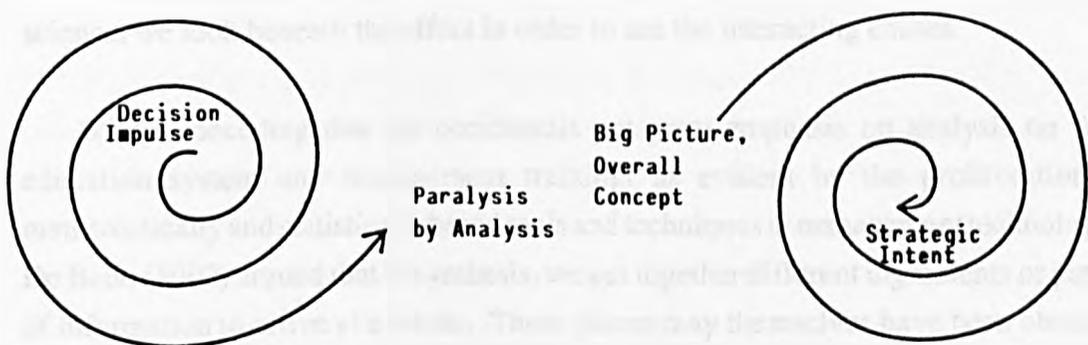
- Integrating the core functional areas of business teaching
- Integrating business theory and practice

Whilst the author recognises that the integration of functional aspects of business into a coherent whole is an essential aspect of good business-school practice, his main preoccupation is in integrating business theory and practice which requires knowledge of real world business, display of creative intuition, judgement, vision, rigorous analysis, innovative thinking and lateral approaches to real world problems.

Issues of growth and development of (rival) nations, the cultural basis of growth, the dynamics of global competition, the tension between competition and cooperation in companies and nations and the determinants of the changing structure of the world economy have been among those directly tackled by fellow researchers. This approach enlivens research as we raise to the challenges we will have to face as business people, and indeed as people, in the real world.

As an Asian, and in particular, the product of a Chinese, Confucian society, the author's approach to problem analysis and solving may vary somewhat from that of those conditioned by a different culture. It is necessary to be explicit about cultural conditioning of the researcher, as Heede (1984) cautioned against researchers operating from hidden values or spontaneous philosophy paradigm and therefore do not specify the societal presumptions in their studies. Hofstede and Bond (1988) were aware of how culture can affect the theories that we are able to develop to explain our practices.

The author is responding to the call by Mendoza (1992) to invent new management tools and techniques and conceptual frameworks that will work, that will be effective, that will be efficient in Asian countries and among Asian people. To Mendoza, the Asian way emphasizes the process of synthesis more than of analysis. Western man thinks like an arrow, straight and to the point; Eastern man thinks like a circle, looking at a point from all angles, enveloping it, seeking to understand it in its total reality. This mode of thinking focuses not only upon the separateness of things but on their identity, their interconnectedness. This difference in approach can be depicted in the following manner:



**The Western Spiral Business Philosophy:
Myopic Vision**

**The Eastern Spiral Business Philosophy:
Mega Vision**

The spiral on the left starts at the centre and circles out, ie the Western man is quick to "get to the point". He has the preference for analyzing a point. The spiral on the right starts at the outside and circles inward, ie the Eastern man has the habit of "circling around". He has the preference for integrating and shaping the many facets. For example, in decision making, a Western CEO would decide on the spot and delegate the implementation details to his subordinates. A Japanese CEO would take the circuitous route to consult before making the final commitment. Using the imagery of a cone, the Western spiral symbolises a top-down approach (from the apogee to the base). Whilst the Eastern spiral symbolises a bottom-up approach (from the base to the apogee).

Synthesis has its emphasis on commonsense to overcome the syndrome of "paralysis by analysis". As Linder and Smith (1992) observed, MBAs are reluctant to apply synthesis (ie commonsense) because they are suspicious of decision-making not based upon detailed, time-consuming analysis, which ultimately proves very costly. By delaying decision-making, strategic opportunities are often squandered. In a macrocosmic view, Eastern culture is characterised by synthesis, while that of the West features analysis. Synthesis refers to the view of all things as an organic whole, and attention to the relations between the parts. Analysis means separating things into many parts and seeing them as individual components, as a tree in a forest. Western culture, based on analysis, is metaphysical (Xian Lin, *Straits Times*, November 7, 1991). Managers in Japan and other Asian countries may have a competitive advantage over their counterparts in the USA and Europe because Oriental culture emphasizes the art of synthesis. Occidentals are preoccupied with analysis. (Hofstede and Bond, 1988). Hence, Westerners have the saying "we cannot see the wood (the forest) for the trees". As in science, we look beneath the effect in order to see the interacting causes.

Whilst conceding that the occidentals put great emphasis on analysis on their education system and management training(as evident by the proliferation of mathematically and statistically based tools and techniques in management technology), De Bono (1992) argued that in synthesis, we put together different ingredients or pieces of information to arrive at a whole. These pieces may themselves have been obtained from analysis. Planning, problem-solving and prediction all make use of synthesis. We construct scenarios of the future from past experience and analysis of present trends and influences. In other words, although analysis is a subset of synthesis, synthesis is much more than simply a collection of a series of analysis. Of course, Orientals and Occidentals may both undertake analysis and synthesis, but the perspective of each may

be quite different due to variations in their cultural conditioning. According to Hampden-Turner and Trompenaars (1993), parts and wholes, universals and particulars, can be seen as either excluding one another (in Western discourse) or including one another (in Eastern discourse). In the West, what passes for holism and particularism is the attempt to champion the whole against the parts, and the particular against the universal (ie to remain both adversarial and analytic). Westerners are thus inclined not to grasp the genuine breadth of holistic thinking. In the East, genuine wholeness views all details, and all particulars are being encompassed within its pattern, ie to synthesize for harmony. Western thinking is analytical, while Eastern thinking is synthetic. Science may benefit from analytical thinking, but management and government are based on the art of synthesis. With the results of Western, analytically derived technologies freely available, Eastern cultures could start putting these technologies into practice according to their superior synthetic abilities. And, the Japanese is famous for this pragmatic synthesis (Hofstede and Bond, 1988). See Tables 2-2, 2-3 and 2-4 for "Comparative Management Styles of Eastern and Western Companies".

Scientific analysis and the rational approach is the hallmark of professionalism in Europe and the USA. Nevertheless, Maynard Jr and Mehrtens (1993) sensed a growing disenchantment with scientism. The West has always stressed rational truth - it has been widely accepted that science and scientific processes are the way to determine truth and that rational intelligence and logical thoughts are the most valuable abilities. It is increasingly accepted that such phenomena as feelings and intuition expand the range of human potential to find answers, making both rational and nonrational processes legitimate components in the search for knowledge and understanding.

The ultimate test in business is performance; Drucker (1993) contended that "as with treating an illness, what matters is that the patient recovers, not whether the doctor is right". Today, Asia is a major exporter of ideas, in a position to teach the West vital lessons in leadership and the management of corporate change (Bennis, 1993). The Japanese economic miracle, particularly in the 1970s, made the rationalists think again, for it appeared that something had been stirring in Japan of a non-rational, if not irrational, nature. It involved soft-edged shared values (Pascale and Athos, 1982; Lessem, 1990). It involved paradigm, a pattern or map for understanding and explaining certain aspects of reality. Hampden-Turner and Trompenaars (1993) argued that each of the seven cultures of capitalism (the USA, UK, France, Germany, Japan, Sweden, and the Netherlands) has unique cultural habits and traditions of economic excellence.

TABLE 2-2 COMPARATIVE MANAGEMENT STYLE OF EASTERN AND WESTERN COMPANIES

<u>CHARACTERISTICS</u>	<u>JAPANESE COMPANIES</u>	<u>AMERICAN COMPANIES</u>
<ul style="list-style-type: none"> • Management-labour relation • Decision-making • Communication style • Promotions • Profit sharing • Strategic planning (time horizon) • Performance evaluation • Career paths • Market • Corporate goal • Job security (employment) • Labour cost • Wage and promotion • Decision-making • Executive positions • Employee turnover • Group behaviour 	<ul style="list-style-type: none"> • Cooperative • Participative • Polite • Seniority • Bonuses for everyone • Long and short-term • Long-term, not critical • Nonspecialized • Global • Market share stability • Permanent (lifetime) • Fixed cost • Age and length of service • Participative • Promotion from within • Low • Group oriented (collective responsibility) 	<ul style="list-style-type: none"> • Antagonistic • Vertical • Direct • Merit • For executives • Short-term • Objective, rational • Specialized • Domestic • Maximum quarterly profit • Little job security (short-term) • Variable cost • Performance • Autocratic • Hiring from outside • High • Individual (individual responsibility)
<ul style="list-style-type: none"> • Negotiation styles 	<ul style="list-style-type: none"> • Emotional sensitivity highly valued • Hiding of emotions • Subtle power plays, conciliation • Loyalty to employer, employer takes care of its employees • Group decision-making consensus • Face-saving crucial; decisions often made on basis of saving someone from embarrassment • Decision makers openly influenced by special interests • Not argumentative; quiet when right • What is down in writing must be accurate, valid • Step-by-step approach to decision making • Good of group is the ultimate aim • Cultivate a good emotional social setting for decision making; get to know decision makers 	<ul style="list-style-type: none"> • Emotional sensitivity not highly valued • Dealing straightforward or impersonally • Litigation not as much as conciliation • Lack of commitment to employer, breaking of ties by either if necessary • Teamwork provides input to a decision maker • Decisions made on a cost-benefit basis; face saving does not always matter • Decision makers influenced by special interests, which often is not considered ethical • Argumentative when right or wrong, but impersonal • Great importance given to documentation as evidential proof • Methodically organized decision making • Profit motive or good of individual ultimate aim • Decision making impersonal; avoid involvement, conflict of interest
<ul style="list-style-type: none"> • Management styles 	<ul style="list-style-type: none"> • Highly pragmatic • Strong emphasis on size and growth • High value on competence and achievement • Wholistic concern • Implicit control mechanisms 	<ul style="list-style-type: none"> • Highly pragmatic • High achievement and competence oriented • Emphasis on profit maximization, organizational efficiency, high productivity • Segmented concern • Explicit control mechanisms

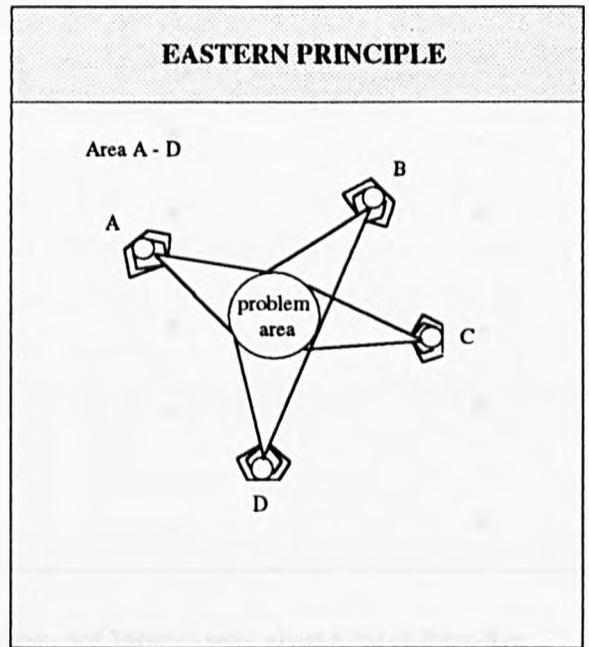
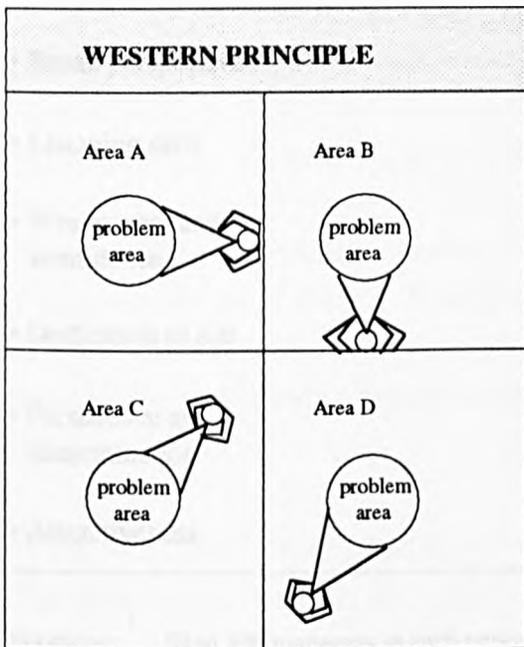
Source: Adapted from Ouchi, William (1981), Theory Z: How American Business can meet the Japanese Challenge. Addison-Wesley, Reading, Massachusetts; Adler, Nancy J. (1991), International Dimensions of Organizational Behaviour. Second Edition, Kent Publishing, Boston; Hodgetts, Richard M. and Luthans, Fred (1991), International Management. McGraw-Hill, New York; Matsuura, Nanshi F. (1991), International Business: A New Era. HBJ Publishers, San Diego; Dawson, Sandra (1992), Analysing Organizations. Second Edition, MacMillian Press, London.

TABLE 2-3 GENERIC COMPARISON OF WESTERN, JAPANESE AND OFFSHORE CHINESE METHODS OF DECISION MAKING AND MANAGEMENT

<u>Western</u>	<u>Japanese</u>	<u>Offshore Chinese</u>
<ul style="list-style-type: none"> Companies employ "systems" style management and Management by Objective (MBO) 	<p>Companies highly institutionalised restrictive, protectionist, stratification, is a unifying influence</p>	<p>Companies small, dynamic, free-ranging, open, resilient, flexible and adaptable</p>
<ul style="list-style-type: none"> Individual decision making 	<p>Dependence, compromise, consensus, decentralised decision making by group with a ceremonial boss</p>	<p>Decision making by key figure or a few family members - these are often snap decisions</p>
<ul style="list-style-type: none"> Aggression, conflict, confrontation 	<p>Collective responsibility, harmony, competent industrial bureaucrats rather than leaders, manager is facilitator</p>	<p>Intuitive, centralised, authoritative, adventurous management style, autocratic but frequently employing benevolent paternalism</p>

Source: Adapted from Waters, Dan (1991). 21st Century Management : Keeping Ahead of the Japanese and Chinese. Prentice Hall. Singapore. pp. 38.

PRINCIPLES FOR PROBLEM CONSIDERATION



Source: Schraft, R.D. (1990), "State-of-the-Art in Flexible Manufacturing in the Mechanical Engineering Industry (World-Wide)", The Institution of Manufacturing Engineers Singapore Branch YearBook 1990. Singapore, pp. 165.

TABLE 2-4 THE MOST IMPORTANT NEGOTIATOR CHARACTERISTICS
ACCORDING TO VARIOUS MANAGERS IN THREE NATIONS

<u>Characteristics</u> ¹	<u>American Managers</u>	<u>Japanese Managers</u>	<u>Chinese Managers</u>
• Integrity	•	•	-
• Perceive and exploit power	•	•	-
• Verbal expression	•	•	-
• Preparation and planning skills	•	-	•
• Judgement and intelligence	•	-	•
• Product knowledge	•	-	•
• Think under pressure	•	-	-
• Broad perspective	-	•	-
• Listening skill	-	•	-
• Win respect and confidence	-	•	•
• Dedication to job	-	•	-
• Persistence and determination	-	-	•
• Attractiveness	-	-	•

Footnote : ¹ 50 to 100 managers in each nation (ie America, Japan and Taiwan) were given a list of forty-five characteristics and asked to identify the characteristics of greatest value for bargaining.

Source: Adapted from Karrass, C.A. (1970), The Negotiating Game. Crowell, New York; Graham, J.L. and Sano, Y. (1984), Smart Bargaining: Doing Business with the Japanese. Ballinger Publishing, Cambridge.

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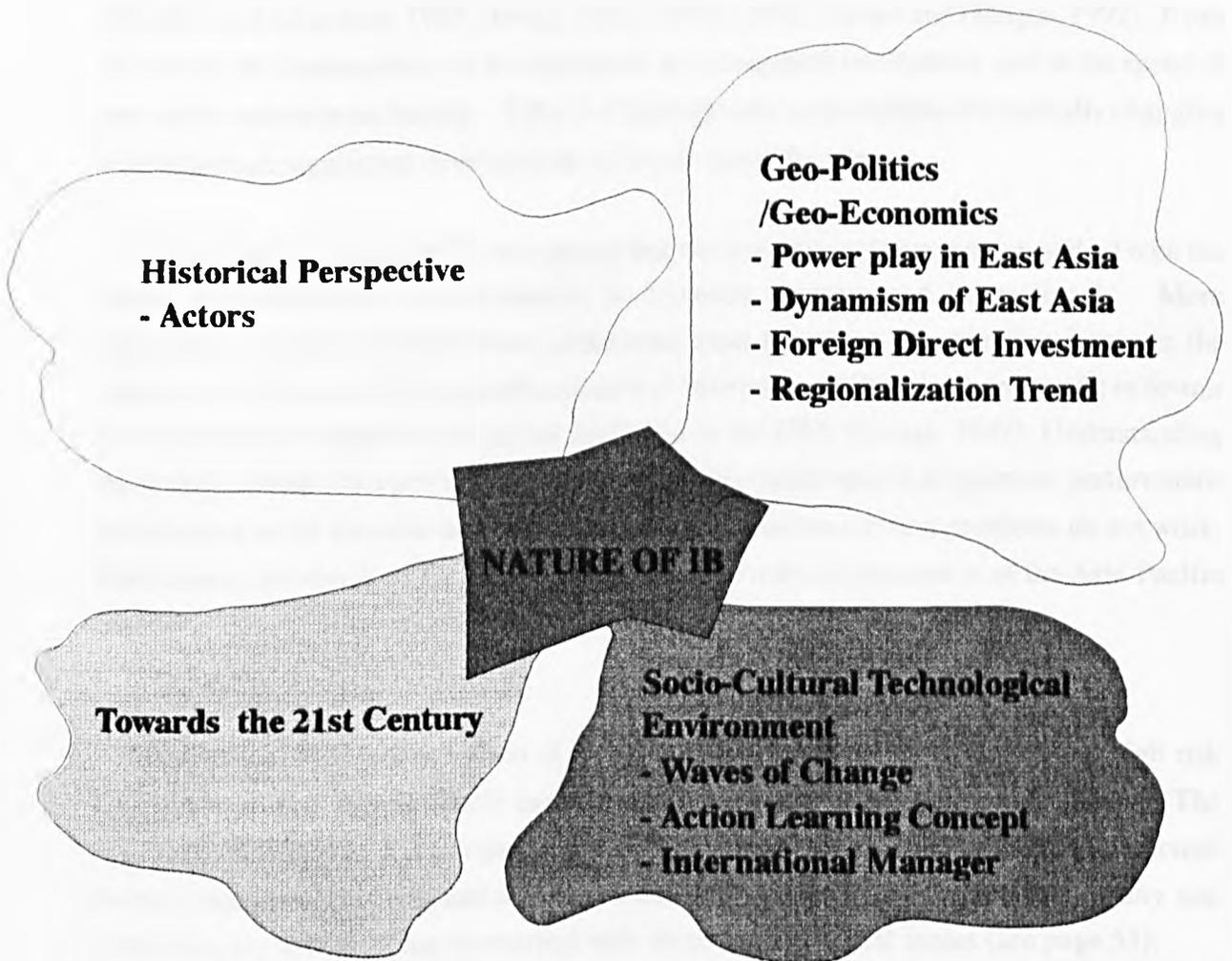
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CHAPTER THREE

THE CHANGING INTERNATIONAL BUSINESS ENVIRONMENT

(1945 - 1990s)



CHAPTER THREE

THE CHANGING INTERNATIONAL BUSINESS ENVIRONMENT (1945 - 1990s)

3.1 The Nature of International Business

The aim of this Chapter is to trace the changing trends in the international business environment from 1945 to the 1990s. Over a span of half a century, we have witnessed tumultuous change impacting almost every facet of international business operations. Discontinuous change can already be seen transforming organisations, work, and education (Naisbitt and Aburdene, 1985; Handy, 1991; Toffler, 1991; Turner and Hodges, 1992). It can be seen in the disintegration of existing ideas and antiquated institutions, and in the speed of new development in technology. Table 3-1 highlights the stark realities of a radically changing world through significant development of events over fifty years.

Ball and McCulloch Jr (1993) recognised that the international company must deal with the forces in three kinds of environment, ie domestic, foreign, and international. More importantly, however, international companies must recognise the changing forces in the regional environment. For example, concern about a power shift in the Asia-Pacific in favour of Japan is more evident in the region itself than in the USA (Cronin, 1992). Understanding these environments is a pre-requisite if international companies are to optimise performance and learning in the dynamic and fluid situation as old solutions to new problems do not work. The focus of interest is on the ASEAN countries within the larger context of the Asia-Pacific region.

International business as a form of human endeavour is a highly complex and high risk undertaking. The uncontrollable environmental factors far exceed the controllables. The international company has to operate and strategise whilst embedded in the environmental forces of the global economy and of its constituent parts at the regional, national, company and intra-company levels. It has to contend with these environmental forces (see page 55):

TABLE 3-1 CHANGING TRENDS IN INTERNATIONAL BUSINESS ENVIRONMENT FROM 1945 TO THE 1990S

1945 - 1985	1985 - 1990s
<p>i) <u>Geo-Political</u></p> <ul style="list-style-type: none"> . Bi-polar world (USA and its Allies; Soviet Union and its Satellites) . America needed as a partner to balance the military and ideological threat posed by the Soviet Union . Ideological crusade (Communism versus Capitalism) . Military might . Development of arms . National independence . National perspective . National security <p>ii) <u>Geo-Economic</u></p> <ul style="list-style-type: none"> . Survival issues . Government controls and regulations . Unstable energy markets . Centrally-planned command economies . Dominant economic interests in the hands of locals . Comparative advantage . National markets . Local production and services for local consumption 	<ul style="list-style-type: none"> . Multi-polar world (USA, EU, Russia, Japan, and China) . America needed as a partner to balance the growing economic threat posed by Japan . Economic development . Economic prowess . Curb on arms . Regional/Global inter-dependence . Regional/Global perspective . Economic development . Environmental degradation, Human Rights issues . Liberalisation . Deregulation . Privatisation . Stable energy markets . Market economies . MNCs have become increasingly important in the economic and industrial life of many nations . Competitive advantage/Competitive cooperation . Regional/International/Global markets . Internationalization of processes, products and services

. USA: the most powerful economic power; wealthiest country was USA (in 1991, income per head was US\$22,240)

. National sourcing for local production

. Selling concept: "We sell what we make"

. "Real economy" of production and trade of goods and services

. Slow rate of internationalization of business

. US surplus

. US dominated dollar

. World organisations (eg GATT, IMF, World Bank, influence of G-7)

. MNCs based in Western developed countries

. International trade

. Key to economy: Manufacturing

. International Economics

iii) **Socio-Cultural**

. Hierarchical, pyramidal management system

. Industrial society

. Traditional factors of production

. American marketing/management

. Japan: the most powerful economic power; wealthiest country is Japan (9 out of 10 world's largest ten banks are Japanese, poor on profits; in 1991, income per head was US\$26,930)

. Regional/Global sourcing and worldwide production

. Relationship marketing concept: "We integrate customers' needs into our core competencies"

. "Symbol economy" of financial flows and transactions (eg capital movements, exchange rates)

. Rapid growth in volume of business

. Increase in number of countries participating in international business

. US trade deficit

. Financing is occurring in many currencies

. Regional trade blocs (eg AFTA, APEC, EAEC, EEA, NAFTA, SEM)

. MNCs from diverse areas and economies

. Regional/International/Global business

. Foreign direct investment

. Mergers, acquisitions, strategic alliances

. Key to economy: Operations (manufacturing/ services)

. International Business Relationship Management

. Network model of organisation

. Knowledge society

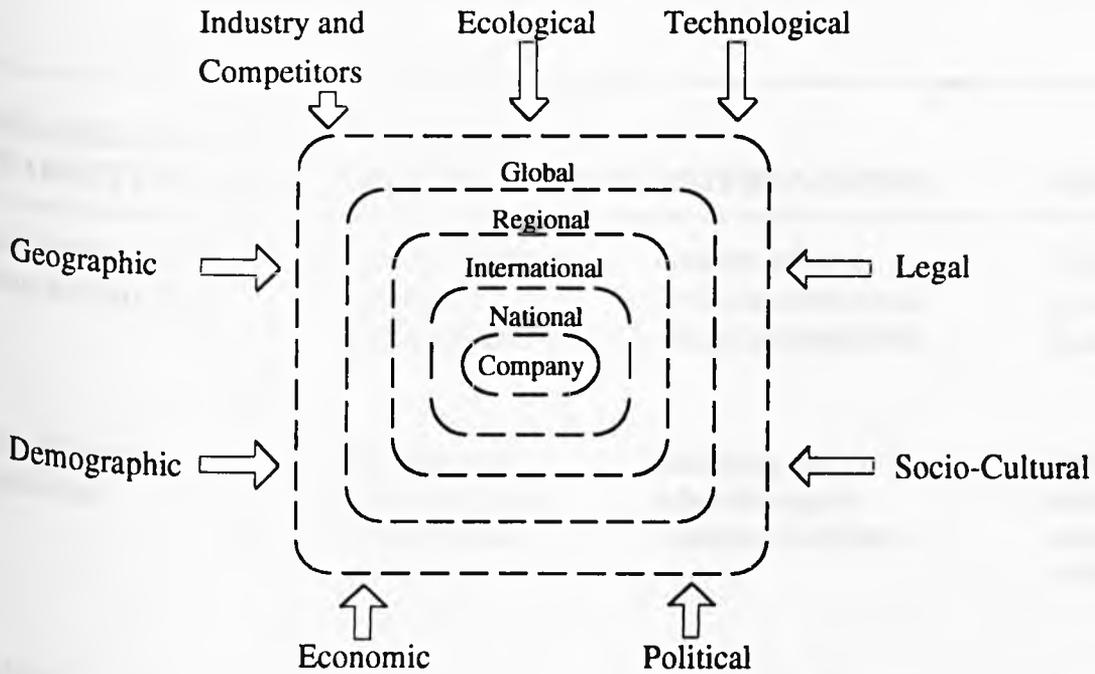
. New factors of production, eg knowledge, entrepreneurship

. Japanese marketing/management

<ul style="list-style-type: none"> . Unidisciplinary in research and writing . Programmed knowledge/ Maintenance learning . Managers: products of pre-war and post-war training . Domestic managers with ethnocentric approach . Piece-meal approach to problem solving 	<ul style="list-style-type: none"> . Multidisciplinary in research and writing . Interdisciplinary in research and writing . Questioning insight/ Innovative learning . Managerial Technocrats: products of formal education, training in communications and computing technologies; increasing popularity of business schools leading to MBA and MSc degrees . International managers with multicultural management perspective . Holistic, creative systems approach reinforced by relationship management
<p>iv) Technological</p> <ul style="list-style-type: none"> . Human element in production . Manual labour . Cutting edge of production . Production technology . Mass production with cost as the main criterion . Productivity: defined as combination of effectiveness and efficiency of manpower, methods, money, machines and materials . Country focus: skills intensive manufacturing activities 	<ul style="list-style-type: none"> . Intelligent manufacturing systems reinforcing the computer integrated manufacturing concept; advent of artificial intelligence and expert systems . Mental power . Cutting edge of innovation and information . Telecommunications and computing technologies: driving forces behind the internationalization of business . Mass customization with satisfying needs and expectations as the main criterion . Value added: in products and services . Transfer of technology: overseas manufacturing facilities
<p>v) Overall Theme</p> <ul style="list-style-type: none"> . Change: slow pace, more predictable . Greater stability in international business 	<ul style="list-style-type: none"> . Change: rapid, radical, discontinuous, unpredictable . Greater instability fuelled by fast-changing markets is contributing to business turmoil

Source: Author

FIGURE 3.1 ENVIRONMENTAL FORCES IN INTERNATIONAL BUSINESS



Source: Author

(See Annex 2 for details)

Since the early 1980s, the world has witnessed a trend towards greater interdependence among countries. More and more countries are trading services, natural resources and manufactured goods. There are three types of companies in international business, namely the multinational companies, the international companies and the global companies. The organizational characteristics and key strategic capabilities of these companies are shown in Table 3-2.

Internationally, businesses are facing greater competitive pressures. The keen global competition is fuelled by the slowdown in world economic growth. Nevertheless, the world is not in recession but going through a period of transition from an industrial society to the knowledge society (Drucker, 1993). See Figure 3.2.

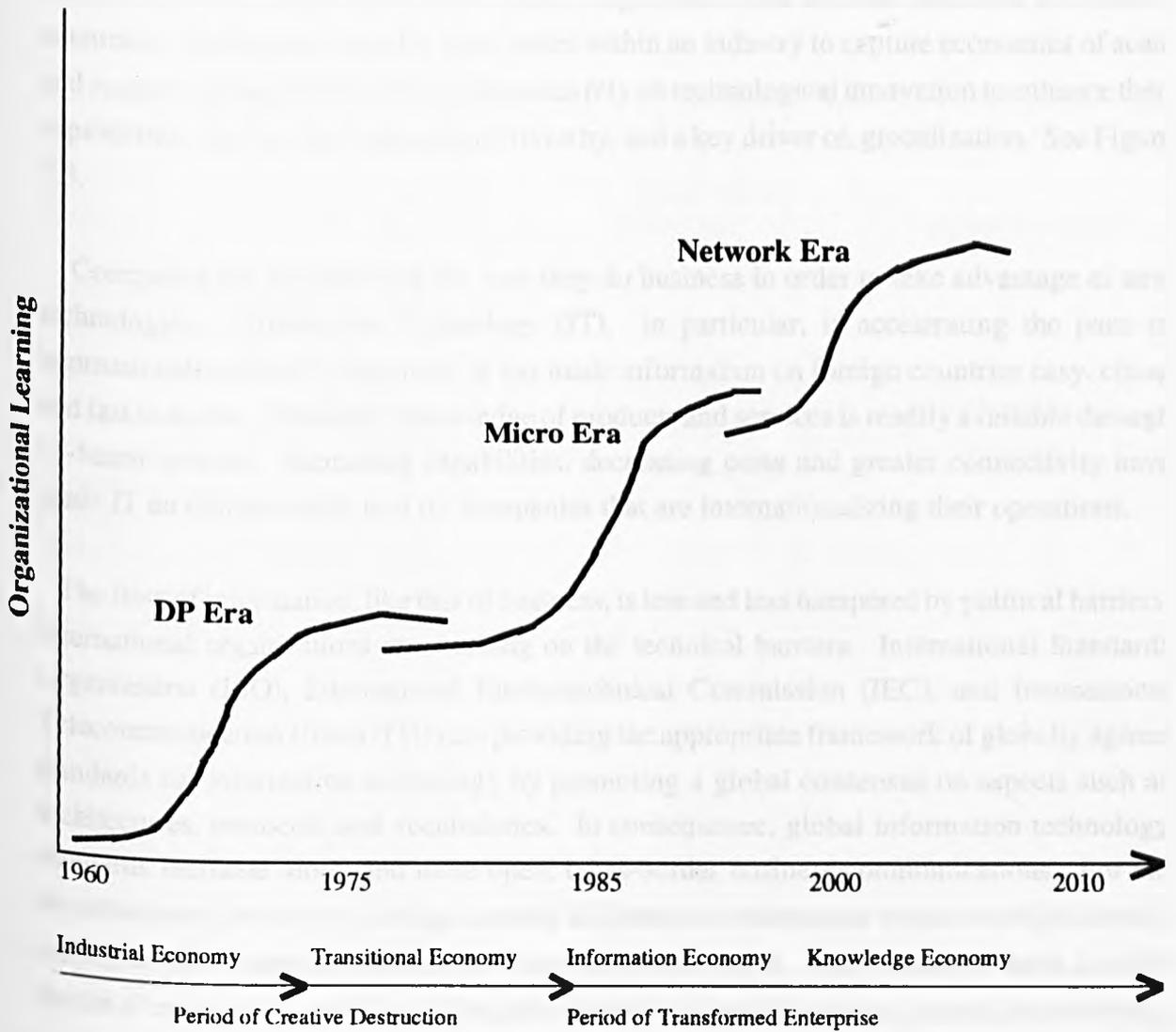
Bradley, et al. (1993) identified globalization and technological innovation as the most significant drivers of strategic change in the world today. Globalization is proceeding

TABLE 3-2 THREE WAYS TO STRADDLE THE WORLD

ORGANIZATIONAL CHARACTERISTICS	MULTINATIONAL	INTERNATIONAL	GLOBAL
Configuration of assets and capability	Decentralised and nationally self-sufficient	Sources of core abilities centralised; others decentralised	Centralised and globally scaled
Role of overseas operations	Sensing and exploiting local opportunities	Adapting and adopting parent company's abilities	Implementing parent company strategies
Development and diffusion of knowledge	Knowledge developed and retained within each unit	Knowledge developed at the centre and transferred to overseas units	Knowledge developed and retained at the centre
Key strategic capabilities	Building strong local presence through sensitivity and responsiveness to national differences	Exploiting parent company knowledge and capabilities through worldwide diffusion and adaptation	Building cost advantages through centralised global-scale operations

Source: Bartlett, Christopher A. and Ghoshal, Sumantra (1989), Managing Across Borders: The Transnational Solution. Harvard Business School Press, Boston, Massachusetts, pp. 15 and 58.

FIGURE 3.2 TRANSITION OF THE WORLD ECONOMY (1960s TO 1990s)



Source: Adapted from Bradley, Stephen P., Hausman, Jerry A. and Nolan, Richard L. (Eds.) (1993), Globalization, Technology, and Competition: The Fusion of Computers and Telecommunications in the 1990s, Harvard Business School Press, Boston, Massachusetts, pp. 9.

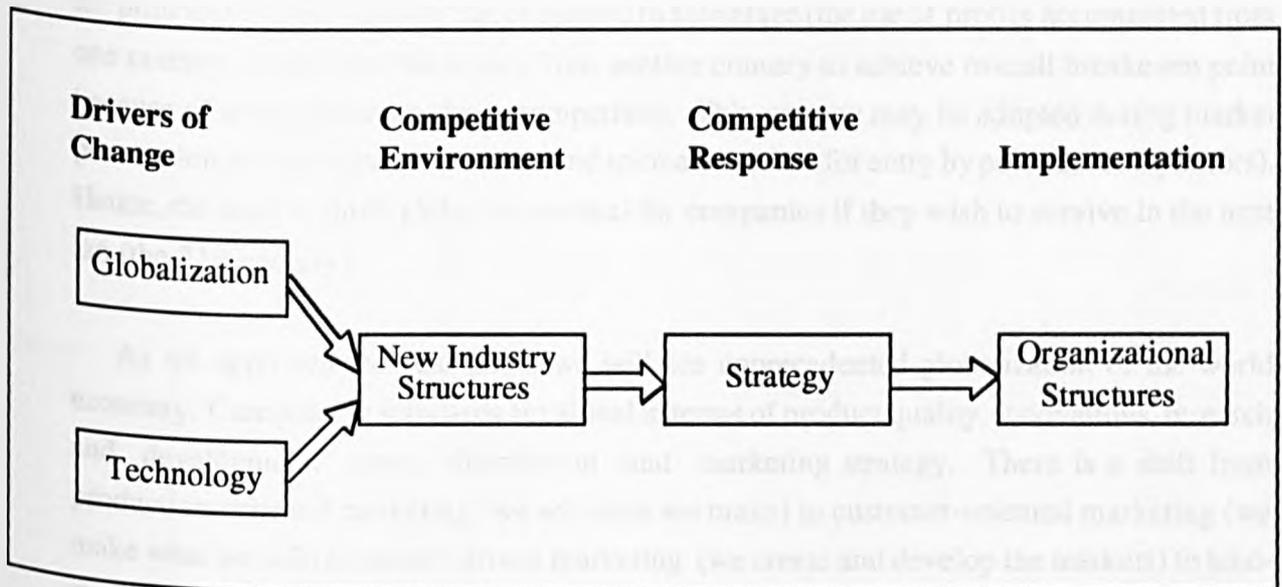
differently in different industries, driven primarily by increasingly similar demands of end-users for global products; changing needs and capabilities of global customers; underlying economies of scale and scope in research, product development, and manufacturing; and the traditional differential costs of input factors (eg labour rates and raw materials in different countries). Technology enables companies within an industry to capture economies of scale and scope by going global; global companies rely on technological innovation to enhance their capabilities. Technology is thus both driven by, and a key driver of, globalization. See Figure 3.3.

Companies are transforming the way they do business in order to take advantage of new technologies. Information Technology (IT), in particular, is accelerating the pace of internationalization of companies. It has made information on foreign countries easy, cheap and fast to access. Moreover, knowledge of products and services is readily available through IT-based systems. Increasing capabilities, decreasing costs and greater connectivity have made IT an indispensable tool for companies that are internationalizing their operations.

The flow of information, like that of business, is less and less hampered by political barriers. International organizations are working on the technical barriers. International Standards Organization (ISO), International Electrotechnical Commission (IEC), and International Telecommunication Union (ITU) are providing the appropriate framework of globally agreed standards for information technology by promoting a global consensus on aspects such as architectures, protocols and vocabularies. In consequence, global information technology standards facilitate more, and more open, cross-border business communications. For the manufacturers, the cost of seeking to satisfy different national market requirements is reduced and a potential international customer base put within reach. The consumers have a wider choice of compatible products and benefits from the competition among manufacturers vying to meet their needs.

Globalization is an important emerging business mandate relevant to virtually all businesses. *It is an Information Economy, as opposed to an Industrial Economy, business concept.* Modern communications enable businesses to operate in multiple countries with diverse shapes and forms of organization and control. They make it possible to send information to every part to know what every other part - and the organization as a whole - is doing all the time. Moreover, global businesses can link directly to their customers, suppliers, and partners around the world, ie international business relationship management. Businesses

FIGURE 3.3 DRIVERS OF CHANGE IN GLOBAL COMPETITION AND TECHNOLOGY



Source: Bradley, Stephen P., Hausman, Jerry A. and Nolan, Richard L. (Eds.) (1993), Globalization, Technology, and Competition: The Fusion of Computers and Telecommunications in the 1990s. Harvard Business School Press, Boston, Massachusetts, pp. 4.

capable of participating in global markets can operate in a much more robust manner than those constrained to narrower national markets. They can exploit national market niches that are too small to be efficiently served individually, but that collectively add up to an efficient scale. They can marshal scarce skills from multiple countries to work on a project or problem when the required skills cannot be found in one country or in the numbers needed. In globalization, the principle of cross-subsidy can be applied to advantage (the use of profits accumulated from one country to subsidise the losses from another country to achieve overall breakeven point because of severe price war from competitors. This strategy may be adopted during market penetration, to maintain market share and to create barriers for entry by potential competitors). Hence, the need to think global is essential for companies if they wish to survive in the next lap (the 21st century).

As we approach the year 2000, we will see unprecedented globalization of the world economy. Competitive standards are global in terms of product quality, innovations, research and development, costs, distribution and marketing strategy. There is a shift from production-oriented marketing (we sell what we make) to customer-oriented marketing (we make what we sell) to market-driven marketing (we create and develop the markets) to lead-marketing-manufacturing (we lead the customers, create and develop the markets, and manufacture at low costs. Japanese companies have done this conspicuously and successfully in sectors such as automobiles and consumer electronics. For example, Toyota as reported by Womack et al in the "Machine that Changed the World", 1990). The convergence of communications and computing technologies (see Table 3-3) have made markets and competition global. It will shift the basis of the strategies pursued by companies to new concepts of competitive advantage.

Globalization is more a business concept than a geographic concept. Becoming global allows businesses to keep up with the competition, positions them to keep abreast of new trends in technology, and enables them to create and take advantage of developing business opportunity. As a business concept, a global company has a sphere of activity and awareness that stretches beyond where it operates to where it earns revenues and carries out activities with an outside party. Globalization is the ability to do business anywhere. Being global means moving from a mechanistic organization, where the whole of the business equals the sum of its parts, to a holistic organization, where any part of the business reflects its identity and, therefore, allows you to see and understand the whole business. Global holism means the organization has shared beliefs, attitudes and values wherever it chooses to do business

TABLE 3-3

CONVERGENCE OF COMMUNICATIONS AND COMPUTING TECHNOLOGIES

	1847 -	1870 -	1920 -	1940 -	1960s	1970s	1980s
Communications Technology	• Telegraphy	• Telephony	• Sound • Photo • Facsimile • Telex	• Radio • Television • Tape Recording • Direct Distance Calling	• Colour Television • Communications Satellites • Digital Communications • Electronic Switching	• Facsimile Transmission • Packet Switching • Optical Fibre • Video Disks	• Cellular Radio • Private Satellites • Integrated Service Digital Networks
Hybrids					• Stereo Hi-Fi Sound	• Teletext • Paging	• Electronic Mail • Tele-Conferencing • On-line Enquiry • Computer Aided Design • Computer Aided Manufacturing • Videotext • Materials Planning and Stock Control • Remote Sensing Devices
Computing Technology	• Analytical Engine	• Punched Card Business Machine	• Electro-Mechanical Calculator • Differential Analyzer	• Transistor • Electronic Numerical Integrator and Computer • Electronic Calculator	• Structured Programming • Mini-Computers • Integrated Circuits	• VLSI • Spreadsheets • Micro-Processors • Applications Generators • LSI • Database Management Systems	• Wafer Scale Integration • Dataflow Processor • Expert Systems • Transputer • Optical Disk Storage • Portable Computers

Source: Turner, Louis and Hodges, Michael (1992), Global Shakeout: World Market Competition - The Challenges for Business and Government, Century Business, London, pp. 53.

(Daniels and Frost, 1990). The essential fact is the need for management to think globally (a mindset) if it is to make sense of its competition and market opportunities in a world where national and geographic business is becoming ever less significant. This applies to all companies within such industries, ie even those companies which choose not to go global will be competing against companies whose strategy and resources cannot be interpreted nationally. The key task is revising management's perceptual map of competitors and markets. Over the years, many companies have developed a fragmented view of their threats and opportunities. Perception of competition and markets have been compartmentalised along national lines. The industrial environment (as a system of interdependent markets and companies) has outgrown national boundaries, forcing management to take a much broader view of the world (Leontiades, 1986; Ohmae, 1987). Morris (1990), Bartlett and Ghoshal (1991) estimated that business leaders in the USA, Europe and Japan had well shifted their line of vision to a global perspective by about 1985.

Since the 1980s, international business has ceased to be regarded as simply an additional route to growth, but instead is seen as important in shaping strategy for all businesses, even those with strictly domestic markets. In order to compete profitably, companies have often been obliged to redesign their whole system of doing business, given the international and global aspects of their market (Humes, 1993). For example, the US market is no longer served by a monopoly of American businesses. Foreign competitors are increasing their market share in the previously captive American markets. By 1986, foreign companies had captured 85 percent of the US market for binoculars, 30 percent of automobiles, over 40 percent of electronics, 50 percent of microchips and 80 percent of radios (Cundiff and Hilger, 1988).

Clearly, in the years ahead, international marketing will be even more pervasive than it is today. Indeed, most businesses will be either globe-trotters or globe-watchers. The lifeblood of the international company is marketing abroad. When one deals with two or more markets on the international scene, market structures for a given product may vary appreciably from one country to the next due to such factors as difference in values, lifestyles, economic development, government regulations of business and political stability (Thorelli and Cavusgil, 1990). Hence, a major goal of international business education must be to sensitise students to ethnocentrism (ie their home country shapes their impression of the rest of the world) and encourage them to see the world from different perspectives (Punnett and Ricks, 1992).

3.2 Historical Perspective of International Business

The post-World War II explosion in the volume of international trade, and especially in the magnitude of international investment by large MNCs, elevated the status of management-oriented approaches to the study of international business (Globerman, 1986; Cavusgil, 1993). The growth of international business in its many forms, volume and magnitude involves the consideration of the economic, political, and social effects on both the host and home economies and hence the resultant concern of business, government, and society.

In following the development of international business since World War II to the 1980s, Robinson (1981) identified four episodes as defined by the number of actors relevant to corporate decision making. These are:

(a) The First Episode: The 2-Actor Era

Immediate Postwar Decade - 1945 to 1955

- Two Actors:
- The Company
 - Its overseas commercial associates (ie customers, suppliers, licensees, joint-venture partners)

These postwar years were characterised by European and Japanese reconstruction, with technology, machines, and consumer goods much sought after in both markets. This led to massive US exports, augmented in the mid-1950s by a growing flow of foreign direct investment by US-based companies in other countries. There were some national entry controls (eg trade barriers in Japan), but most market-oriented countries (eg Japan and Taiwan) were still anxious about the process of accelerated, deliberate national development. Few of these companies contained the expertise to scan all possible investment opportunities on a global basis. Corporate decision-makers were products of prewar and immediate postwar management experience and training.

Just as in the study of international business, the practice of international business was largely US dominated. The achievement of business goals was perceived to be culture-free phenomenon. Such a perception led to ill-conceived attitudes and inappropriate behaviour as it encouraged a parochial and ethnocentric approach by both American business and the American government. In the United States, US industry was

considered efficient, and its technology, management and marketing skills assumed to be the best in the world. Therefore, when US industries went abroad, US products, skills and production methods went with it (Dunning, 1989; 1993). This was described by Ball and McCulloch Jr (1993) as the "self-reference criterion" or by Dymysza and Vambery (1987) as "self-reference bias", ie bias associated with studying foreign cultures from one's own frame of reference. Further, much of the research conducted had been concerned with emic (ie single-culture specific, normally American culture) analysis, although often the inferences drawn were such as to suggest that an etic (ie cultural universal) conclusion had been reached (Albaum/Peterson, 1984; Ronen, 1986). From the perspective of a hegemonic power, any reaction of other companies or governments to what the USA did or did not do was assumed to be negligible. As a result, rather than adapting to local customs, American MNCs often exerted a strong influence on business practices in the countries where they operated. The Americans (viewed as being at the forefront of management and technological developments) had the capability and confidence to restructure an international economic order after their own design.

There were few attempts to conceptualise the role of business in international affairs except as related to the two world wars. International business was an area dominated by US writers and researchers and by US-oriented studies. [Thomas (1993) noted that the most successful export marketers, Germany and Japan do not have many business schools and there is a notable lack of marketing textbooks authored by the nationals of either country]. The sheer size and growth rate of the US market may have encouraged such ethnocentrism (Wind and Robertson, 1983). Their initial training and professional orientation was rooted in one of the established functional fields of business. Tools and technical apparatus to analyse the behaviour of international companies were relatively undeveloped and unsophisticated. Until recently, the American marketing literature is almost exclusively domestic and most marketing texts simply added an international marketing chapter. Even the term "marketing" dates back not much more than half a century (Hartley, 1990).

(b) The Second Episode: The 3-Actor Era

The Growth Years - 1955 to 1970

- Three Actors:
- The Company
 - Its overseas commercial associates
 - Political players

Increasingly, formulators of corporate strategy were sensitive to the political dimension, in terms of its impact on corporate strategy, and vice versa. Some academics and government leaders became aware that business could be an important international actor.

By this time, Japanese and Western European reconstruction was complete. Japanese and European companies began to seek global markets more vigorously (in contrast to American and Japanese MNCs, European MNCs had deep roots in the overseas markets and had accumulated knowledge of local business conditions and practices). The USA had lost its nuclear monopoly. The Korean war was over. The Japanese economy had exploded into unprecedented growth. Many parts of Asia were liberated from colonial rule by Britain, France, and the Netherlands as the remaining colonial ties were cut and new, self-conscious nations entered the stage (eg countries in Southeast Asia). Deliberately accelerated national development became common. Host governments were increasingly sensitive to the potential loss of power associated with foreign investment. These factors resulted in new regulations of foreign investment that were often stringently enforced. A number of larger US-based international companies moved toward fashioning globally integrated production and marketing systems, with computers as an important management tool for controlling far-flung operations.

By then, the hegemony of US power, technology, and capital had been challenged. Western Europe and Japan provided alternative sources for needed capital, skills, machines and technology. Competition, although growing in strength, was in no way as intensive and sophisticated as it is today. Host government options widened. New academic warnings about the mounting political risk facing international business appeared in the late 1950s and early 1960s. A handful of courses were offered by business schools. However, the conceptualisation of international business became almost exclusively an activity of economists, who were inclined to equate foreign direct investment automatically with the MNC, without understanding that this was but one form of international business. People see international business as dominated by giant corporations whose economic power is so great that it may even compromise the political autonomy of nation-states. The MNC is the key figure in international business. During this period, few political scientists or organisational behaviourists concerned themselves at all with the phenomenon. Little research was done on the dynamics of change in international business.

Most of the research on international business issues was undertaken within particular disciplines. Much of the research was thus unidiscipline on theories about the motivation for, and determinants of foreign direct investment and the MNCs. However, intense debates centred on whether international business, and particularly the teaching of international business, should be developed as a new and self-contained discipline or whether each of the functional areas comprising business studies should be internationalised (Dunning, 1989; Hout, 1993).

(c) The Third Episode: The 4-Actor Era

The "time of trouble" - The 1970s

- Four Actors:
- The Company
 - Its overseas commercial associates
 - Political players
 - Multinational corporations

During the 1970s, the parent governments became increasingly active. By then, the interdependence of national economies became obvious to all. Governments began to realise the economic and political impact of international business. Political scientists finally discovered the MNC as a political actor. So began the four-actor era. The possible response of a corporation's parent government now entered the corporate decision-making calculus.

By the mid-1970s, the entire sphere of international business was heavily politicised. Mounting government regulations had intensified as public concerns surfaced in regard to pollution, natural resources allocation, income and wealth distribution, consumer protection, energy, the governance of corporations, etc. Many US companies chose to pull back rather than expand as the overall regulation of international business increased.

Few management schools had built any links between international management and political science and organisational behaviour or added professional expertise in political science to their faculties.

(d) The Fourth Episode: The Multi-Actor Era

The new international order - 1980 and beyond

- Multi-actors:
- The Company
 - Its commercial associates
 - Political players
 - Multinational corporations
 - Interest groups
 - Regional authorities
 - International organisations

A wide variety of international organisations and interest groups became relevant to corporate decision making, thereby introducing a new degree of uncertainty. MNCs of this period must consider many groups whose membership transcended national boundaries - special interest groups (eg racial, religious, ethnic), international agencies, and economic alliances, among others. These groups had developed a certain degree of political power. Environmental groups around the world, for example, had influenced businesses to incorporate "green", or ecological, issues into international strategic decisions.

In the late 1980s, efficiency seeking MNCs had increasingly accepted the need to adapt their strategies to meet the specific needs of the countries in which they operate because of country-specific differences in factor endowments, tastes, institutions, culture and language. With the growing role of government as a factor influencing the location of economic activities by MNCs, a resurgence of interest in environmental issues and national cultural identity, international business is now on the political agenda of most countries (Dunning, 1989; 1993).

Robinson (1981) concluded that little research was being done on the internal dynamics of international business. Generally, academic research and teaching lagged behind the reality. Even in the 1980s, much attention was focused on the MNC, a special form of international business organisation which appeared during the 1950s and 1960s and which may be giving way to the international service and trading companies (Rugman et al., 1985; Robinson, 1986).

Robinson (1981) had traced the four episodes of international business from 1945 to 1981. He had actually identified four major historical eras from 1550 - 1970, each characterised by a particular business emphasis or motivation. However, his suggestion

of slow-down of technological innovations and its commercialisation in the late 1980s was unfounded nor did he anticipate the momentous changes after 1981. (He was at the threshold of the fourth episode). Subsequent research by other scholars focused on the strategic imperatives, strategic constraints, and strategic logic of international business strategy. See Table 3-4.

Much of the research and writings on marketing in the USA and even around the world focused on the micro (company) level. There was a proliferation of works on the change in US business orientation from a production to a sales focus (in the 1930s) and to a marketing focus (in the 1950s and 1960s). However, Hollander (1986) tended to see their standard chronologies as gross simplifications. There is a critical void at the macro (nation) level, eg marketing and economic development. The role of marketing and the profound impact of IB on the economy must be understood and related in a constructive manner. There is a vital link between domestic and foreign markets. Without trade there can be no true development of the economy of industries in specific countries (Kaynak, 1986; Tayeb, 1992).

Over four centuries (1500s to 1990s), IB has evolved from a one-actor stage to a multi-actor stage spurred on by different motivations which defines its business-political relationships. Simultaneously, the focus for each type of activity has shifted through the eras, from marketing in the home country (ie domestic marketing) to the management of business on domestic, international, regional, and global basis. Hence, the growing popularity of *modern international business management* studies in business schools. As a corollary, the focus in IB is no longer on "marketing" per se but on "business" with its multi-faceted dimensions (Shenas, 1992). See Table 3-5.

In 1991, customer satisfaction and customer expectations were the single most-written-about subject in Japanese marketing journals. As such, it has become firmly established as the most important issue in international marketing for the 1990s. Customer satisfaction is clearly the main issue for Japanese companies today (Mizuguchi, 1992). Ultimately, *customer satisfaction is the route to profit and market share*, ie business goal. And, marketing is inherently a process of seeking to enhance customer satisfaction, to exceed customer expectations.

TABLE 3-4 MAJOR DEVELOPMENTS AND ISSUES IN INTERNATIONAL BUSINESS STRATEGY FROM THE 1980s

Scholars	Strategic Imperatives (The Strategy)	Strategic Constraints (The Difficulties)	Strategic Logic (The Reasons)
Hout, Porter, Rudden, and Vogt (1982)	Interdependent subsidiaries compels leveraging competitive edges across nations. Innovative decision logics change the scale and scope of competition.	Pre-emptive efficiencies of global competitors limit market access. National conditions also impede internationalization.	Synergistic decision-making at so-called "leverage points" enact barriers to entry and mobility.
Levitt (1983)	Global marketing; Product standardization to exploit scale economies; Commitment to producing low cost, high quality products.	Economic and cultural nationalism threatens to impede standardization; Second-mover disadvantages.	"Sell the same thing, the same way everywhere".
Hamel and Prahalad (1983; 1985)	World brand domination enables leveraging technology and distribution channels; Contracting product life cycles accelerates product throughput. Manage cash flows to cross-subsidise subsidiaries.	Subsidiaries intent on retaining autonomy in resource allocation. Political pressure for national decision centers.	Leveraging proprietary technology through proprietary distribution channels while managing cash flows to attack and defend market share.
Kogut (1985a; 1985b)	Multimarket sourcing and production shifting to arbitrage market imperfections and economic dis-equilibria.	Political risks and information uncertainty can create inefficiencies in external and internal transactions.	Surrender strategic fit for strategic flexibility to gain comparative advantage based competitive advantage.
Quelch and Hoff (1986)	Emphasize efficient global use of good marketing ideas rather than standardizing to gain scale. Install an organisation that encourages transfer of information.	Tendency of managers to see global marketing either as standardization or adaptation. Expanding HQ bureaucracy slows response time and raise costs.	Tailoring global operations to maximize efficiency in concept development and effectiveness in local delivery.
Porter (1986)	Configure value activities to exploit factor cost differentials; Extend competitive advantage by coordinating interrelationships.	Market and political imperfections threatens to separate value activities.	Achieve integration by efficiently configuring and effectively coordinating the global value chain.
Robinson (1986)	Bundle of markets differentiated by regional and ethnic tastes; Analyse its value added chain for competitiveness "selective externalisation".	National trade barriers; Identity within national borders; Challenge view of learning held by managers.	Culturally and/or environmentally based preference; Individually determined preferences; Consumer options are widening; <ul style="list-style-type: none"> . Market Segmentation . Product Adaptation . Technology permits economic production of widely diversified products on an ever small scale; Capacity to capture and learn from experience; Key is information and flexibility.
Ghoshal (1987)	Global competitiveness rests on achieving scale effects, managing attendant risks, and developing internal systems of innovation and adaptation.	Misplaced belief in the notion of industry determinism; Inability to separate operational and strategic risks; Unable to leverage learning.	Strategic tasks of managing global is to use sources of competitive advantage to optimize efficiency, risk, and learning simultaneously.
Bartlett and Ghoshal (1989)	Developing a transnational capability to manage across borders, a task that requires integrative processes that move the firm from a philosophy of fit to one of flexibility.	Legacy of administrative heritage that is contradictory to transnationalism. Tendency to imitate organizational capacities of competitors.	Firm strategic control and global coordination are precursors of success in the international marketplace.
Hamel and Prahalad (1989)	Create sense of urgency among managers. Extensive competitive intelligence. Resourceful workers. Clear checks and balances.	Challenge to managers' traditional views of planning. Analyzes are biased toward domestic markets.	Strategic intent captures the essence of winning, is stable over time, and sets targets that deserve commitment.
Stalk and Hout (1989)	Focused operations that emphasize flexible manufacturing and rapid response systems built on a foundation of R and D.	A portfolio of unrelated products and an organization that stress cost and control over fast responses.	Sustaining international position requires providing the most value for the lowest cost in the least amount of time.
Ohmae (1989)	Principle of "equidistance" in managers' vision-seeing and thinking globally. Managing variable approaches to global products requires so-called insiderization of functional skills.	Misplaced home country reflex to implement United Nations Model. Bureaucratic inertia ruins collaborations.	The lure of a global product is a false allure. Deliberate insiderization of functional strengths is the route to global success.

Source: Adapted from Sullivan, Daniel and Bauerschmidt, Alan (1991), "The 'Basic Concepts' of International Business Strategy: A Review and Reconsideration", *The Management International Review*, Vol. 31, Special Issue, pp. 111 - 123.

TABLE 3-5

**HISTORICAL PERSPECTIVE OF INTERNATIONAL BUSINESS:
THE ACTORS IN THE INTERNATIONAL BUSINESS ENVIRONMENT**

¹ Era	² Actors in IB Environment	Motivation	Business- Political Relationship	Type of Activity	Focus
Commercial 1500 - 1850		Personal Fortune Seeking	Company Sovereignty	Domestic Marketing	Buy from Distant Lands and Market in the Home Country
Explorative 1850 - 1914	One-Actor 1850 to 1945	Empire Building	Colonial Rule	Export Marketing	Export Strategies/Export Management
Concessionary 1914 - 1945	Two-Actor 1945 to 1955	Protectionism	Political Concessions	Foreign Marketing	Marketing in Foreign Countries
National 1945 - 1970	Three-Actor 1955 to 1970	Market Development	MNCs Encounter Nationalism and Localisation	Comparative Marketing/ International Marketing	Similarities/Differences in Marketing between Countries; Marketing across Multi-Countries
Global 1970 - 1990	Four-Actor 1970 to 1980	High Competition	Regional Company- Government Interaction and Cooperation, especially in European and Third World Countries	Multinational/ Global Marketing	Multinational Coordination and Integration of Marketing/ Global Coordination and Integration of Marketing.
Regional 1990 onwards	Multi-Actor 1980 onwards	Cooperative Competition	Regional Trade Blocs: APEC, EU, NAFTA. Environmental/Human: Rights Issues	Modern International Business Management	Coordination and Integration of Business on Domestic, International, Regional, Global Basis

Footnote:

- ¹
Era
- Commercial
 - Explorative
 - Concessionary
 - National
 - Global
 - Regional

- : dominant form of transactions is international trade
- : industrial revolution facilitated the birth of international business with export of foreign management, skills and technology
- : industrial policies of host country granting concession to foreign companies for their paternalistic responsibilities
- : increasing hostilities toward foreign enterprises; spirit of nationalism and indigenous economic development in host countries
- : global rationalization for efficient and effective production of components
- : trend towards regional economic cooperative and trade blocs fuelled by regionalization

²
Actors in IB Environment

- One-Actor
- Two-Actor
- Three-Actor
- Four-Actor
- Multi-Actor

- : the company (mainly individual entrepreneur)
- : the company, its overseas commercial associates (foreign constituencies)
- : the company, its overseas commercial associates, political players (host governments increasingly important)
- : the company, its overseas commercial associates, political players, MNCs (home governments increasingly important)
- : the company, its overseas commercial associates, political players, MNCs, interest groups, regional authorities, international organizations, economic alliances

Source: Adapted from Punnett, Betty Jane and Ricks, David A. (1992), *International Business*. PWS-Kent Publishing Co., Massachusetts, pp. 22 - 50; Hamill, James (1992), "Global Marketing", in *Perspectives on Marketing Management: Volume 2*. Baker, Michael J. (Ed.), John Wiley & Sons, Chichester, West Sussex, pp. 159 - 179.

3.3 Geo-Political and Geo-Economic Realities in International Business

The 1980s and 1990s saw an ever increasingly complex world of international business dominated by relentless march of technology in computers, telecommunications, information, transportation, and by the breathless pace of environmental turbulence (the Gulf War; uncertainties and instability in the Middle East; tension between a nuclear-powered India and nuclear-capable Pakistan; the collapse of Communism in the Soviet Union and Eastern Europe; the disintegration of the 74-year old Soviet Union, and the emergence of the new Commonwealth of Independent States; the fledging market democracies of Eastern Europe; the East Germany peaceful 1989 revolution that paved the way for reunification in 1990; the 1992 Single European Market; tensions in the Korean Peninsula; China's final agreement to sign the 1968 Non-Proliferation Treaty; the open-door policy of China; improvements in relations between China and India, normalisation of ties between China and Indonesia, China and Vietnam, establishment of diplomatic relations between China and Israel, China and South Korea; dispute between China and Taiwan over Taiwan's sovereignty; the normalisation of relations between US and Indochina). The entire foundation of the world economy has been dramatically altered with the onset of economic tripolarity, a world of three roughly equal economic superpowers - the USA, Japan, and an economically uniting Europe (Bergsten, 1992; Yao, 1992). Furthermore, as Table 3-6 shows, considerable steam had built up behind the liberalisation of key sectors in many countries - using both deregulation and privatisation as tools (*Economist*, June 13, 1992). The world is also seized with global community issues, especially human rights and the concern about effective integration of environmental concerns and economic development. ASEAN-EU trade had grown at an average annual rate of 24.5 percent over the last three years reaching US\$50 billion in 1991 (*Straits Times*, October 31, 1992). However, there is a sharp division between countries in ASEAN and EU over human rights and the promotion of democracy (*Business Times*, November 2, 1992). The Japanese government stated that the amount of aid a country will get from Japan is dependent on its human rights record and arms procurement policy (*Straits Times*, October 26, 1992). Further, the Clinton Administration is expected to pursue aggressively human rights, human freedoms, and democracy.

The end of the Cold War may have brought "peace" but it may also unleash new competitive forces on the economic plane that could result in new sources of international instability. In this new "geoeconomics", the competition for influence through capital flows rather than troop deployments will be the order of the day. In practical terms, a new realism based on profitability rather than ideological affinities now determines economic transactions between states across the old Cold War divide (Bergsten, 1992; Chin, 1992).

TABLE 3-6

EXAMPLES OF DEREGULATION AND PRIVATISATION**(A) Deregulation**

Year	Sector	Country	Comments
1975	Finance	USA	Elimination of fixed commissions (New York Stock Exchange)
1978	Aviation	USA	Deregulation of domestic aviation market
1979	Finance	UK	Elimination of exchange controls
1984	Telecommunications	USA	Deregulation of AT&T; break-up of monopoly and creation of seven regional companies
1985	Finance	Japan	Starts deregulation of financial markets
1986	Finance	UK	Elimination of fixed commissions and new option to create financial conglomerates
1989	Automotives	Mexico	Elimination and reduction of production and import restrictions and local content requirements
1989	Foreign Investment	Hungary	Liberalization of foreign investment laws, allowing foreign companies 100 percent ownership
1990	Finance	Poland	Introduction of internal convertibility for currency; capital controls remain
1990	Aviation	Australia	Deregulation of domestic aviation market
1990	Finance	Germany	Elimination of capital controls
1992	Finance	Canada	Liberalization of financial services (Bank Act)

(B) Privatisation

Year	Sector	Country	Comments
1984	Telecommunications	UK	Privatisation of British Telecom
1985	Telecommunications	Japan	Privatisation of NT & T
1986	Energy	UK	Privatisation of British Gas
1987	Aviation	UK	Privatisation of British Airways
1990	Energy	UK	Privatisation of electricity companies
1990	Travel/Finance	Hungary	Privatisation of IBUSZ (travel and financial services group)
1990	Telecommunications	Mexico	Privatisation of Telmex
1991	Consumer Electronics	Hungary	Privatisation of Lehel (refrigerators)
1991	Aviation	Holland	Privatisation of the State Aviation College
1992	Energy	Canada	Privatisation of Petro Canada
1993	Telecommunications	Singapore	Privatisation of Singapore Telecom

Source: Adapted from Turner, Louis and Hodges, Michael (1992), Global Shakeout. Century Business, London, pp. 26, 30.

3.3.1 The Dynamism of the East Asian Economies

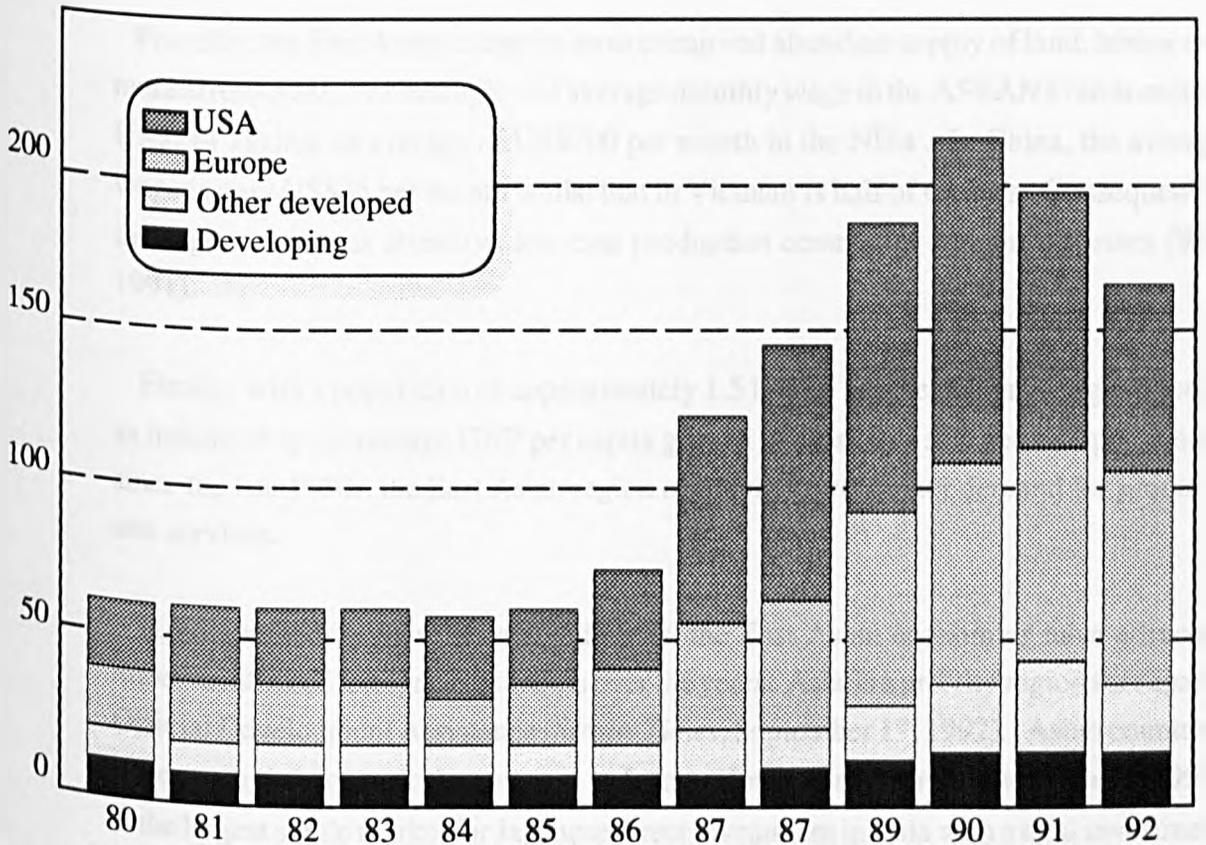
There is some concern in Asia that the region will become an area of intense economic and political rivalry between Japan and the USA. Events like regional economic integration such as the Single EU Market or North America Free Trade Area (NAFTA), and the collapse of centrally-planned economies have changed the global landscape. Liberalization and market restructuring in the East Asian economies like China, Malaysia, Indonesia, Vietnam and South Asia have also transformed the international and regional business environment. The net impact of all these developments is rapid internationalization of the world economy. A major force underlying this trend is the flow of foreign direct investments (FDI). Japan overtook the UK in 1992 as the world's second largest national source of FDI, despite a massive slowdown in the growth of international direct investment since 1990 (US Department of Commerce; See Figure 3.4). As a conduit for cross border activities of multinational corporations (MNC), FDI expedites changes in international business, and leads to the increasing interdependence in the world economy. Consequently, nations and corporations have to grapple with an array of new issues and challenges in the internationalized business world.

There are several factors which galvanise the economic attractiveness and dynamism of East Asian economies. One of the significant factors is increasing commitment toward liberalization, deregulation and privatization of the economy, trade, financial markets and investment controls in East Asia. For instance, regulations on foreign equity participation have been progressively relaxed in Malaysia, Indonesia and Thailand since the late 1980s. Financial deregulations in Indonesia and Thailand provide for the entry of foreign banks. Foreign exchange controls have been gradually relaxed in the Philippines and Thailand. Massive privatization exercises have been undertaken in Malaysia, Thailand and the Philippines. In more recent times, transition towards a market economy and economic reforms have been implemented in China and Vietnam.

The second reason is the rapid industrialization programme embarked upon by the Asian countries. The transformation of a commodity-based economy to an industrialized-based economy has reduced the vulnerability of the Asian economies to the vagaries of world commodity prices. This has helped to spur economic development in the region. As a result, the share of manufacturing exports to total exports in the ASEAN Four countries (ie Malaysia, Indonesia, Thailand and the Philippines) rose from 17 percent in 1980 to more than 50 percent in 1991 (Wu, 1991).

FIGURE 3.4 WORLD FLOWS OF INWARD DIRECT INVESTMENT

By major recipient (US\$bn)



- Footnote: (1) The US remains the leading source of investment. The study says a surge in foreign investment like that seen in the 1980s - with annual increases averaging 19 percent - is unlikely to occur "without a further liberalisation of investment barriers".
- (2) In 1991, FDI grew by just 5.5 percent to US\$1.90 billion. Stimulus could come from liberalisation of investment rules due to successful completion of the Uruguay Round of world trade talks; from removal of investment restraints at the sub-national level and in such regulated industries as telecommunications, airlines, utilities, and natural resources; from a surge in privatisation of state-owned companies; and from agreement on harmonising national competition policies.
- (3) In 1992, the stock of US outward investment amounted to US\$489 billion. The UK, with a stock of US\$243 billion after two years of negligible growth, was overtaken by Japan, with US\$248 billion. This follows a five-year surge to 1990, during which Japan's FDI grew at an annual rate of almost 37 percent. Growth for 1992 has slowed down to 7 percent.
- (4) Investment into the USA has plummeted. The report shows the USA falling behind the UK, France and the Netherlands in 1992 as the single largest host to FDI.

Source: US Department of Commerce

The economic acceleration in the region had led to brisk growth in intra-Asian trade, the third factor for the East Asian economic buoyancy. Between 1987 and June 1992, intra-Asian trade grew by an annual average rate of 20 percent compared with 10 percent for the Asia-North America trade and 15 percent for the Asia-Europe trade. This fast pace of trade expansion reflected enhanced economic integration among the countries in the region. This will be the major driving force for trade expansion in the coming decades (Wu, 1991).

Fourthly, the East Asian countries have cheap and abundant supply of land, labour and natural resources. For example, the average monthly wage in the ASEAN Four is around US\$144 against an average of US\$700 per month in the NIEs. In China, the average wage is only US\$45 per month whilst that in Vietnam is half of China's. Consequently, the region serves as attractive low cost production centres for foreign investors (Wu, 1991).

Finally, with a population of approximately 1.5 billion people and growing affluence as indicated by an average GNP per capita growth of close to 7 to 8 percent per annum since the late 1980s, the East Asian region offers rising consumer demand for products and services.

Underpinned by these attractive factors, the East Asian economies have attracted massive influx of foreign investments over the years. Asia is a priority region for Japan's Official Development Assistance (*Straits Times*, September 17, 1992). Asian countries have strategic economic importance to Japan. Hong Kong (to return to China in 1997) is the largest single market for Japanese direct investment in Asia with a total investment of US\$7.6 billion during 1985 to 1989 (Chan, 1992). The British colony is fast becoming a base for Japanese companies making forays into China. Indonesia is not only a convenient manufacturing base, but also an important source of raw materials. Japan also ranks high among foreign investors in Indonesia. In Thailand, Japan has successively marketed its products to become the Kingdom's largest supplier. (The amount of Japanese investments in the Asian countries is reflected in Table 3-7).

In early 1991, Asia emerged as Japan's top regional export market. Exports to Europe declined because of its political instability. Exports to the USA declined because of the US slump, enhanced American competitiveness and protectionist measures such as

TABLE 3-7

JAPAN'S DIRECT INVESTMENT IN THE ASIAN COUNTRIES

	FY 1987		FY 1988		FY 1989		FY 1990		FY 1991		YY%
	\$ mil.	% share									
Asian NIEs	2,580	7.7	3,264	6.9	4,900	7.3	3,355	5.9	2,203	5.3	-34.3
South Korea	647	1.9	483	1.0	606	0.9	284	0.5	260	0.6	- 8.5
Taiwan	367	1.1	372	0.8	494	0.7	446	0.8	405	1.0	- 9.2
Hong Kong	1,072	3.2	1,662	3.5	1,898	2.8	1,785	3.1	925	2.2	-18.2
Singapore	494	1.5	747	1.6	1,902	2.8	840	1.5	613	1.5	-27.0
ASEAN 4	1,030	3.1	1,966	4.2	2,782	4.1	3,242	5.7	3,083	7.4	- 1.9
Indonesia	545	1.6	586	1.2	631	0.9	1,105	1.9	1,193	2.9	8.0
Malaysia	163	0.5	387	0.8	673	1.0	725	1.3	880	2.1	21.4
Philippines	72	0.2	134	0.3	202	0.3	258	0.5	203	0.5	-21.3
Thailand	250	0.7	859	1.8	1,276	1.9	1,154	2.0	807	1.9	-30.1
China	1,266	3.7	296	0.6	438	0.6	349	0.6	579	1.4	-65.9
USA	14,704	44.1	21,701	46.2	32,540	48.2	26,128	45.2	18,026	43.3	-31.0
Europe	6,575	19.7	9,116	19.4	14,808	21.9	14,294	25.1	9,371	22.5	-34.4
World Total	33,364	100.0	47,022	100.0	67,540	100.0	56,911	100.0	41,584	100.0	-26.9

Source: Nomura Research Institute (1992), Surveying Trends in a Changing Business Environment, October.

voluntary restraint agreements (VRAs) on steel and machine tools, and penalty tariffs on computers. American market cannot continue to absorb both the majority of products churned out by the Japanese export machine and the economic growth of other Asian states. For the current US debt to be paid off, its economy has to run a trade surplus of at least US\$20 million for more than a decade; or it has to monetise, ie inflate its way out of the crisis (see Table 3-8). Either way, the buying power of America will be sharply reduced and this then creates a situation where the real alternative market for Japan will be the rest of Asia and vice-versa. This is why trends towards economic regionalism in Europe, North America and East Asia are so important since post-Cold War (Johnson, 1993). Cronin (1992), argued that in the 1990s Japan will consolidate its position as the most important Asia-Pacific economic power, the region's "core economy" and the main catalyst of growing intra-regional trade.

Japanese FDI in East Asia had been spectacular, both with respect to the speed of the surge since 1985 and its size, relative to the host economies. With North American and European economies suffering from what may be protracted slowdowns, and East Asian living standards projected to rise rapidly in the 1990s, Asian production opportunities can be expected increasingly to attract Western companies as well, not just as exporters, but as investors (see Table 3-9). In Asia, the distribution of American and Japanese FDI is broadly similar across economies and industries. One reason for the similarity is that US companies arrived in force in the 1970s to produce for the US market, rather than locally. Japanese companies arriving in the late 1980s set up production bases to maintain export shares in North American and European markets and to serve the increasingly affluent local markets (*Business Times*, October 29, 1992). Japanese FDI in China totalled less than US\$500 million in 1990, a year after the crackdown on a pro-democracy movement in Tiananmen Square (De Keijzer, 1992). The lure of China's high growth market is so strong that Japanese corporations are stepping up investment. Japan is the fourth largest investor in China after Hong Kong, Taiwan and the USA. Japan is now the world's biggest donor of aid to China (*Business Times*, October 27, 1992). During the 1980s, Japan decisively displaced the USA as the largest source of new business investment and economic aid in the region stretching from South Asia to the Pacific islands. Total cumulative Japanese investments in Asia amounted to US\$59.88 billion up till March 31, 1993, double the US commitments in the region (Ministry of Finance, Japan). See Figure 3.5.

TABLE 3-8

MAIN SOURCES OF THE US TRADE DEFICIT: NON-SEASONALLY ADJUSTED (1989 - 1992)

	1989 US\$ Billion	1990 US\$ Billion	1991 US\$ Billion	1992 US\$ Billion	1993 * US\$ Billion
Japan	49.1	41.1	43.4	49.6	54.0
Taiwan	13.0	11.2	9.8	9.4	10.0
Canada	9.1	7.7	5.9	6.0	7.0
Germany	7.9	9.4	4.8	7.6	9.0
Netherland	6.5	8.1	8.4	8.4	8.2
China	6.2	10.4	12.7	18.3	24.0
Total	US\$ 109.5	US\$ 101.7	US\$ 66.7	US\$ 84.5	US\$112.2

Source: US Department of Commerce: US Trade Balance Reports (1989 to 1992); Figures for 1993* are estimated by *Fortune*.

TABLE 3-9

SUMMARY TABLES OF GDP GROWTH RATES AND INFLATION RATES IN ASIAN NIEs AND ASEAN COUNTRIES

(A) GDP Growth Rates (in real terms)						
	1987	1988	1989	1990	1991	(%) 1992
South Korea	12.0	11.5	6.2	9.0	8.5	7.6
Taiwan	12.3	7.3	7.6	4.9	7.2	7.5
Hong Kong	14.5	8.3	2.7	2.8	4.2	5.8
Singapore	9.4	11.1	9.2	8.3	6.9	6.5
Indonesia	4.9	5.8	7.5	7.4	6.6	6.3
Malaysia	5.4	8.9	8.7	9.8	8.0	7.1
Philippines	4.8	6.3	5.9	2.1	0.0	3.1
Thailand	8.8	12.0	11.9	10.4	7.8	7.3

(B) Inflation Rates (measured by GDP deflator)						
	1987	1988	1989	1990	1991	(%) 1992
South Korea	3.5	5.9	5.2	8.9	9.3	8.3
Taiwan	0.5	1.1	3.1	3.8	3.5	3.9
Hong Kong	7.6	8.9	11.4	8.4	8.5	8.2
Singapore	0.7	4.2	3.6	3.0	3.2	3.0
Indonesia	15.9	7.6	9.6	9.9	8.4	7.9
Malaysia	5.5	4.7	2.7	2.9	4.7	3.4
Philippines	7.4	10.1	8.5	13.2	17.0	13.1
Thailand	4.5	5.7	6.8	5.0	7.2	5.5

Note: The GDP growth and inflation rates are actual figures for 1987-90 and forecasts for 1991 and 1992.

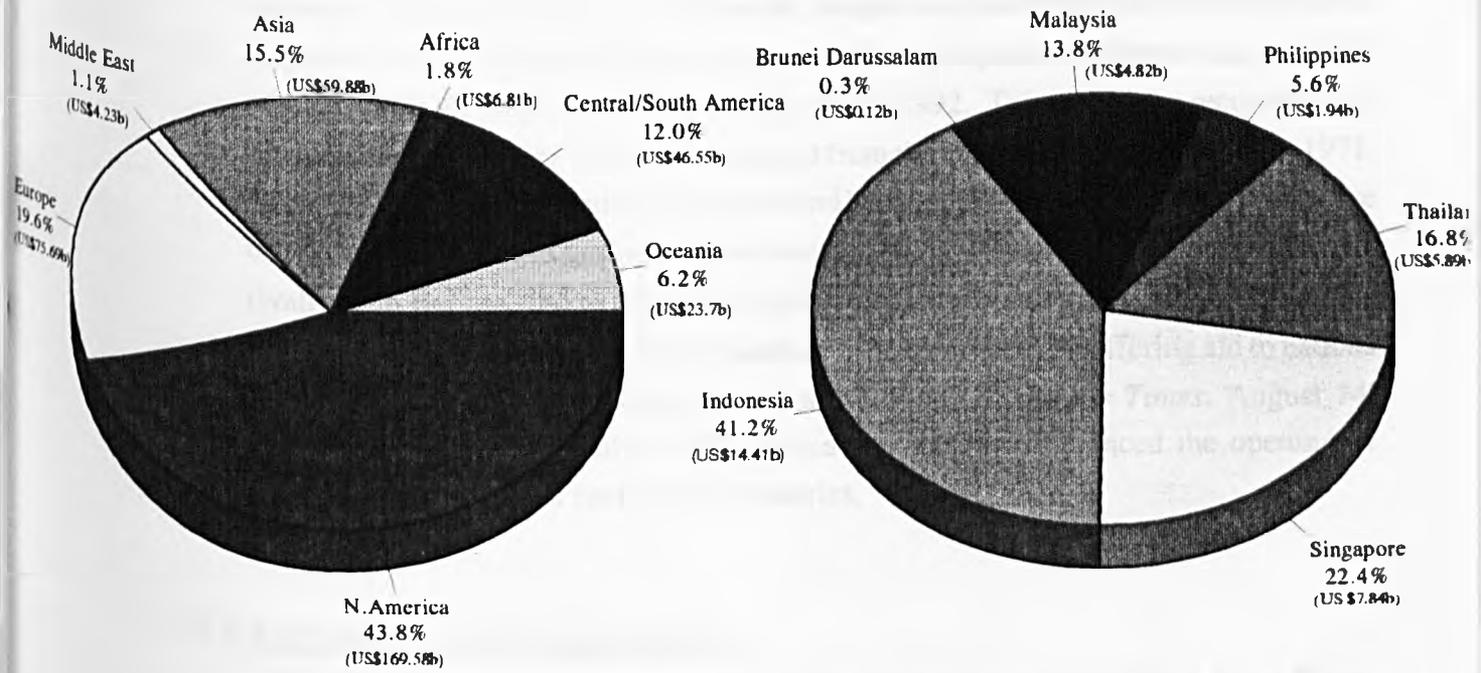
Reference Table. Group Growth Rates for Asian NIEs and ASEAN 4						
	1987	1988	1989	1990	1991	(%) 1992
Asian NIEs						
ASEAN 4	12.3	9.6	6.3	6.7	7.4	7.3
Asian NIEs	6.0	8.1	8.7	7.8	6.1	6.3
and ASEAN 4	10.0	9.1	7.1	7.1	6.9	6.9

(i) Asian NIEs (South Korea, Taiwan, Hong Kong and Singapore) and ASEAN 4 (Indonesia, Malaysia, the Philippines and Thailand).

(ii) The GDP figures in 1990 prices were converted into US Dollars using the 1990 exchange rates, and the group growth rates were those of the group totals of the US dollar-denominated GDP

Source: Toida, Mitsuru and Hiratsuka, Daisuke (Eds.) (1992), 1992 Economic Forecasts for Asian Industrializing Region, Institute of Developing Economies, Tokyo.

FIGURE 3.5 JAPANESE INVESTMENTS WORLDWIDE AND IN ASEAN



Source: Ministry of Finance, Japan

The Asian region is looking for faster-growing markets and closer intra-regional ties. The dependence of newly industrialised economies in East Asia - Taiwan, South Korea, Hong Kong and Singapore - on exports to the USA has been falling fast as regional trade growth has burgeoned. Japanese, Taiwanese and Hong Kong capital surpluses have been building new business links and prosperity across the region.

Taiwan became the second leading source of new investment in the Philippines, and an important investor in Hong Kong. By 1989, Taiwan was the second-ranking source of FDI in Malaysia and Thailand, after Japan (see Table 3-10). Taiwan's foreign exchange reserves, the largest in the world, surged to a record high of US\$88 billion at the end of July 1992. South Korea, Taiwan's last formal diplomatic ally in Asia, switched recognition from Taipei to Beijing on August 24, 1992. Taiwan is now recognised by only twenty-nine states. Taiwan was ousted from the United Nations by China in 1971. It uses its Overseas Economic Cooperation and Development Fund (OECD) to improve official and substantive ties with other countries in the face of its on-going diplomatic rivalry with Beijing, and to help break diplomatic barriers set up by China. Taiwan is reducing its economic aid to Central America in order to focus on offering aid to nations like Vietnam, Cambodia, Indonesia and the Philippines (*Straits Times*, August 14, 1992). Further, in September 1992, Russia and Taiwan announced the opening of representative offices in each other's countries.

3.3.2 The Trends Towards Regionalization

In 1992, the world's fastest-growing economies continued to be China, Hong Kong, Indonesia, South Korea, Malaysia, Singapore, Taiwan and Thailand, and they also accounted for much of the expansion of regional trade.

Successful export-led industrialisation strategies of the 1980s mean more dependence on trade and foreign investment in the 1990s. As a consequence, the ASEAN countries find themselves increasingly affected by world events external to the region. These dynamic forces profoundly affect economic linkages and interdependencies, as ASEAN governments and the private sector respond to the challenges of possible trade and investment diversion to Europe (see Table 3-11), NAFTA, and other newly liberalising economies in Latin America and the Asian sub-continent. Rapid growth dictates a need to forge new relationships with the OECD, G-7, and Asian NIE member countries.

TABLE 3-10

JAPANESE AND ASIAN NIEs' SHARE OF TOTAL FOREIGN INVESTMENTS IN THE ASEAN FOUR, 1987 - 1990

From	To	Indonesia	Malaysia	Philippines	Thailand	Total	
		(US\$m)	(US\$m)	(US\$m)	(US\$m)	(US\$m)	% share
1990							
Japan		2,234	1,565	306	364	4,460	25.5
Asian NIEs		2,547	3,124	384	610	6,665	38.0
Hong Kong		993	138	208	365	1,704	9.7
South Korea		721	314	21	42	1,098	6.3
Singapore		217	331	14	62	624	3.6
Taiwan		616	2,341	141	141	3,239	18.5
World Total		8,691	6,510	961	1,362	17,524	100
1989							
Japan		769	993	158	388	2,308	24.2
Asian NIEs		1,197	1,335	323	284	3,140	32.9
Hong Kong		407	130	133	62	732	7.7
South Korea		466	70	17	27	581	6.1
Singapore		166	338	24	41	569	6.0
Taiwan		158	797	149	154	1,258	13.2
World Total		4,529	3,194	804	1,008	9,535	100
1988							
Japan		247	467	117	723	1,554	19.4
Asian NIEs		1,590	607	142	235	2,574	32.1
Hong Kong		240	114	27	35	416	5.2
South Korea		200	16	2	21	239	3.0
Singapore		240	160	2	21	423	5.3
Taiwan		910	317	111	158	1,258	18.6
World Total		4,409	1,863	486	1,266	8,024	100
1987							
Japan		532	284	29	143	988	35.4
Asian NIEs		172	235	39	80	526	18.8
Hong Kong		135	35	28	14	212	7.6
South Korea		23	1	1	4	29	1.0
Singapore		1	103	1	2	107	3.8
Taiwan		8	96	9	60	173	6.2
World Total		1,481	817	167	326	2,791	100

Source: Board of Investments, Thailand; Board of Investments, the Philippines; Indonesian Investment Coordinating Board; and Malaysian Industrial Development Authority.

TABLE 3-11 MAJOR MULTINATIONAL COMPANY INVESTMENTS IN EASTERN EUROPE AND THE FORMER SOVIET UNION

Investor	Partner (if any)	Industry	Value million	% Stake
Volkswagen (Germany)	SKODA, BAZ (Czechoslovakia)	Cars	\$ 6,630	70%
Coca-Cola (USA)	Treuhandanstalt (ex-GDR)	Beverages	DM 660	NA
Philip Morris (USA)	Tabak (Czechoslovakia)	Tobacco	\$ 395.8	100%
Allianz (Germany)	Deutsche Versicherung (ex-GDR)	Insurance	\$ 278.4	100%
Suzuki (Japan)	New Factory (Hungary)	Cars	\$ 235	40%
Mercedes Benz (Germany)	Avia (Czechoslovakia)	Trucks	DM 450	31%
Siemens (Germany)	SkodaKonzern (Czechoslovakia)	Power Generation	\$ 170	67%
General Electric (USA)	Tungsram (Hungary)	Lighting	\$ 150	75%
Asea Brown Boveri (Sweden/Switzerland)	Treuhandanstalt (ex-GDR)	Engineering	DM 112	NA
Asea Brown Boveri (Sweden/Switzerland)	Zamech (Poland)	Turbines	\$ 50	76%
Pilkington (UK)	HSO Sandomierz (Poland)	Glass	\$ 140	40%
Nestle and BSN (Switzerland, France)	Cokoladovny (Czechoslovakia)	Food	\$ 95.5	43%
			••	

- Total Investment Commitment
- Proposed

Source: The Financial Times, The Economist, Business International, Bureau of National Affairs "East European Reporter"

ASEAN countries will also place increasing importance on its role in such extra-regional organisations as the EAEC, APEC, and PECC (Pacific Economic Cooperation Conference). Within the region, a certain degree of convergence in trade and investment patterns and responses to MNCs implies a shifting balance between competition and complementarity. Asian nation-state will increasingly share its authority with other bodies, larger or smaller. One current development with great significance is the development of National Economic Territories (NETs), entities cutting across political lines to pool natural resources, manpower, capital and technology. NETs are emerging throughout East Asia (*Business Times*, March 31, 1993): Guangdong - Hong Kong-Taiwan; Johor - Singapore - Riau (Indonesia); Shandong - South Korea.

Economic theory still assumes that the sovereign national state is the sole, or at least the predominant unit, and the only one capable of effective economic policy. But increasingly decision-making power is shifting to the second unit, the region (Drucker, 1991). Prahalad (1990) argued that it is no longer adequate to think in terms of nation-states; the impact of the emergence of trading blocs and economics must be taken into account. Economic interdependence has placed an even higher premium upon the construction of institutions and decision-making mechanisms above the nation-state (*Business Times*, March 31, 1993). The 1990s witnessed the speed with which the world's trading nations grouped themselves into trade blocs (and creating acronyms) which will have an impact on the multilateral trading system hitherto guided by GATT. The EU led the way, first aiming for a SEM among its twelve members, but later rushing into an even mightier EEA that took in the seven members of the EFTA. In January 1992, ASEAN had its own AFTA. The USA, Canada and Mexico agreed in August 1992 to form NAFTA. Countries in both AFTA and NAFTA belong to the same larger grouping in APEC, with this group meeting in Seattle in November 1993, an occasion memorable for some improvements in Sino-US relations (*Business Times*, November 20 - 24, 1993). APEC has to contend with another proposed rival, the EAEC. The creation of regional economic blocs may intensify cross-border competition. A key focus of the 1990s will be how these groupings deal with one another. In the long run, regionalism may well be a positive development for the world. Free trade within regions and managed trade between regions may well be the long run route to freer world trade. Jumping in one big leap from national economies to a world economy is simply too big a leap to make. It is necessary to take smaller intermediate steps first, and quasi-trading blocs combined with managed trade, may be just such a necessary intermediate step (Thurow, 1992).

The trend towards regional liberalization in trade and payment arrangements must be in the context of an effective global nature of economic relations (Bergsten, 1992). The traditional East-West and North-South descriptions of the post-World War II era has given way to new form of social relationships among nation-states, ie nation-states collaboration within regional communities. Three regional communities seem likely to dominate global trade in the 1990s: North America, Europe and Asia Pacific (Fombrun, 1992; Paliwoda, 1993).

Modern technology and science are pushing the world simultaneously in the direction of regionalism and globalism. Real regionalism requires a world view, if it is not to lose its way in the global world of modern technology and science. It must also have a rational and deep understanding of the new history which is shaped through the cooperative interaction of some five billion people who today live in a vastly shrunken planet and are better informed about the world we live in than earlier generations (Rajaratnam, 1992). Already, however, many companies are hedging their bets by establishing a large presence in each region. Hence, the recent flurry of cross-border acquisitions and the rash of global alliances and joint ventures (Khambata/ Ajami, 1992) . See Table 3-12.

In the machine tool industry, General Electric has united with FANUC on a fifty-fifty partnership to build control devices for automated machine tools (Morris, 1990). It manufactured industrial robots in the USA, thus circumventing the important limitations imposed on Fanuc by the US government (Holt, 1993). Other leading Japanese machine tool companies that pursue a similar strategy to maintain market share in the USA (stretching from the north to the south region), are Yamazaki (Holland, 1989), and Okuma (Bleeke and Ernst, 1993).

Mr Takuma Yamamoto, Chairman of Fujitsu Ltd, believed that the years of classic capitalism in the computer industry, in which individual companies compete head to head, will soon be over. He envisioned instead a future in which competition among cross-border alliances of companies will maintain the dynamism of capitalism. These alliances are a measure to avoid economic friction with foreign countries and a way to capitalise on the creative talents of companies outside Japan (*Business Times*, March 3, 1992).

Abegglen and Watanabe (1990), Buckley (1992) and Drucker (1992) predicted that

TABLE 3-12 METHODS OF EXPANSION: EXAMPLES OF COMPANIES ENGAGED IN LICENSING, FRANCHISING, JOINT VENTURES, TAKE-OVERS AND GREENFIELD INVESTMENTS, 1989 - 1992

Origin	Licensing	Franchising	Joint Venture	Take-Over	Greenfield
USA	<ul style="list-style-type: none"> • Coca-Cola (USA)/Britvic (USA/UK) • Philip Morris (USA)/Tabak (Czechoslovakia) and Krakow Tobacco Factory (Poland) • Apple (USA)/Sharp (Japan) • Texas Instruments (USA)/Ricoh (Japan) 	<ul style="list-style-type: none"> • McDonald's (USA) • Opel (USA)/Yanase (Japan) • Pepsico (USA) • Ford (USA) 	<ul style="list-style-type: none"> • Hughes Aircraft (USA)/JVC (Japan) • Chevron (USA)/Kazakhstan (oil) • Morton International (USA)/Robert Bosch (Germany) 	<ul style="list-style-type: none"> • Ford (USA)/Jaguar (UK) • Philip Morris (USA)/Jacobs Suchard (Switzerland) • Pepsico (USA)/Wedel (Poland) • IBM (USA)/Muszertechnika (Hungary) 	<ul style="list-style-type: none"> • Motorola (USA)/Tianjin (China) • Texas Instruments (USA)/Avezzano (Italy) • General Motors (USA)/Szentgotthard (Hungary) • Coca Cola (USA)/Gdynia (Poland)
Japan	<ul style="list-style-type: none"> • Hitachi (Japan)/Olivetti (Italy) • Sony (Japan)/Samsung (Korea) 	<ul style="list-style-type: none"> • Mazda (Japan) • Toyota (Japan) • Nissan (Japan) 	<ul style="list-style-type: none"> • NKK (Japan)/Bethlehem Steel (USA) • Honda Motor (Japan)/Guangzhou Motor Cycle (China) 	<ul style="list-style-type: none"> • Fujitsu (Japan)/ICL (UK) • Sony (Japan)/Columbia Pictures (USA) 	<ul style="list-style-type: none"> • Mitsubishi (Japan)/Aachen (Germany) • Hitachi (Japan)/Landshut (Germany) • Canon (Japan)/Brittany (France) • Toyota (Japan)/Burnaston (UK)
UK	<ul style="list-style-type: none"> • ICI (UK)/Hungary, Czechoslovakia • Pilkington/PPG (USA) 	<ul style="list-style-type: none"> • Rover (UK) • Burger King (UK) • Body Shop (UK) 	<ul style="list-style-type: none"> • Atlantic Television (UK)/Channel 2 TV Romania (Romania) • Laura Ashley (UK)/Japanese United Stores (Japan) 	<ul style="list-style-type: none"> • SmithKline Beecham (UK)/Saechsiches Serumwerke (Germany) • Unilever (UK/NL)/NMV (Hungary) • Unilever (UK/NL)/Pollena Bydgoszcz (Poland) 	<ul style="list-style-type: none"> • ICI (UK)/Puerto Rico • GKN (UK) and Tochigini Fuji (Japan)/Tochigi (Japan)
France	<ul style="list-style-type: none"> • Rhone-Poulenc (France)/Regeneration Pharmaceuticals (USA) 	<ul style="list-style-type: none"> • Citroen (France) • Renault (France) • Peugeot (France) 	<ul style="list-style-type: none"> • Total (France)/Komineft (Russia) • France Telecom (France)/Deutsche Telekom (Germany) • Club Med (France)/Carnival Cruise Lines (USA) 	<ul style="list-style-type: none"> • Bull (France)/Zenith (USA) • SNECMA (France)/Speco (USA) • Rhone-Poulenc (France)/Chemlon (Czechoslovakia) 	<ul style="list-style-type: none"> • Société Ciments Francais (France)/Turkey • Orsam (Lafarge Coppee) (France) and Ajino-moto (Japan)/Venice (Italy)

Source: Turner, Louis and Hodges, Michael (1992), Global Shakeout : World Market Competition - The Challenges for Business and Government, Century Business, London, pp. 65.

alliances of all kinds (mergers, acquisitions, strategic alliances) are becoming increasingly common, especially in international business and the trend is likely to accelerate. As observed by Thurow (1992), companies in such inter-locked groups are much stronger competitors. In Schill and McArthur's (1992) new global marketing paradigm, long range competitive success can no longer be achieved by a single company. The relevant competitive unit has shifted from the company to the larger competitive system of companies aligned in strategic collaborations for competitive advantage. Today's global companies will be superseded by the "relationship enterprise", a network of strategic alliances among big companies, spanning different industries and countries but held together by common goals which encourage them to act almost as a single company (*Economist*, February 6, 1993). Whatever their nationality, companies now accept that a purely national strategy is no longer defensible in the super-competitive world. Strategic alliances which increasingly straddle continents, bring together combinations of European, Japanese or American companies in alliances (Turner and Hodges, 1992).

3.4 Socio-Cultural-Technological Environments

The *First Wave* of change, the agricultural revolution, has essentially ended. The *Second Wave*, coincidental with industrialization, continues to spread. The *Second Wave* is rooted in materialism and the supremacy of man. From this orientation flows a stress on competition, self-presentation, and consumption, which has led to such current problems as pollution, solid-waste disposal, crime, family violence, and international terrorism.

A new, post-industrial *Third Wave* is gathering force in the modern industrialised nations. The *Third Wave* manifests growing concern for balance and sustainability. As the *Third Wave* unfolds, we become more sensitive to the issue of conservation, sanctity of life, and cooperation.

We see a *Fourth Wave* following close upon the Third. The *Fourth Wave* foresees a radically different future in which business principles, concern for the environment, personal integrity, and spiritual values are integrated.

According to Maynard, Jr and Mehrtens (1993), each wave has a distinctive worldview, epitomized as:

- *Second Wave* - we are separate and must compete
- *Third Wave* - we are connected and must cooperate
- *Fourth Wave* - we are one and choose to cocreate

(See Table 3-13 for details.)

Naisbitt (1982) noted that although the shift from an agricultural (the first wave) to an industrial society (the second wave) took one hundred years, the present restructuring from an industrial to an information society (the third wave) has taken only two decades. We have experienced a megashift from an industrial to an information society based on the creation and distribution of information. In an industrial society, the strategic resource is capital. In the new society, the strategic resource is information. Information is the core of today's economy as it profoundly affects all business and their organisation. Computers and telecommunications are reshaping the basic structure of our enterprises and competitive businesses must use the new technology either to improve products and services or create new ones (Davis and Davidson, 1991). Further, technological change (and in particular the shrinking of the globe through the increased speed and diminishing cost of international transportation, telecommunications and data processing) has created world markets that override national frontiers with increasing ease and transformed the time dimension of competition. Turner and Hodges (1992) labelled this period as the Super-Competitive Era. Super-competition not only involves products, brands and companies. It is also a contest between views of the world and frameworks for organising economic life.

In the information age, the focus of manufacturing will shift from the physical to the more intellectual functions upon which the physical depends. The end of labour-intensive manufacturing leaves us with organisations which receive added values from the knowledge and the creativity they put in rather than the muscle-power. The new formula for success is:

$$I^3 = AV$$

where I stands for Intelligence, Information, and Ideas; AV means added value. In a competitive information society, brains on their own are not enough, they need good information to work with and ideas to build on to make value out of knowledge (Handy, 1992). We now mass-produce knowledge and this knowledge is the driving force of our economy.

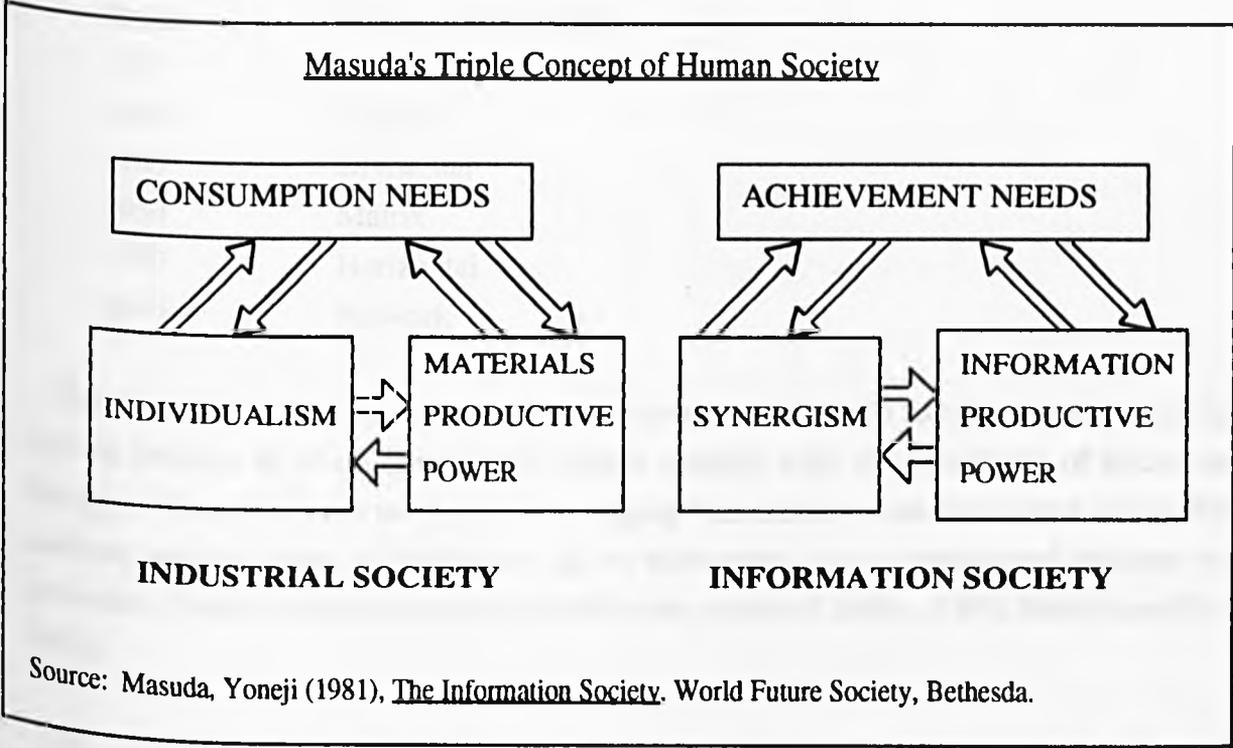
Today, learning, information and knowledge are pre-requisite for good business practice to

TABLE 3-13 THE FOUR WAVES : TOWARDS BUSINESS IN THE 21ST CENTURY

	The Second Wave (Industrialization Era)	The Third Wave (Post-Industrialization Era)	The Fourth Wave The 21st Century
Worldviews	We are separate and must compete	We are connected and must cooperate	We are one and choose to cocreate
Corporate Role	Maximize profits	Create value	Act as global steward
Corporate Wealth	Tangible assets	Tangible and intangible assets	Most tangible assets, emphasizing the quality of life
Corporate Structure	Hierarchy, matrix, business unit	Team value	Community
Environmental Perspective	Consumption	Sustainability	Preservation
Technology Development	In a vacuum	In growing harmony with sociocultural, political and environmental values	In full accordance with principles of appropriate technology
Corporate Leadership Role	Business leader	Participant in dialogues on societal and global warfare	Global leader and biopolitician

Source: Compiled by the Author from Maynard, Jr Herman Bryant and Mehrtens, Susan E. (1993), The Fourth Wave: Business in the 21st Century. Berrett-Koehler Publishers, San Francisco, California.

achieve world-class performance (Woodcock and Weaver, 1993). The real source of competitive advantage is in intellectual property - the concepts, ideas, designs and approach that formed the basis for new industries (Prahalad, 1990). Knowledge has become a developed economy's capital. The new reality is - Knowledge is now capital, and Knowledge workers are specialists who are creating information-based organisations. Drucker's (1989) knowledge society is Masuda's (1981) information society, ie a society that grows and develops around information, and brings about a general flourishing state of human intellectual creativity. If the goal of industrial society is presented by volume consumption of durable consumer goods or realisation of heavy mass consumption, information society may be termed as a society with high intellectual creativity with people seeking self-actualisation (Naisbitt and Aburdene, 1990)



The production of information values and not material values will be the driving force behind the evolution of society. We will use our brainpower to create instead of our physical power and the technology of the day will extend and enhance our mental ability.

The notion that knowledge can create economic value is generally absent from most economic analysis. Traditional economic factors of production are land, labour, capital and raw materials. Morgan (1991) recognised that in the modern age, knowledge, creativity,

opportunity seeking, interpersonal skills, and entrepreneurship are becoming equally important (Rachman et al., 1993). Drucker (1991) identified Management as the decisive factor of production. In order to survive, organisations must anticipate and adapt to change and this responsibility belongs with management (Baker, 1979). Better managed companies manage change instead of being "shocked" by it (Toffler, 1970).

Changes in the internal and external business environment have, over the last two hundred years, been the catalyst behind a dramatic organisational evolution. (See Table 3-14). Organisations have taken several forms, viz:

<u>Period</u>	<u>Form of Organisation</u>
1800	Owner-managed
1850	Vertical
1900	Divisional
1950	Matrix
1990	Horizontal
2000	Network

The traditional view of an organisation as a structure with clearly stated goals and a clearly defined industry in which it competes meshes uneasily with the emergence of electronic linkages. These links are the basis for managing businesses across time zones and global markets, and the limits of trading are set by technology, not organisational structure or procedure. Management is becoming network management (Caulkin, 1990; Shafritz and Ott, 1992).

We are entering an organisational era which is fundamentally different from the past, one which is characterised by the shift from the command-and-control organisation to the information based organisation. These new forms of organisational structure involve fundamental reformations in managerial responsibilities, in communication and information flows, and in interpersonal relationships. We are witnessing the declining appeal of the American Management System and the increasing interest in Japanese Management mystique. However, Hodgetts (1991) debunked the myth of Japanese superiority in production management (eg TQM, JIT, QFD, continuous improvement) by exposing some weaknesses and flaws (eg its unwillingness to tap the full potential of its female employees, bias against hiring minorities, training people to be generalists) in its system. For every Japanese company

TABLE 3-14 EVOLUTION OF THE CORPORATION

Date	Form	Description
1800	Owner-Managed	Small companies, generally making one product for a regional market, are controlled by one person who performs many administrative tasks
1850	Vertical	Companies grow larger and hire more managers, each to oversee a stage of the chain from raw materials to finished products
1900	Divisional	Large companies organise around a series of vertical chains of command to manage each product, or group of related products, that the company makes
1950	Matrix	Large companies with vertical structures add a second, informal reporting chain that links managers with allied responsibilities or managers working together on temporary projects
1990	Horizontal (*)	Companies have to organise workers into self-managing teams, altering management and employee responsibilities - and everybody's compensation; Senior managers must relinquish control whilst lower-level managers must take more responsibility for wider issues
2000	Network	Small central organisations rely on other companies and suppliers to perform manufacturing distribution, marketing, or other crucial business functions on a contract basis

(*) Since the Industrial Revolution, business has often taken the army as its model, a system that relies on a clear-cut chain of command. Information flowed up from the bottom, and orders flowed down from the top. Generations of managers could point to pyramid-shaped organizational charts and tell you exactly where they stood. Nevertheless, the 1990s witnessed the phenomenal success of "horizontal corporations", where workers concentrate on satisfying customers rather than bosses, is looking like the real thing. Top US companies such as General Electric, American Telephone & Telegraph, and DuPont are flattening out their hierarchies and getting improvements in speed and productivity that cannot be matched by old styles of management.

Source: Wilson and Dobrzynski (1986), pp. 64 - 71, reprinted from March 3, 1988 issue of *Business Week*; Byrne, John A. (1993), "The Horizontal Corporation", *Business Week*, December 20, pp. 44 - 49.

(or American company) that is a model of management success, there is a host of other companies that exemplify far less effective and efficient management. Finding the equilibrium between the Western and Eastern Way of doing things is a challenge and an imperative.

If one had to name a single factor that has led to the downfall of manufacturing companies, Gerelle and Stark (1988) identified that factor as "change". Cravens and Woodruff (1992) predicted that the nature and scope of social and economic changes in the future are likely to occur at a much faster rate than in the past. In the same vein, Turner and Hodges (1992) believed that technology - induced change will affect every aspect of our lives - our economies, culture and political organisations - with the triple conquest of distance, complexity and size. In the new environment, characterised by turbulence, complexity, discontinuity, unpredictability, diversity, and intense competition, we must be wary of the dangers of extrapolation of the same trends into the future (Ansoff and McDonnell, 1990). In "The Age of Unreason", Handy (1991) claimed that we live in an age of "discontinuous change" and that in order to cope with this, as managers, we have to be able to learn faster than the rate of change. Learning is, therefore, a central part of coping in "The Age of Unreason". Change, after all, is only another word for growth, another synonym for learning (Handy, 1991).

Lessem (1991) predicted that over the course of the next twenty-five years, the learning organisation will supplant the business enterprise as the critical entity within the national and international economy, if not within society as a whole. By implication, therefore, it will be the quality of our learning, as individuals and managers, and as organisations and society, that will determine our overall development. In a similar vein, Senge (1990) argued that in an age when quality, technology and variety are all becoming widely available at relatively low cost, the only sustainable competitive advantage that a company can create may be the ability to learn faster than its rivals and to anticipate changes in the business environment. A learning organisation is one that can adapt swiftly to change. Also, Noori (1990) saw that research being done today, to a large extent, influences the economic direction and well-being of the future. To Drucker (1992), learning has moved from being an option to a necessity - today only learning and knowledge holds the keys to personal, corporate and national wealth.

One should pursue knowledge that comes to reside at the core of what it means to be productive. Learning, then, is not something that requires time out from being engaged in productive activity; learning is the heart of productive activity - it is the new form of labour (Zuboff, 1988). The ability to engage in lifelong learning and the opportunity to engage in it

on the job are two key capacities in the workforce. The "knowledge content" of most goods and services is rising, putting a premium on people who have problem-solving skills. (Reich, 1992). During the 1990's, well-educated, skilled information workers will earn the highest wages in history (Naisbitt and Aburdene, 1990; Reich, 1991).

Crosby (1992) recognised that the acceptable minimum amount of knowledge is constantly growing, and the knowledge itself changes with the steadiness of a waterfall. What came over the top previously has nothing to do with today. Much academic education is irrelevant and out of date for lack of connection to the problems and practicalities of the real world (Kolb et al., 1991). One criticism of management education is that business schools have not adapted quickly to the changing needs of business. These needs are *Internationalism, Integration, and Implementation*. (O'Reilly, 1993). Specialised education with a focus on one national or regional economy, or on one functional aspect of business, is of limited value, and even the broadest and most all-encompassing management programme is of little use if it does not teach managers how to integrate the different functional aspects of business problems and to implement solutions to them (Bain, 1993). Management Schools have borne the brunt of the attack as they are charged with management development and growth. Their best defence is in re-thinking and restructuring their traditional programmes (too much emphasis on teaching the things that can be taught; too much analysis; less focus on the "soft skills" of management) to meet corporate demands for practical knowledge (Oliver, 1993). The value of the establishment of alliances between business and higher education is in the promise to increase the effectiveness of both (Kolb et al., 1991). Barnett (1992) had identified the need to rethink the academic and industry interface. Tucker (1992) saw the need to forge links with industry.

Mere acquisition of information and honed skills in analysis is essential but inadequate in managerial learning. More importantly, managerial learning means learning to take effective action; learning to acquire the "soft skills", ie leadership, decision-making, teamworking, business ethics, communications (Pedler and Boydell, 1991; O'Reilly, 1994).

Revans' Action Learning focuses on improving the manager's job performance through action and analysis of action in real management situation (Clutterbuck and Crainer, 1990). The emphasis is now on action as exemplified by the Ashridge Management College (UK) which stresses the practical nature of all it teaches (Crainer, 1993). The importance of action learning to management development has been stressed by Lawrence (1991) and Barnett (1992), and in the recent literature by Harris (1993), Moran, et al. (1993) and Mumford (1993).

The University of Strathclyde includes action learning projects in its MBA programmes designed for corporate clients (Anderson, 1993).

Action learning is one approach to management growth and development (Caulkin, 1990; Clutterbuck and Crainer, 1990; Kennedy, 1991). It induces managers to focus primarily on their own lives experiences, to learn from exposure to problems and to each other. It involves actually taking action, not recommending action or undertaking analysis of someone else's problem (eg case study). It differs from group discussion which occur on management training courses where, even if real problems are discussed, they are discussed only because the programme exists, not because the problems have brought about the programme. It is also different from experimental processes like business games which focus on process through simulation, not task and process through reality (Margerison and McCann, 1990; McGill and Beaty, 1992).

Academic studies can be cross-fertilised with new ideas gelled from action and experience-based learning in the workplace. Experiential learning emphasizes the integration of the abstract concepts of social knowledge with the concrete, subjective experiences of personal knowledge (Kolb, et al. 1991). And, Revans' action learning seeks to connect the practicalities of the real world to the knowledge base of the academia (Pedler, 1991; McGill et al., 1992).

Scepticism about the value of conventional MBAs has been voiced in many quarters, eg by Chaplin and McKenzie-Smith, for senior English managers (Devine, 1988). Hence, the increasing popularity of consortium and in-company business qualifications (Lewis, 1992b). For example, Rolls Royce - Loughborough University, Bass - Bradford University, National and Provincial - Bradford University/Lancaster University. Judge Institute of Management Studies at Cambridge University is designed to maintain an active relationship between work and study. There is a trend towards action learning, ie closer collaboration with employers and more emphasis upon work-based projects. Traditional academies are applying the philosophy and methodology of action learning and action research (Orturn, 1993).

Business school-company alliances for theoretical inputs and practical experience are gaining popularity. For example, the Faculty of Business Administration and the School of Postgraduate Management Studies of the National University of Singapore (NUS) have received a boost from the local business community with the setting up of a new Faculty Fellowship Scheme. Launched on 2 March 1992, eleven prominent Chief Executive Officers

have been invited to pioneer the scheme. The fellowship is an honorary appointment for a period of three years, and is renewable. The primary role of the Faculty Fellows will be to assist to strengthen ties and promote interaction with the business community, to help shape the Faculty into a major centre of business education and research by providing its staff members with opportunities to undertake research projects in their organizations, and to help staff members write case studies on issues pertaining to local business.

Even at the polytechnic level, the Nanyang Polytechnic (the newest Polytechnic in Singapore, established since April 1992) has a strategic unit called the International Business Resource Centre (IBRC). IBRC focuses on international and regional issues and seeks to inculcate a global mindset among its staff and students. IBRC is introducing action learning concepts and projects in collaboration with industries for their students, regardless of the discipline of study (eg business management, engineering, information technology, health sciences). This practice-oriented learning approach is called the "Teaching Enterprise" concept. It brings real life problems into the Polytechnic, and integrates the working and learning environment to provide students with relevant and real life experiences for effective learning to develop them as competent managers eventually.

Management education cannot be the exclusive monopoly of traditional academia because there has to be a match between what the workplace needs and what the business schools are producing. The process of learning, unlearning and relearning is a painful, costly, and time-consuming exercise. It is apparent that academics and business-students alike have recognised the imperative for action learning. Discussions and debates on dated case-studies are deemed of little relevance in today's fast changing world. Critiques noted that many executive development programmes lack action learning in which executives in teams work on real-world problems to come up with real-world solutions (*Business Week*, 1992). Revan's (1982) philosophy of action learning anticipates this wave in management education. Programmed Knowledge (P) from traditional academy is necessary but inadequate for learning. Questioning Insight (Q) has become a critical component for coping in a world changing so rapidly and radically. Q is the ability to map one's own ignorance so as to see more clearly what P is called for and how it is deployed. Action learning is a small amount of P and a large amount of Q. Q is the field of action learning. The essence of action learning is doing then reviewing rather than the acquisition of knowledge per se. It is therefore inadequate to merely know, but necessary to be able to do, ie result-oriented.

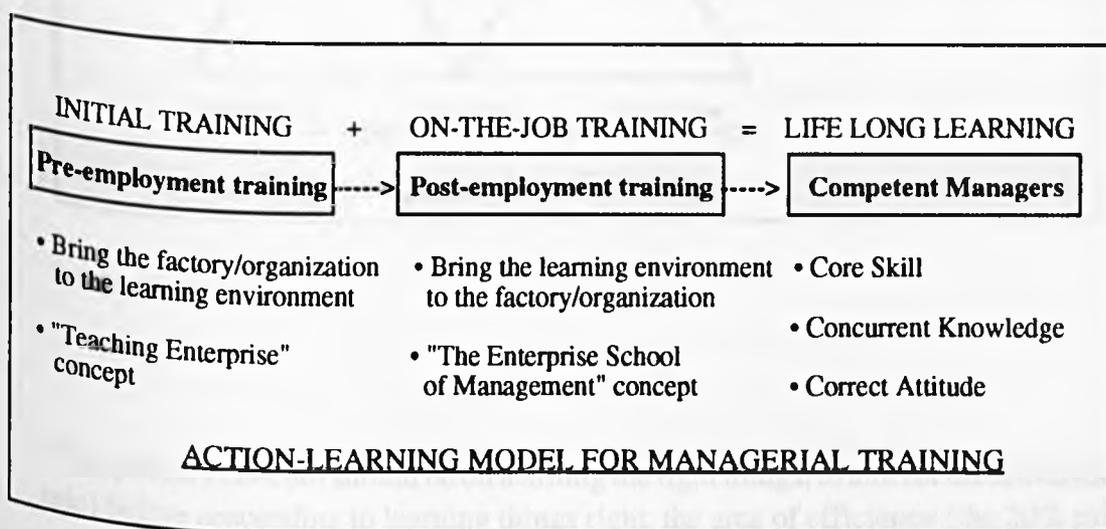
Total learning for quality management embraces two modes of learning, viz:

- Maintenance Learning - The acquisition of fixed outlooks, methods and rules for dealing with known and recurring situations. It enhances our problem-solving abilities - for problems that are given. It is the type of learning designed to maintain an existing system; an established way of business, of management education or of life (drawn from Lessem, 1991). This would be the field of Programmed Knowledge (drawn from Revans, 1982).
- Innovative Learning - for long-term survival, particularly through times of turbulence, change or discontinuity. This can bring change, renewal, restructuring and problem reformulation to individuals and to organisations. Innovative learning involves both anticipation and participation. Through "anticipation", individuals or organizations consider trends to make plans, shielding from the trauma of learning by shock. "Participation" is an attitude characterised by cooperation, dialogue and empathy. It means not only keeping communications open but also constantly testing your operating rules and values against those of others (drawn from Lessem, 1991). This would be the field of Questioning Insight (drawn from Revans, 1982). Hence, the Learning Equation is:

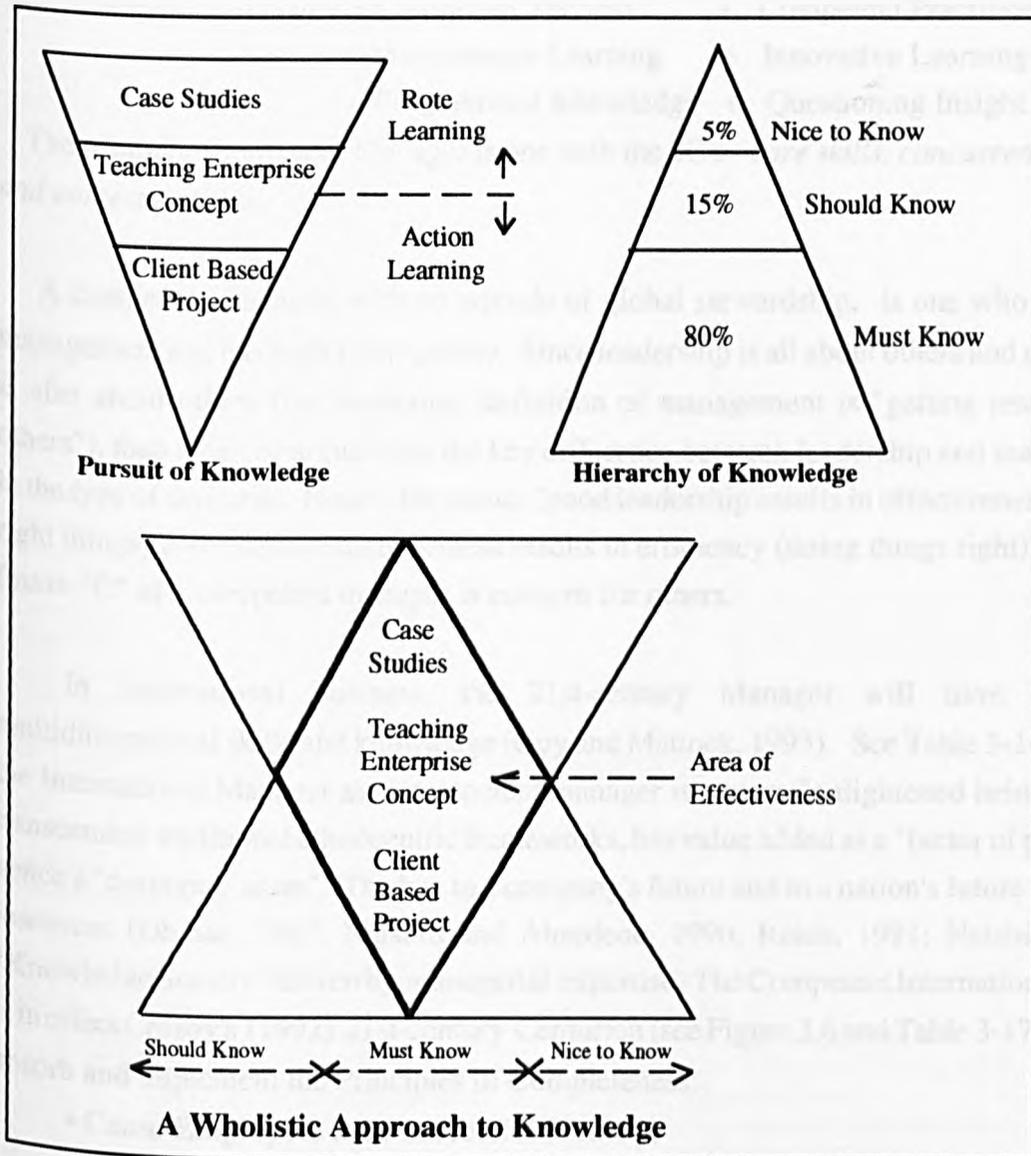
$$\begin{aligned} \text{Learning} &= \text{Programmed Knowledge} + \text{Questioning Insight} \\ &= \text{Maintenance Learning} + \text{Innovative Learning} \end{aligned}$$

Whilst maintenance learning is still essential in industry, it is not sufficient. What is even more essential is the inclination towards innovative learning. The development of critical thinking skills in creative/innovative learning must take precedence over rote-learning (eg lateral thinking) (De Bono, 1992; 1993). We have to stress the importance of total learning for quality management that fits into the context of every working life. (By assiduously learning from, and then surpassing established American and European companies in industry after industry, Japanese companies have earned an intimidating reputation. Interestingly, the Japanese are now implying that the Americans and Europeans are still too slow to learn from what has made Japanese companies successful). We have to stress the orientation towards personal growth and development which simultaneously contribute towards business growth and development. In the end, it is one and the same. In a very real sense there is no such thing as organizational behaviour. There is only individual behaviour. Everything else flows out of that (Senge, 1990).

Indeed, the philosophy of action learning permeates the learning and training environment. The "Teaching Enterprise" environment in traditional academy is in sync with developments in the real business world and provides opportunities for students to work on real business projects. In the real world, especially if the company's business is affected by the international business environment, heuristic learning holds the key to adapt to the changing environment. Action learning is the energy in the concept of the "Teaching Enterprise" - bringing the factory/organization to the traditional academy, and the motivation in the concept of the "Enterprise School of Management". The enterprise where we work is the most significant "business school" that managers ever attend and hence we have to seek to evolve more effective learning within the enterprise. The enterprise itself is the School of Management(Wills, 1993). Strategic manpower development is a long and arduous process which combines high level conceptualization (in the Teaching Enterprise) with learning focused on managerial effectiveness and efficiency (in the Enterprise School of Management) - see figure below. Prahalad (1990) recognised the need for more collaboration between practitioners (managers) and researchers (academics) if they are to build a mutually beneficial symbiotic relationship. The challenge faced by managers is primarily intellectual. The need for a new intellectual anchor - a new framework and a methodology - permeates all aspects of their jobs, be it motivating an international work force or assessing the value of intellectual property. Managing is increasingly an intellectual activity. The surprise is that so little of the intellectual energy of the academic community is directed towards such collaboration as evidenced by the scholarly output.



The area of effectiveness in our quest for knowledge could perhaps be thus depicted:



Source: Author

The primary concern should be on learning the right things, to aim for effectiveness (the 80% rule) before proceeding to learning things right, the area of efficiency (the 20% rule), mutual reinforcement. Academics and practitioners alike have recognised the need for joint responsibility to produce "Corporate Assets" capable of functioning as Competent Managers

in the international business environment (see Table 3-15). A Competent Manager needs to be both a Competent Theorist and a Competent Practitioner, ie

$$\begin{aligned}\text{Competent Manager} &= \text{Competent Theorist} &+& \text{Competent Practitioner} \\ &= \text{Maintenance Learning} &+& \text{Innovative Learning} \\ &= \text{Programmed Knowledge} &+& \text{Questioning Insight}\end{aligned}$$

The resultant Competent Manager is one with the 3C's - *core skills, concurrent knowledge and correct attitude*.

A competent manager, with an attitude of global stewardship, is one who is skilful in management and has leadership quality. Since leadership is all about others and management is also about others (the traditional definition of management is "getting results through others"), then it can be argued that the key difference between leadership and management is in the type of concerns. Hence, the axiom "good leadership results in effectiveness (doing the right things) and effective management results in efficiency (doing things right)". Thus, the fourth "C" of a competent manager is *concern* for others.

In international business, the 21st-century Manager will have to possess multidimensional skills and knowledge (Guy and Mattock, 1993). See Table 3-16. After all, the International Manager as a competent manager is a more "enlightened being" who has transcended traditional ethnocentric frameworks, has value added as a "factor of production", hence a "corporate asset". The key to a company's future and to a nation's future is its human resources (Ohmae, 1987; Naisbitt and Aburdene, 1990; Reich, 1991; Naisbitt, 1994); a "Knowledge Society" driven by managerial expertise. The Competent International Manager is in effect Crosby's (1992) 21st-century Centurion (see Figure 3.6 and Table 3-17) who must absorb and implement the Principles of Completeness:

- Cause **Employees** to be successful (Crosby)
- Cause **Suppliers** to be successful (Crosby)
- Cause **Customers** to be successful (Crosby)
- Cause **Distributors** to be successful (Author's addition)
- Cause **Competitors** to be successful (Author's addition)
- Cause **Shareholders** to be successful (Author's addition)

This is the true spirit in the strategic intent of the intelligent enterprise (Quinn, 1992), or the intelligent organisation (Handy, 1992; Pinchot, 1993). For "intelligent" read "knowledge-based". The future winners in the world economy will be those who achieve

TABLE 3-15 COMPETENT MANAGER IN THE INTERNATIONAL ENVIRONMENT

(A) The Competent International Manager		<u>Percent</u>
Characteristic		71
• Strategic awareness		67
• Adaptability in new situations		60
• Sensitivity to different cultures		56
• Ability to work in international teams		46
• Language skills		46
• Understanding international marketing		40
• Relationship skills		40
• International negotiation skills		27
• Self-reliance		19
• High-task orientation		19
• Open, non-judgmental personality		13
• Understanding international finance		13
• Awareness of own cultural background		2
(B) How are Managers Selected for International Postings?		<u>Percent</u>
Characteristic		85
• Technical skill/expertise for the job		69
• Potential of manager to develop in role		63
• Knowledge of company systems, procedures		48
• Understanding the market and customers		46
• Appropriate language skills		46
• Necessary component of career path		38
• Support of spouse and family		25
• Knowledge/understanding of culture/norms of the host country		13
• Good health		8
• Age		6
• Seniority		2
• Gender		2
• Proven expatriate track record		2
(C) Ranking Ten Areas of Chief Executive Officer Expertise		
Rank	1988	2000
1	Strategy Formulation	Strategy Formulation
2	Marketing/Sales	Human Resource Management
3	Human Resource Management	Marketing/Sales
4	Negotiation/Conflict Resolution	Negotiation/Conflict Resolution
5	Accounting/Finance	Accounting/Finance
6	Media Skills	International Economics & Politics
7	Production/Operations	Media Skills
8	International Economics & Politics	Science/Technology/R&D
9	Science/Technology/R&D	Production/Operations
10	Foreign Languages	Computer Literacy

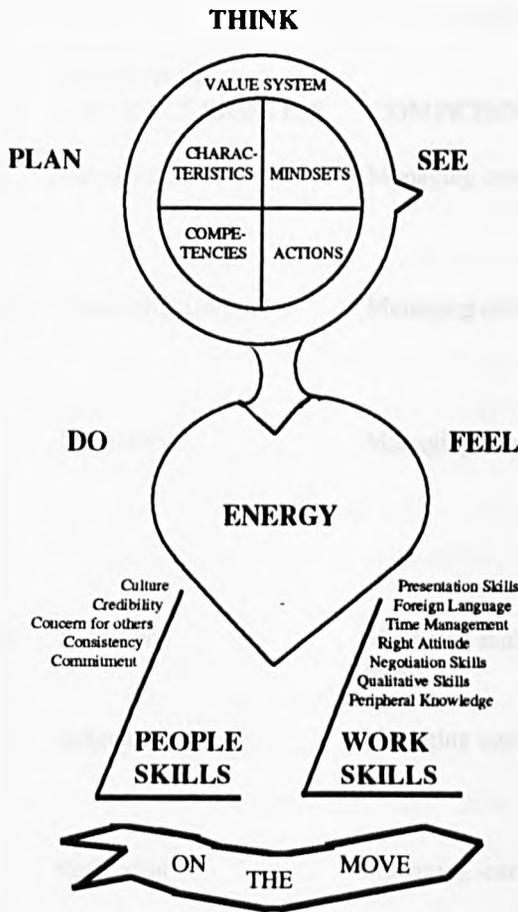
Source: Adapted from Barham, Kevin and Oates, David (1991), The International Manager. The Economist Book Ltd, London, pp. 69, 103; Barham, Kevin and Oates, David (1991), The Quest for the International Manager: A Survey of Global Human Resources Strategies. Special Report No. 2098, The Economist Intelligence Unit, London, pp. 21, 27, 90, 150; Syrett, Michel and Hogg, Clare (Eds.) (1992), "The Leader of the Twenty-First Century Corporation: A Profile", in Frontiers of Leadership: An Essential Reader. Blackwell, Oxford, pp. 341 - 346.

TABLE 3-16 THE 21st-CENTURY EXPATRIATE MANAGER PROFILE

Core Skills	Managerial Implications
Multidimensional perspective	Extensive multi-product, multi-industry, multi-functional, multi-company, multi-country and multi-environment experience
Proficiency in line management	Track record in successfully operating a strategic business unit(s) and/or a series of major overseas projects
Prudent decision-making skills	Competence and proven track record in making the right strategic decisions
Resourcefulness	Skilful in getting himself or herself known and accepted in the host country's political hierarchy
Cultural adaptability	Quick and easy adaptability into the foreign culture - An individual with as much cultural mix, diversity and experience as possible
Cultural sensitivity	Effective people skills in dealing with a variety of cultures, races, nationalities, genders, religions. Also, sensitive to cultural difference
Ability as a team builder	Adept in bringing a culturally diverse working group together to accomplish the major mission and objective of the organisation
Physical fitness and mental maturity	Endurance for the rigorous demands of an overseas assignment
Augmented Skills	Managerial Implications
Computer literacy	Comfortable exchanging strategic information electronically
Prudent negotiating skills	Proven track record in conducting successful strategic business negotiations in multicultural environment
Ability as a change agent	Proven track record in successfully initiating and implementing strategic organisational changes
Visionary skills	Quick to recognise and respond to strategic business opportunities and potential political and economic upheavals in the host country.
Effective delegatory skills	Proven track record in participative management style and ability to delegate

Source: Adapted from Howard Cecil G. (1992), "Profile of the 21st-Century Expatriate Manager", HR Magazine, June, pp. 96; Sinetar, Marsha (1991), Developing a 21st Century Mind, Ballantine Books, New York, pp. 8 - 39.

FIGURE 3.6 "TOP GUN" INTERNATIONAL MANAGER



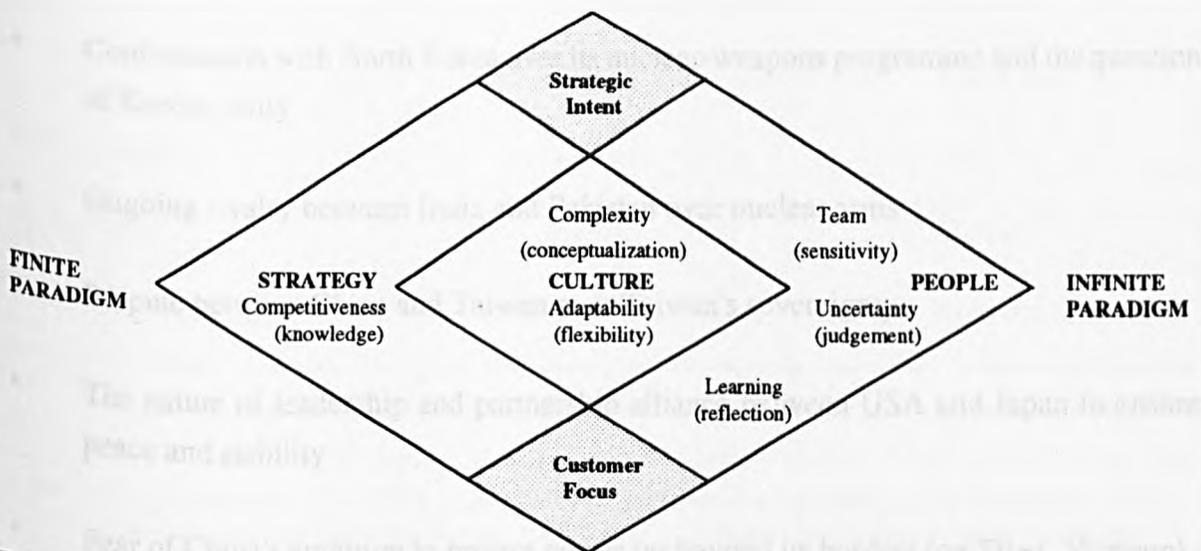
"TOP GUN" stands for:

- The ability to **Think** (Education is not all about teaching, it is also about learning to think independently, ie rationally, logically, clearly, etc)
- The ability to **Organise** through time management to alleviate stress
- The ability to set **Priorities**
- The **Gumption** and the ability to discern and decide, ie avoid paralysis-by-analysis and to exercise commonsense and the use of guts and intuition
- The **Unique** ability to experiment and learn from mistakes through creativity and innovativeness - the heart of an entrepreneur's skills
- The **Nimbleness** to adjust and adapt to changes and new trends, ie perseverance, commitment and the will-power to strive for excellence

Source: Adapted from Wareham, John (1991), The Anatomy of a Great Executive, Harper Collins Publishers, New York, pp. 80; Guy, Vincent and Mattock, John (1993), The New International Manager, Revised Edition, Kogan Page, London, pp. 9 - 10.

TABLE 3-17 ELEMENTS OF AN INTERNATIONAL MANAGER

GLOBAL MINDSETS	PERSONAL CHARACTERISTICS	COMPETENCIES	ACTIONS
Bigger, broader picture	Knowledge	Managing competition	Manage competitiveness through knowledge by driving for the broader picture
Balance of contradictions	Conceptualization	Managing complexity	Manage complexity through conceptualization by accepting the balance of contradictions
Trust process (ie systems, policies, norms of behaviour to respond rapidly to change)	Flexibility	Managing adaptability	Manage adaptability through flexibility by trusting process over structure
Teamwork and diversity	Sensitivity	Managing multicultural teams	Manage teams through sensitivity by valuing diversity
Change as opportunity	Judgement	Managing uncertainty	Manage uncertainty through judgement by flowing with change
Openness to surprises	Reflection	Managing learning	Manage learning through reflection by seeking to be open



Source: Adapted from Rhinesmith, Stephen H. (1993), A Manager's Guide to Globalization: Six Keys to Success in a Changing World, Business One Irwin, Homewood, Illinois, pp. 27 - 34.

the highest levels of education and use the knowledge thus created and shared to the most powerful effect (Drucker, 1993). We are at the threshold of the fourth wave.

3.5 Conclusion

In the 1950s and 1960s, Americans invested in factories and businesses in Europe, Japan and Latin America, building an American economic empire. Americans, at the forefront of technology, management, and marketing, established the first of the multinationals. In the 1970s, the Europeans invested in factories and businesses in USA, Japan, Asia and Latin America. In the 1980s and 1990s, the Japanese emerged as a formidable business competitors. A significant characteristic of this period is the change in the locus of industrial leadership (from the West to the East) in a wide variety of industries (See Table 3-18). The Asian communitarian variants of capitalism posed as an alternative to the individualistic Anglo-Saxon British-American form of capitalism, sparking intense interest in Japanese Management style.

Japan led Asian growth in the 1960s, followed by the NIEs in the 1970s; Southeast Asia flourished in the 1980s. The 1990s could be the decade of China and "new frontiers" like Vietnam (George, 1992). However, the wealth game of the earlier decades of growth, trade and increasing prosperity is threatened by new power games. Left unchecked, they could turn into war games of the 1990s that would divert the mind and effort from economic cooperation, investment and trade. The potential threats are:

- Confrontation with North Korea over its nuclear-weapons programme and the question of Korean unity
- Ongoing rivalry between India and Pakistan over nuclear arms
- Dispute between China and Taiwan over Taiwan's sovereignty
- The nature of leadership and partnership alliance between USA and Japan to ensure peace and stability
- Fear of China's ambition to project power far beyond its borders (eg Tibet, Vietnam)
- Suspicious of Japan's military ambition fuelled by bitter wartime memories

TABLE 3-18 CHANGING PATTERN OF INDUSTRIAL LEADERSHIP

<u>INDUSTRY</u>	<u>LEADERS</u> 1950 - 1975	<u>CHALLENGERS</u> 1980 -
Automotive	GM Ford	Toyota Nissan Honda
Semiconductors	TI Motorola	NEC Toshiba Fujitsu Hitachi
Tires	Goodyear Firestone	Michelin Bridgestone
Medical systems	GE Philips Siemens	Hitachi Toshiba
Consumer electronics	Philips	Matsushita Sony
Machine Tools	Cincinnati Milacron Cross and Trecker Hardinge Warner and Swasey	Mori Seiki Okuma Toshiba Yamazaki
Photographic	Kodak	Fuji
Xerography	Xerox	Canon
Earth moving equipment	Caterpillar	Komatsu

Source: Adapted from Prahalad, C.K. (1990), "Globalization: The Intellectual and Managerial Challenges", in Pucik Vladimir, Noel, M. Tichy and Barnett, Carole K. (Eds.) Globalizing Management: Creating and Leading the Competitive Organization. John Wiley, New York, pp. 341; Bleeke, Joel and Ernst, David (Eds.) (1993), Collaborating to Compete: Using Strategic Alliances and Acquisitions in the Global Marketplace, John Wiley, New York, pp. 167.

- Conflict between USA and Japan over Japanese trade practices (Japan trade deficit with USA in March 1992 to March 1993 was US\$46.11 billion)
- Conflict between USA and China over human rights (eg Hong Kong is used as the battleground for pushing human rights and democracy)
- The nature of the new triangular relationship among the Americans, Japanese, and the Chinese.

Without the certainty of peace, it is moot whether the centre of gravity in economic production and consumption would shift to the Asia-Pacific from the western hemisphere within decades of the new century. Invariably, peace and security in the region must be preserved so that international business may flourish unimpeded. US military presence is necessary to encourage and help underwrite the stable geopolitical climate necessary to promote economic growth. Toffler (*The Economist*, April 3, 1993) warned that if Americans do not maintain a visible military presence in the Pacific, the degree of economic and political instability would be incalculable.

Historically, economic imperatives while being important, have often been subsumed by the political factors which impact upon decision-making and, more importantly, by the personalities (politicians) who make those decisions. It is in this realm that national interests often seem to be in a higher order ranking than regional ones. A China that is intent on economic development is good for the region. Prosperity can spill over to the other Asia Pacific economies. But should China's future economic reforms falter (due to a change in leadership and a return to the Party's past ideological orthodoxy), it could spell domestic turmoil, with adverse consequences for regional stability. China can put aside the leadership transition problem only for as long as Deng Xiao Ping is around.

The age of intense competition and national interest has now become paramount and much will depend on identifying new modes of growth without an overly ambitious reliance on exports alone. Asian development strategy may therefore have a trajectory of its own and the political realities of such a development need to be addressed more critically than has been done by economists (*Straits Times*, April 24, 1993).

To Kennedy (1993), the world economy is becoming more integrated and richer overall,

although creation and enjoyment of wealth is very uneven. The main creators and controllers of technology have increasingly become large MNCs with more global reach than global responsibility. Rather than narrow the gap between rich and poor, the way international business and finance develops may result in the "have-nots" becoming ever more envious of the "haves". On the use of robotics, Japan is way ahead (176,000 robots in 1988) of Western Europe (48,000) and the USA (33,000), and the rest of the world (23,000). The robotics revolution will benefit developed countries and MNCs more than developing countries (*Straits Times*, April 8, 1993).

Toyne (1989) saw the emergence of the global economy as a move towards economic integration of the world. Stonier (1993), anticipated that the integration of the global economy will continue with transnationalization of the economy as various geographic regions become increasingly efficient in producing some specific product in service and as communication and transportation systems continue to become better and cheaper. In the post-industrial economy, cooperative interactions tend to predominate over competitive ones.

The prime reality of contemporary international business is change. No international businessman can ever anticipate the circumstances, conditions and situations in which they must perform. Further, there are strong market forces that create change (see Table 3-19). Businessmen cannot operate effectively without some major regauging of mindset, attitudes, skills and knowledge (Stumpf and Mullen, 1992; Toffler and Toffler, 1993) because we are entering not the geo-economic era but the geo-information era, increasingly affected by the growing role of knowledge. International companies may have to increase their ability to sense, understand and respond to changes in the environment rapidly, efficiently and effectively (Taylor, 1992a). In other words, a premium will be put on strategic flexibility, on a company's adaptability for organization-environment fit. Strategic focus, agility, and speed are needed in the face of global competition and rapid technological change, ie making decisions faster, responding to customers' needs faster and coming out with new products faster (Tweed, 1990; Peters, 1992; Pine, 1992). The hallmarks of a changing world is in Table 3-20.

Evans and Doz (1992) highlighted some common dualities in today's complex organizations (see Table 3-21). Dualities reflect opposing forces that must be balanced - properties that seem contradictory or paradoxical, but which are in fact complementary. For example, in "Think Global, Act Local", complex MNCs must typically provide integration to subsidiaries that need to be locally responsive (McLuhan and Powers, 1989; Barham and Oates, 1991).

TABLE 3-19 FOUR STRONG MARKET FORCES THAT CREATE CHANGE

Market	====> Change Dynamic	====> Resulting Environment
• Internationalisation	• Global Factory and Global Markets	• Greater Turbulence • Greater Uncertainty • Greater Complexity
• Deregulation	• Reduction of Barriers to Entry	• Greater Rates of Change • Greater Ambiguity
• Consumer Awareness	• Sophisticated and Discerning Buyers	• Decreased Stability in Structures, Markets, and the Workforce
• Technicalisation	• Access to Specialised Technologies	• Decreased Utility of Rules and Procedures • Decreased Utility of History to Predict Future Events

Source: Stumpf, Stephen A. and Mullen, Thomas P. (1992), Taking Charge: Strategic Leadership in the Middle Game, Prentice-Hall, Englewood Cliffs, New Jersey, pp. 22.

TABLE 3-20 HALLMARKS OF A CHANGING WORLD

- **Shift in Consciousness**
Consciousness is primary : we create our realities and seek wholeness
- **Disenchantment with Scientism**
Intuition and other nonrational processes complement reason in the search for knowledge and understanding
- **New (Inner) Sources of Authority and Power**
We decide ourselves how we live and work and take steps to ensure that our institutions serve us
- **Respiritualization of Society**
We are engaged in a search for meaning, purpose, truth, love, compassion, self-worth, wisdom, and unity - and the means to express them
- **Decline in Materialism**
Intangibles such as honesty, openness, courage, conviction, personal fulfilment, caring, cooperation, and justice are the dominant forces guiding our actions
- **Spreading Political and Economic Democratization**
No room is left for political or economic imperialism
- **Movement Beyond Nationality**
Global interdependence is unavoidable

Source: Maynard, Jr, Herman Bryant and Mehrtens, Susan E. (1993), The Fourth Wave: Business in the 21st Century, Berret-Koehler Publishers, San Francisco, California, pp. 31.

TABLE 3-21 SOME COMMON DUALITIES IN TODAY'S COMPLEX ORGANIZATIONS

Competition	<====>	Partnership
Differentiation	<====>	Integration
Loose	<====>	Tight
Control	<====>	Entrepreneurship
Planned	<====>	Opportunistic
Formal	<====>	Informal
Vision	<====>	Reality
Decentralization	<====>	Centralization
Business Logic	<====>	Technical Logic
Analysis	<====>	Intuition
Delegation	<====>	Control
Individuality	<====>	Teamwork
Action	<====>	Reflection
Change	<====>	Continuity
Formal	<====>	Informal
Top-down	<====>	Bottom-up
Tolerance	<====>	Forthrightness
Flexibility	<====>	Focus

Source: Evans, Paul A.L. and Doz, Yves (1992), "Dualities: A Paradigm for Human Resource and Organizational Development in Complex Multinationals", in Pucik, Vladimir, Tichy, Noel M. and Barnett, Carole K. (Eds.), Globalizing Management: Creating and Leading the Competitive Organization, John Wiley, New York, pp. 86.

This chapter traces a series of geo-political, geo-economic, socio-cultural and technological developments from 1945 to the 1990s that have made major impact on the functioning and responses of international business. The swift and widespread changes on the international business landscape have resulted in the following:

- Review of international business relationships
- New alliances and collisions
- Change in international business patterns
- Change in degree and direction of different forms of international business
- Effects on international trade institutions
- Foreign exchange risks on international business transactions
- Change in the fundamental relationships between the different international financial markets that are reflected in new levels of integration, modernisation, and globalization
- Growing awareness of regional competition and cooperation
- Change in perceptual map, from domestic to regional/global mindset

Table 3-22 highlights some significant events on the operations of international business.

The author has directly or indirectly dealt with Naisbitt and Aburdene's (1990) five megatrends for the 1990s. These five directions are (see Table 3-23):

- The global economy of the 1990s (Hutton, 1988; Morris, 1990; Hodgetts and Luthans, 1991; Lowe, 1992)
- The rise of the Pacific Rim (Matsuura, 1991; Khambata and Ajami, 1992; Punnett and Ricks, 1992; Holt, 1993; Kennedy, 1993)

TABLE 3-22

HIGHLIGHTS OF SIGNIFICANT EVENTS ON THE OPERATIONS OF IB

<u>Significant Events</u>	<u>Impact on the Conduct of International Business</u>
• Technological developments linking countries of the world broadcasted the Tiananmen Square massacre (1989)	<ul style="list-style-type: none"> • China suffered technological set-backs • Discouraged potential investors; many countries boycotted China's products and withdrew plans for expansion • World Bank withdrew some loans to China; some French and US companies withdrew investments • Flight of Capital from Hong Kong; increased investments in other countries, eg Singapore, Canada, North America • Taiwanese businessmen sought investment in China (over US\$ 7 billion); replaced some lost investments from the West; Taiwan-China trade through Hong Kong reached a record of US\$10 billion in March 1993 • Increased centralised control by Chinese government resulted in some joint ventures between Western companies and Hong Kong partners • Environment for international business in Hong Kong and China became more uncertain • Sino-American growing bilateral problems (eg trade deficit, copy right infringements, human rights)
• Reunification of Germany (1990)	<ul style="list-style-type: none"> • International businessmen to consider whether this new Germany represents one culture or two distinct cultures • One currency disappeared • Increased in the relative power of the deutsche mark • West German investment to shift from outside the country to East Germany; Slow down in investments to other parts of the world, eg ASEAN region • Probability of one Germany dominating international business (trade) in Europe; Economic influence may alarm other countries
• Emergence of the new Commonwealth of Independent States (1992)	<ul style="list-style-type: none"> • Created monetary and legal reforms to encourage open trade and global investments • Considering countertrade agreements • Floated US\$274 million Eurobond issue • New, exciting opportunities for international business; foreign investment • Increased exports from the West to Russia and the Commonwealth of Independent States • Pepsi-Cola, McDonald's, Honeywell, Cummins Engine's joint ventures with Soviet partners • American Trade Consortiums formed to negotiate ventures (6,000 registered joint ventures in 1992)
• The opening of Eastern Europe and the move to a free-market economy (1991)	<ul style="list-style-type: none"> • Considering ways to make currencies convertible • Pragmatic approaches to economic reconstruction, eg freezing private bank accounts • New governments and policies encouraged international business • Began to develop legal and economic infrastructures necessary for international business (trade) • Positive change toward global trade and international cooperation especially toward the EU • Opportunities for technological reconstruction, which could potentially improve their worldwide competitiveness • Pools of risk capital in North America and Western Europe were developed to invest in Eastern Europe • New markets for Western goods and services • New investments opportunities
• Worldwide coverage of Iraq's invasion of Kuwait (1991)	<ul style="list-style-type: none"> • Disrupted international business patterns as participants divert their transportation systems and much of their productive capacity to the war effort • Foreign investments disrupted • Shift from consumer goods to industrial goods to meet military objectives • Trade embargo imposed against Iraq substantially curtailed international business (trade) with Iraq • Kuwait suffered substantial losses in foreign exchange earnings; Kuwait currency relatively worthless • Higher oil prices resulted in increased interest in alternative sources; China produced 2.8 million barrels of crude oil in 1992, making it the world's fifth largest producer; oil prices turned volatile
• Shifts in US position relative to the countries of the Middle East, including Iran, Iraq, Israel (1991)	<ul style="list-style-type: none"> • Influenced decision of international companies
• Opening of border between North Korea and South Korea (1992)	<ul style="list-style-type: none"> • Increased trade, particularly with the markets being undersupplied in the North and the economy booming in the South
• ASEAN Free Trade Area (AFTA)	<ul style="list-style-type: none"> • Intent of increasing international business (trade) links among ASEAN countries • More bargaining power with GATT and GSP (Generalised System of Preferences. Under it, the USA grants favourable import terms to 4,400 items from developing countries)
• North American Free Trade Area (NAFTA)	<ul style="list-style-type: none"> • Intent of increasing international business (trade) links among Canada, Mexico and USA • Relatively strong Canadian dollar encouraged some Canadian firms to increase investments in US operations • Machine tools: Mexico's 10 to 15 percent tariffs end on over 75 percent of imports; remainder phased out over five years; US exports expected to rise 9 percent in 1994; more sourcing of parts in North America to meet rules of origin

Significant Events

• Single European Community (1992)

Impact on the Conduct of International Business

- Encouraged joint ventures and acquisitions, eg Johnson acquired Janssen Pharmaceutica in Belgium, H.J. Heinz bought Copous Canning in Greece, Tiffany opened in Berlin, etc.
- Companies outside EU set up offices in Western European countries for direct investments; countries outside the alliance face stiffer trade barriers with Europe; change world trade relations
- Intent of increasing international business (trade) links among 19 European countries; trade restrictions will be minimised

Specifically:

- Automobiles : Japanese car and light-truck imports limited to 9.5 percent of EU market, down from current level of 11 percent
- Financial Services : Foreign banks and securities houses denied access to EU unless their countries grant reciprocal rights
- Computers : Political pressure applied to persuade US and Japanese computer companies to do more manufacturing and research in Europe
- Consumer Electronics : European standards favouring EU companies promoted; may levy infant-industry tariffs on foreign imports of new technologies such as high-definition TV and home automation
- Media : New cultural grant programme for TV and film production launched to counter growing influence of US entertainment groups
- Public Works : Government contracts in telecommunications, transportation, water, and energy denied to foreign companies whose governments do not open similar projects to EU companies
- Telecommunications : State agencies allowed to maintain monopolies in telephone and data transmission and local suppliers favoured for such major purchases as large telecommunications switches

[These trading blocs can be expected to harmonise more of its treatment of MNEs, primarily on trade issues, but potentially on other economic concerns too. Encouraged regional marketing approaches. However, adaptations in marketing may be necessary. These regional trade blocks favour centralised regional operations because economies of scale can often be achieved by serving the entire region from one location within the free-trade zone. Global trade within these regions is expected to increase even as trade between regions becomes more complicated. GATT members negotiated fruitlessly for free world trade]

• Rio Conference (1992)

Environment degradation: harm to the earth's ozone layer, atmospheric pollution, deforestation, pollution of inland freshwater resources and coastal waters, damage to the marine environment, loss of tropical forests (mountain ecosystems)

- Stringent official regulation of the pollution and environment effects especially of manufacturing activities; companies are increasingly concerned about its environmental image (social responsibility)
- Increasing demand for environmentally sound products
- Spur new technological advances into safe and regenerative products
- Portfolio investment in "green" funds wherever such investments could be found
- Affect fish imports and exports and the flow of currencies associated with tourism
- Foreign investors exchanging debt for rain forest acreage in Brazil

• Hong Kong's return to China (1997)

- Some Hong Kong companies moved their head offices to overseas locations, eg Bermuda, Carabian Islands, because of the tax benefits and political insulation
- Economic ties between Taiwan and China have been growing rapidly since tensions between the rival governments began to ease in the late 1980s; almost all trade goes through Hong Kong because Taipei bans most direct links with the mainland; Trade with China accounted for 4.8 percent of Taiwan's total trade in 1992; Bilateral trade accounted for 4.5 percent of China's total trade (China's foreign trade totalled US\$166 billion in 1992, exceeding Taiwan's for the first time)

• Stock market crash (1987)

- Stock markets around the world are tied into each other;

• Japanese stock prices took their sharpest downturn (1990)

- The American and European recession, and appreciation of Japanese Yen, resulting in the collapse of the manufacturing and property markets; the Gulf War also play a role because the heavy investments/loans in Kuwait fuelled by Japanese banks cannot be recovered

Source: Compiled by Author

TABLE 3-23 MEGATRENDS 2000

Author's Comments

<ul style="list-style-type: none"> • The Global Economy of the 1990's 	<ul style="list-style-type: none"> • Economic consideration transcending political considerations • The movement to worldwide free trade • The powerful drive of telecommunications • The relative abundance of natural resources • Competition for reduced taxes • The downsizing of economic output • Inflation and interest containment • The Asian consumer boom • The advancement of democracy and the spread of free enterprise • The obsolescence of war • New attentiveness to the environment • The world moving from trade among countries to a single economy; one economy; one marketplace 	<ul style="list-style-type: none"> • The Global Economy of the 1990s - it is in severe recession - transition from Capitalism to Knowledge Society; knowledge is replacing capital as the basic resource of economies • The movement towards economic regionalism • Agreed • The world is not running out of marketed non-renewable energy and raw materials, but the unmarketed side effects associated with their extraction and consumption have become serious concerns. The problems with minerals extraction are pollution and destruction of natural habitat (World Development Report, 1992) • Agreed • Agreed • Agreed • Agreed • Agreed • There are some 100 international, civil, racial and religious conflicts • Agreed • Ohmae's (1987) triad market of Japan (120 million), the USA (250 million), the EU (345 million) comprise a single market with common needs, shared aspirations, similar habits and tastes; the triad is the advanced world; 85 - 90 percent of high value added, high-tech manufactured goods are produced and consumed in North America, Europe, and Japan
<ul style="list-style-type: none"> • The Rise of the Pacific Rim 	<ul style="list-style-type: none"> • A massive economic shift to the Pacific Rim • Although Japan is the region's economic leader today, the East Asia region (China and the four Tigers - South Korea, Taiwan, Hong Kong, and Singapore) will eventually dominate • The rise of the East need not mean decline of the West 	<ul style="list-style-type: none"> • Agreed • Agreed • Agreed
<ul style="list-style-type: none"> • Global Lifestyles and Cultural Nationalism 	<ul style="list-style-type: none"> • Even as our lifestyles grow more similar, there are unmistakable signs of a powerful trend - a backlash against uniformity, a desire to assert the uniqueness of one's culture and language, a repudiation of foreign influence 	<ul style="list-style-type: none"> • Agreed
<ul style="list-style-type: none"> • The Emergence of Free-Market Socialism 	<ul style="list-style-type: none"> • The essence of the economics of socialism is that the government owns the means of production and controls the distribution of goods. The world is undergoing a profound shift from economies run by government to economies run by markets 	<ul style="list-style-type: none"> • Agreed
<ul style="list-style-type: none"> • The Privatisation of the Welfare State 	<ul style="list-style-type: none"> • From public housing to home ownership • From national health service to private options • From government regulation to market mechanisms • From welfare to workforce • From collectivism to individualism • From government monopoly to competitive enterprise • From state industries to privatised companies • From government social security plans to private insurance and investment • From tax burdens to tax reductions 	<ul style="list-style-type: none"> • Agreed

Source: Compiled by Author

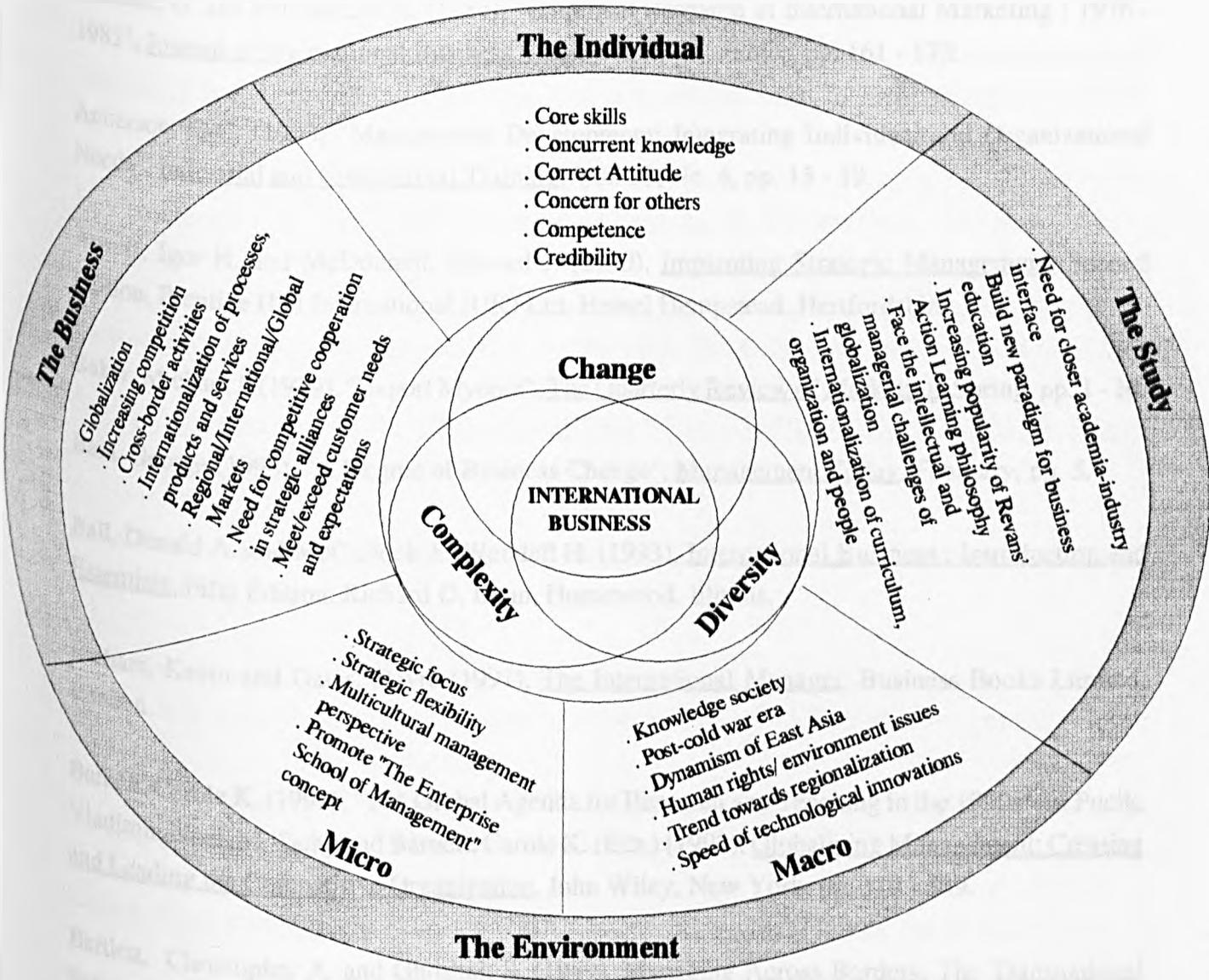
- Global lifestyles and cultural nationalism (Levitt, 1983; Douglas and Wind, 1987; Toffler, 1991)
- The emergence of free-market socialism (Czinkota et al., 1992; Taylor, 1992b; Davidson and Rees-Mogg, 1993)
- The privatisation of the welfare state (Daniels and Radebaugh, 1992; Grosse and Kujawa, 1992; Punnett and Ricks, 1992)

The chapter concludes with another megatrend, the *Triumph of the Individual*. As we globalise, individuals, paradoxically, become more important and more powerful, politically and economically. Technology is empowering the individual. Knowledge is power. Hence, Vernon and Wells (1991) anticipated the rise of "information operatives" as the dominant form of labour (people who make their living receiving information through high-tech tools). In a high-wage information economy, people are paid for what is unique to them - their intelligence and their ability to engage in lifelong learning, the ultimate for sustainable competitive superiority to go beyond world-class status. The key competitive advantage of any company immerse in the global economy is the ability of its people to continuously transform the organization, to engineer and manage such transformations, to turn threats into opportunities, fears into challenges, ie continuous business process reengineering (Hammer and Champy, 1993; Hunt, 1993; Johansson et al., 1993; Morris and Brandon, 1993).

Vaghefi et al. (1991) and Strage (1992) described the past three decades as a period of unprecedented growth, political trauma, social upheaval and economic contradiction. In the realm of business, the period has been no less traumatic. Figure 3.7 captures the essence of discussion on international business on four dimensions:

- The Individual
- The Study
- The Business
- The Environment

FIGURE 3.7 CURRENT ISSUES IN INTERNATIONAL BUSINESS



Source: Author

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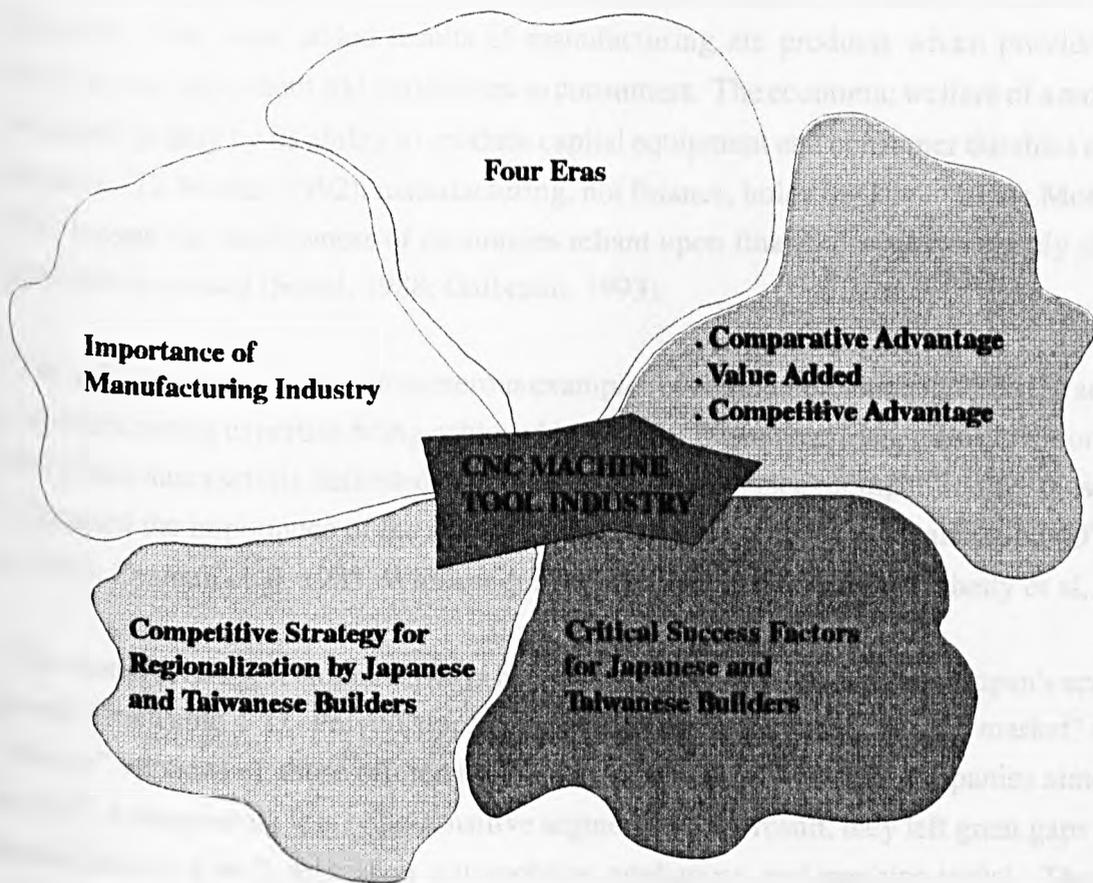
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CHAPTER FOUR

COMPETITIVE DYNAMICS OF JAPANESE AND TAIWANESE

CNC MACHINE TOOL INDUSTRY ; BATTLEFIELD IN THE ASEAN REGION



CHAPTER FOUR

COMPETITIVE DYNAMICS OF JAPANESE AND TAIWANESE CNC MACHINE TOOL INDUSTRY : BATTLEFIELD IN THE ASEAN REGION

4.1 Importance of Manufacturing Industry

The transition from an industrial to an information society does not mean manufacturing will cease to exist or become unimportant. Manufacturing is the very foundation of any economy, a key pillar of economic growth for developed OECD countries and Asia's NIEs. Manufacturing creates tangible goods by applying technology and creativity to resources and materials. The value added results of manufacturing are products which provide utility, convenience, enjoyment and enrichment to consumers. The economic welfare of a nation will be shaped largely by its ability to produce capital equipment and consumer durables and non-durables. To Morita (1992), manufacturing, not finance, holds the key. "Black Monday" in 1987 proved the shallowness of economies reliant upon financial markets, simply shuffling paper assets around (Sobel, 1988; Galbraith, 1993).

The USA and the EU provide numerous examples of companies which ignored the advances in manufacturing expertise being achieved by Pacific Basin countries. Western companies which have successfully defended their markets against overseas competition are those which recognised the importance of the manufacturing function within the organization (O'Neill et al, 1983; Zysman et al, 1983; Whicker et al, 1988; Burrows et al, 1991; Shetty et al, 1991).

The manufacturing sector has always been the "engine" of Germany's and Japan's economic growth (see Table 4-1). Previously, Japanese products were termed "down-market" or even "inferior" versions of those offered by Western companies. Western companies aimed "up-market" at supposedly less price-sensitive segments. As a result, they left great gaps in their product lines (eg hi-fi, television, automobiles, appliances, and machine tools). These gaps were located in precisely those market segments where the Japanese were most able to capitalise their domestic market advantages (Franko, 1983; Porter, 1990).

Until recently, Germany and Japan have been the most successful industrial economies since the Second World War. One quarter of all exports of manufactures now come from these two countries which in combination have just 4 percent of the world's population. When employment in manufacturing has halved in the UK and fallen sharply in the USA, the number of people who work in manufacturing industry has actually risen in Germany and Japan

TABLE 4-1 OECD'S SHARE OF THE WORLD MARKET IN MANUFACTURED GOODS (AS PERCENTAGE MARKET SHARE)

Market	1963	1979	1987	1990
Germany	20.5	19.0	17.0	10.1
USA	17.0	14.0	13.0	13.4
Japan	4.0	12.0	15.0	9.3
UK	11.0	7.0	6.0	7.5
France	8.0	9.5	10.0	6.7
Italy	6.0	7.5	7.0	4.4
Total	69.0	69.0	68.0	51.4

Source: OECD Foreign Trade by Commodities Reports (various years)

because they focus their energies and attention on the quality of products, research and development, marketing and the efficiency of production (Eltis, 1993).

The highest value added per head in many industries is obtained by producing up-to-date products which offer most to consumers and producers, and these often result from more successful and recent research and development (see Tables 4-2, 4-3 and Figure 4.1). These new products then go on to yield the highest profits¹.

Nevertheless, other elements in the macroeconomic environment can swing the balance between success and failure of industries; there are two of particular importance. These are the predictability and stability of the macroeconomic environment, and the structure of taxation and public expenditure, which have a vital impact on industrial relations and the freedom with which management can achieve and finance higher productivity and faster economic growth.

Manufacturing is the key to creating the wealth of nations (PA Consulting Group, 1993). Nations must produce well to live well. The comparative study by Dertouzos, et al. (1989) of US and Japanese performance in eight industries concluded that the USA had lost out to Japan in six basic industries, ie automobiles; computers, semiconductors and office equipment; consumer electronics; machine tools; steel; textiles and apparel. In only two (ie chemicals, commercial aircraft) did the USA maintain its leading edge. The decline in US industrial performance was perceived to be sufficiently serious as to threaten future economic prosperity. In 1992, US trade deficit soared to US\$96.1 billion, while the total gross public debt rose to

Footnote: 1

It is a truism that the professionalization and institutionalization of scientific research within universities, corporate R&D departments and the military establishment led to an historically unprecedented rate of technological advance in the post-war period. The increased supply of inventions gave greater opportunities for sustained innovation, and a consequent shortening of product life-cycles through rapid obsolescence (Jaikumar, 1986; Ferdows, 1989). More significantly, it has provided increasing opportunities to synthesize different types of technology to produce radically new processes and products. This is particularly important because innovations that require a synthesis of different kinds of expertise are more difficult to manage than those which rely on just a single source of ideas (Buckley and Casson, 1992). Further, the increase in the overall level of expenditure on R&D by the main industrialized countries over the last fifteen years suggests that overall returns per Dollar, Yen, or Deutschemark invested are declining. This supports the view that overall marginal returns on investment have decreased since the 1960s. As the numbers of mature markets rise they need continued high levels of investment in R&D. This view is supported by the Profit Impact of Market Strategy (PIMS) database finding that returns on R&D expenditure are likely to be highest in mature industries (Buzzell and Gale, 1987).

TABLE 4-2 VALUE ADDED AS A PERCENTAGE OF GDP

<u>Year</u>	<u>USA</u>	<u>Japan</u>	<u>Germany</u>	<u>UK</u>	<u>France</u>	<u>Italy</u>
1960	28.3	33.9	40.3	32.1	29.1	28.6
1971	24.9	35.2	37.0	28.5	28.5	27.4
1979	23.0	29.3	33.8	25.8	27.0	30.6
1983	20.6	29.1	31.3	21.6	25.2	27.1
1985	20.4	29.8	32.3	22.6	25.4	26.2
1989	19.4	28.9	31.1	20.4	21.4	23.2
1990	19.0	29.0	31.0	20.0	21.0	23.0
1991	-	25.0	23.0	-	21.0	21.0

Source: OECD Reports (various years), World Development Bank (1991 - 1993)

TABLE 4-3

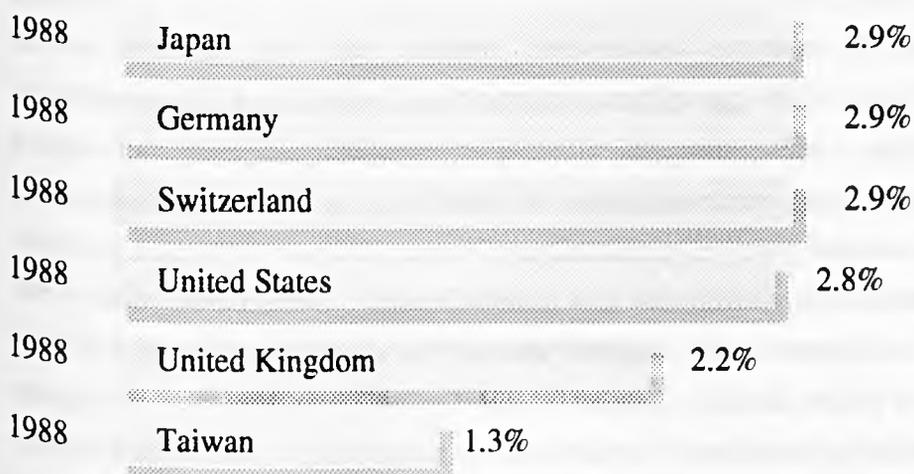
COMPETITIVE POSITIONS AS MEASURED BY RELATIVE UNIT LABOUR COSTS IN MANUFACTURING

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
United States	120	120	113	117	122	131	142	147	157	161	132	113	105	107	103	100	94
Japan	89	97	111	93	83	88	77	84	84	83	114	117	120	106	93	100	112
Germany	76	80	83	85	86	79	83	84	83	81	89	100	99	97	101	100	104
United Kingdom	76	76	84	99	121	125	117	106	101	101	94	91	96	94	97	100	96
Switzerland	79	72	86	82	72	72	80	89	87	86	93	98	100	92	99	100	98
Korea	70	73	74	82	71	65	71	71	66	68	57	62	74	102	101	100	96
Taiwan	66	69	59	67	73	78	79	74	85	80	73	83	94	108	104	100	103
Hong kong	131	123	124	116	115	108	108	93	91	103	82	75	78	89	94	100	103
Singapore	84	79	77	77	75	82	97	107	112	117	87	80	82	90	94	100	107

Footnote: • Indices in US\$ terms; 1991 = 100

• A fall in the indice indicates improvement in competitive position and vice versa

FIGURE 4.1 TOTAL RESEARCH AND DEVELOPMENT EXPENDITURE AS PERCENTAGE OF GDP



<u>Country</u>	<u>1965</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Japan	1.5	2.8	2.9	2.9	3.0	3.1
Germany	1.4	2.7	2.9	2.9	2.8	2.8
Switzerland	1.4	2.7	2.9	2.9	2.9	2.9
United States	3.4	2.8	2.8	2.8	2.8	2.7
United Kingdom	2.3	2.5	2.2	2.2	2.3	2.2
Taiwan	0.5	1.1	1.3	1.3	1.4	1.7

Footnote: Percentage share is calculated based on business expenditure on R&D over total value of GDP at current prices. Figures for Germany refers to the former West Germany.

Source: World Competitiveness and OECD Reports.

US\$4,177 billion from US\$3,801 billion in 1991 (*Federal Reserve Bulletin*, August, 1993). Such problems may be overcome, partly at least by enhancing the productivity and competitiveness of American manufacturing industry - a key industry which produces both consumer and production equipment for other industries (Reich, 1983; 1987). As the world moves towards the 21st century, international economic competition especially in manufacturing is at an all time high (Stephanou and Spiegl, 1992). In the 1990s, manufacturing companies face the challenge of globally integrating their operations (covering both production and servicing capabilities) to rationalise their entire system of manufacturing facilities around the world for a new manufacturing/servicing scale advantage to compete in the volatile global arena. Manufacturers that successfully coordinate global resources to achieve operations flexibility will become stronger, more competitive and more responsive companies (McGrath and Hoole, 1992). The stark political reality is the awareness that a country's survival is dependent on the capability of manufacturing industries to stay ahead of competition in global markets (Chaston, 1990).

Japanese industrial prowess was threatening enough in the 1960s when it was focused on textiles, clothing, steel, and ships. By the mid 1980s, it was much more so, given that the Western manufacturing heartland of automobiles, consumer electronics, and machine tools had also been well penetrated by Japanese companies. (Now under threat are US icons such as media, entertainment, etc). In the field of manufacturing, the machine tool industry plays a dominant role. Machine tools, which cut or shape metal parts are used in the production of durable goods ranging from ordnance, aircrafts and building components to consumer appliances and items such as refrigerators and automobiles. The machine tool industry is therefore a fundamental one, rather like semiconductors, and maintaining a thriving machine tool industry is thus crucial to national economic survival. When people speak of America's economic decline and the rise Japan, they most often cite the US disasters in four key industries, namely, cars, consumer electronics, semiconductors and machine tools (Forester, 1993).

Traditionally, the machine tool industry has been strongly influenced by economic cycles (Morden, 1993). As a producer of basic capital goods, this industry easily falls prey to recession and is one of the last beneficiaries of economic recovery. Machine tool orders remain depressed even after an economy begins to pick up. It usually takes six months to a year (especially for CNC machines) after the confirmation of a full-scale upturn before it begins to enjoy health in business again. (During recession, end-users are faced with the problem of excess production capacity. In times of recovery, end-users will normally take a lead-time of

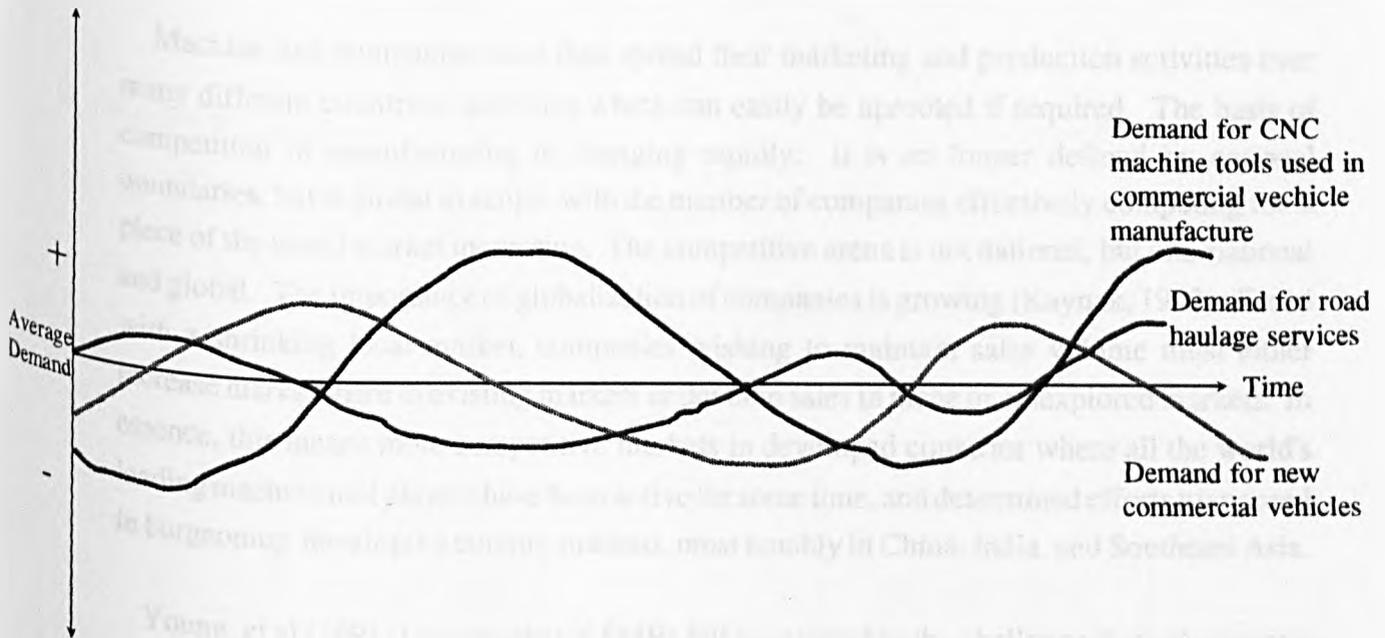
a few months to procure the budget for a purchase - assuming that the technical evaluation phase of the organization buying behaviour for industrial product works in parallel). The number of capital goods on order is often a barometer of industry plans to expand and modernise, as well as a measure of business confidence. In the face of such strong dependence on economic cycles, machine tool builders have learned to cope by adjusting their order backlogs and labour forces, and the average production volume. They pursue product innovation and specialisation, coming up with unique offerings and being the first to market with new products. Hence, concurrent/simultaneous engineering which aims at minimisation of total lead-time from the market research/product design phase right through to the launching of the product in the market place is being extensively practised by machine tool builders (CBI, 1992; DTI, 1993; Parsaei and Sullivan, 1993). (Concurrent engineering is a systematic approach to the integrated, concurrent design of products and their related processes including manufacture and support. This approach is intended to cause developers from the outset, to consider all elements of the product life cycle from conception through disposal including quality, cost, schedule and user requirements; Nevins and Whitney, 1989). See Figure 4.2.

Yet the problem emerging worldwide today for the machine tool industry is one of a more revolutionary nature, completely independent of the traditional economic cycles. It stems from the fact that the much more productive CNC turning machines and machining centers now account for about half of the world's total production of CNC machines (JMTBA, 1992). The number of CNC machine tool manufacturers has grown in response to the increased demand for these two types of machine (ie CNC lathes and machining centers). New entries into the market have intensified competition and reduced profitability, while demand for the conventional product lines (manually operated machine tools which are dependent on the operators' skills) has been severely depressed since the late 1980s. Faced with this dilemma, machine tool builders the world over have been under pressure during the early 1990s to review drastically their management strategies for the rest of the decade and into the next century - the total market for machine tools is shrinking because one CNC machine is the equivalent of three to five conventional machines (Kobayashi, 1993).

In line with the rapid internationalization of business, some industries (eg the machine tool industry) had no other alternative but to follow the trend. An industry is defined as a group of companies producing similar or identical products (Samuelson and Nordhaus, 1992). Products are developed, designed and manufactured where the company sees the best opportunities and where it meets the most favourable conditions. Though Italian footwear and

FIGURE 4.2

CYCLICAL DEMAND VARIATIONS FOR CNC MACHINE TOOLS FROM THE DERIVED DEMAND FOR ROAD HAULAGE SERVICE



Footnote: Demand in business markets is "derived" - goods and services are purchased as inputs to manufacturing or operational process whose objective is the supply of a product or service to another customer or client. For instance, a manufacturer of specialist electronic circuits (eg FANUC) may sell his control systems to machinery manufacturers (eg Hitachi-Seiki, Makino, Mori-Seiki) who sell the final product, ie CNC machine tools to the automobile manufacturers. Thus, market prospects depend on the demand for the product sold to the next customer in the chain of customers. It is inevitable that business markets will suffer from a variable demand pattern. These variations follow the pattern of the business cycle, which reflects the state of the total economy at the time. In boom conditions, industrial markets may be swamped with orders that manufacturers cannot meet quickly.

Source: Adapted from Morden, A.R. (1993), Elements of Marketing. Third Edition, DP Publications Ltd, London, pp. 12.

Dutch fresh-cut flowers are sold worldwide, their respective manufacturing industry is localised because that is precisely where the advantages can be found.

As observed by Young (1991), the machine tool industry remains international rather than global, by virtue of the prevalence of small companies. Also, there were few companies with a spread of manufacturing facilities around the world or even of sales subsidiaries. Nevertheless, the small CNC lathe and machining center sub-sector is a global industry dominated by the Japanese. The four global players in descending order: Amada, Yamazaki-Mazak, Fanuc and Okuma accounts for US\$4.26 billion or 13.9 percent share of the total world's production value (*American Machinist*, August, 1991).

Machine tool companies must thus spread their marketing and production activities over many different countries; activities which can easily be uprooted if required. The basis of competition in manufacturing is changing rapidly. It is no longer defined by national boundaries, but is global in scope, with the number of companies effectively competing for a piece of the world market increasing. The competitive arena is not national, but international and global. The importance of globalization of companies is growing (Kaynak, 1993). Faced with a shrinking local market, companies wishing to maintain sales volume must either increase market share in existing markets or develop sales in niche or unexplored markets. In essence, this means more competitive markets in developed countries where all the world's leading machine tool players have been active for some time, and determined efforts to succeed in burgeoning developing country markets, most notably in China, India, and Southeast Asia.

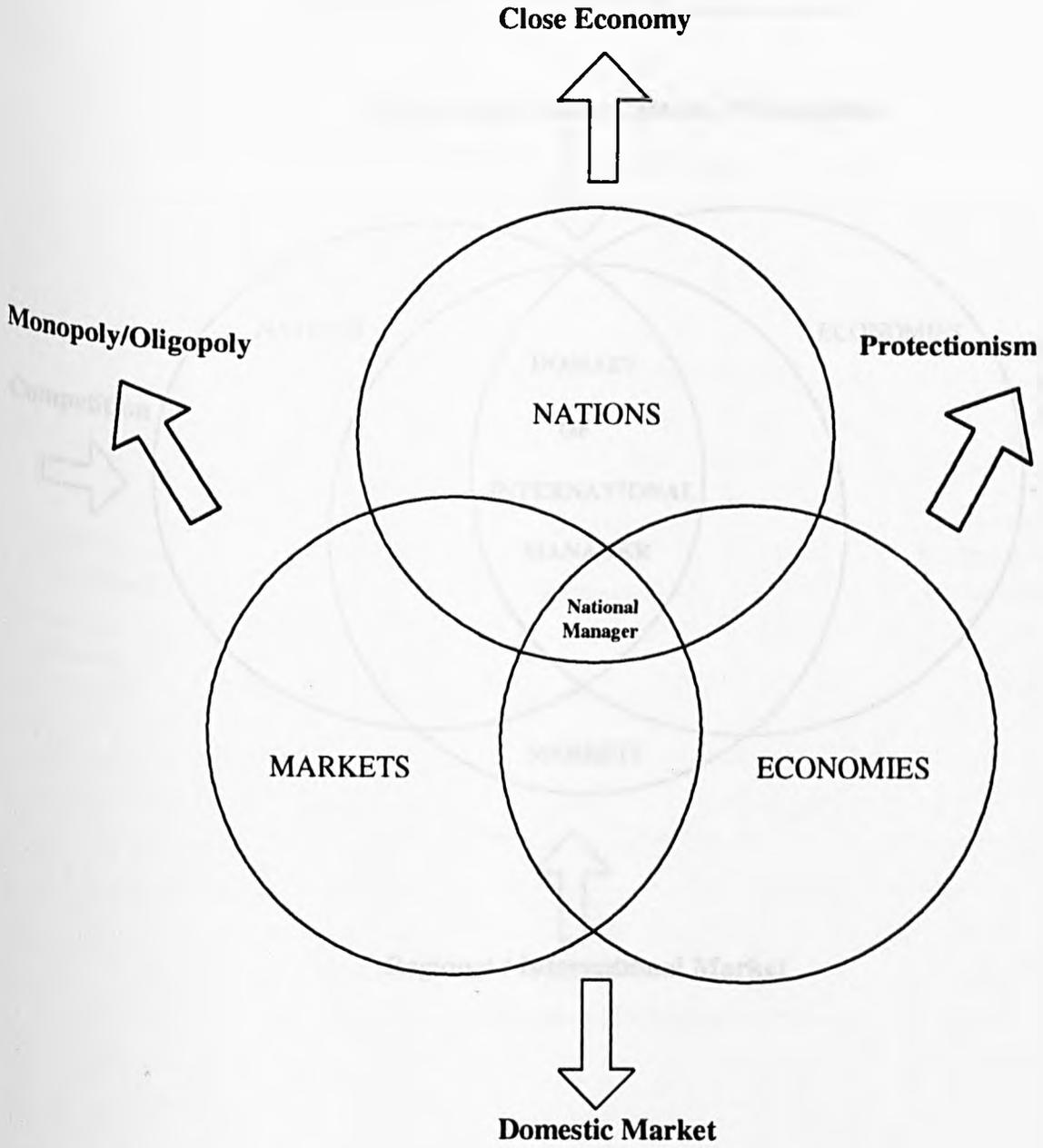
Young, et al (1991) foresees that if SMEs fail to respond to the challenge through creative multinational marketing strategies, the industry will likely evolve into one dominated by large global groups. (Current developments support this foresight).

Internationalization is thus no longer an option but an economic imperative for corporate survival. This places additional requirements upon machine tool managers. See Figures 4.3, 4.4 and 4.5. The macro perspective of international business is highlighted in Table 4-4. As a corollary, as industry grows more international there will be a stronger need for geocentric enterprises to move specialist people among nations. Hence, the demand for managers with an international/global mindset. Further, in an open and fair economy, companies will compete to improve their productivity and offer products at lower prices, of better quality, offering more flexibility and with shorter lead times (Garvin, 1993).

FIGURE 4.3

THE CHALLENGE OF NATIONAL BUSINESS: A MACRO PERSPECTIVE

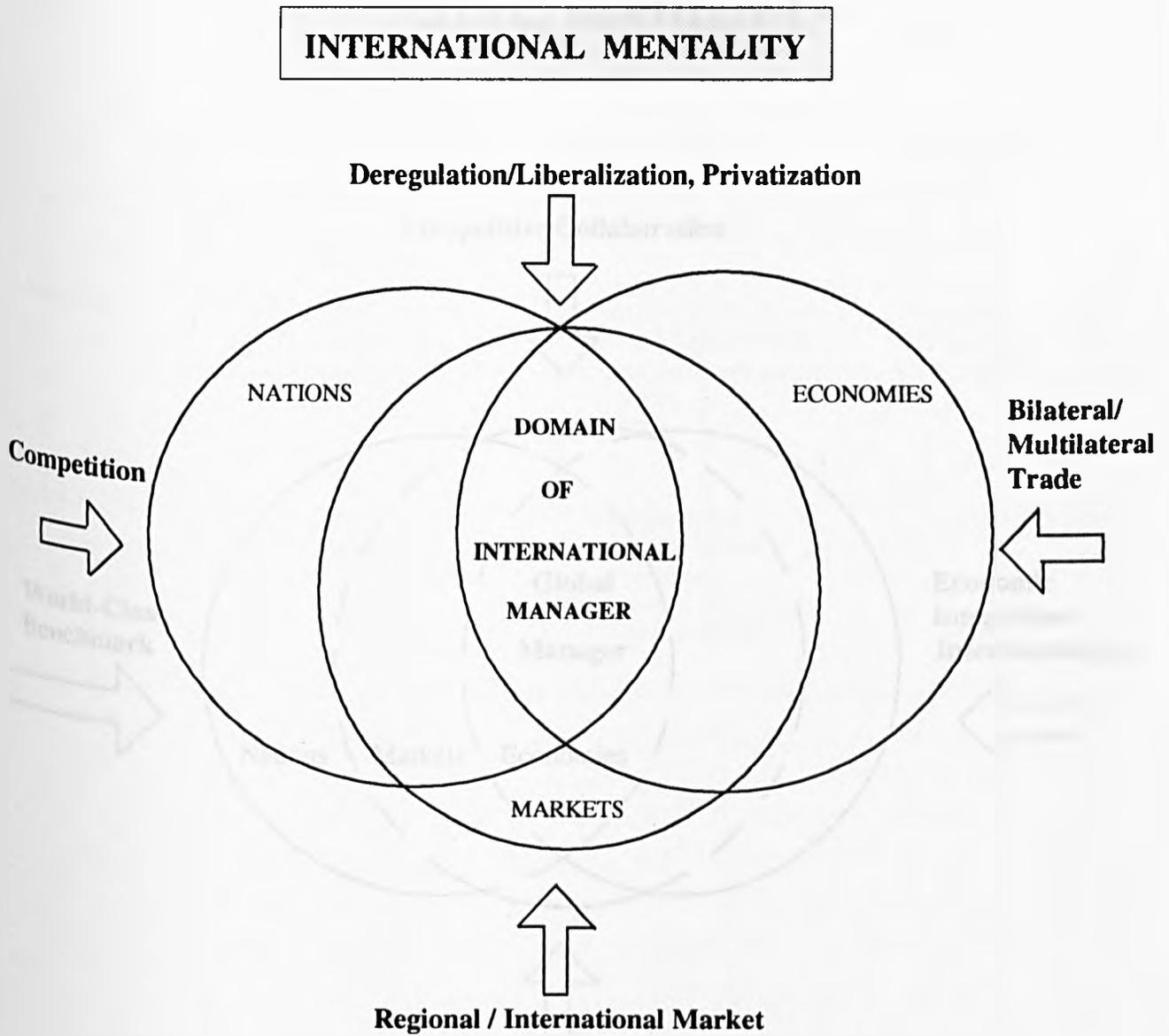
INSULAR MENTALITY



Source: Author

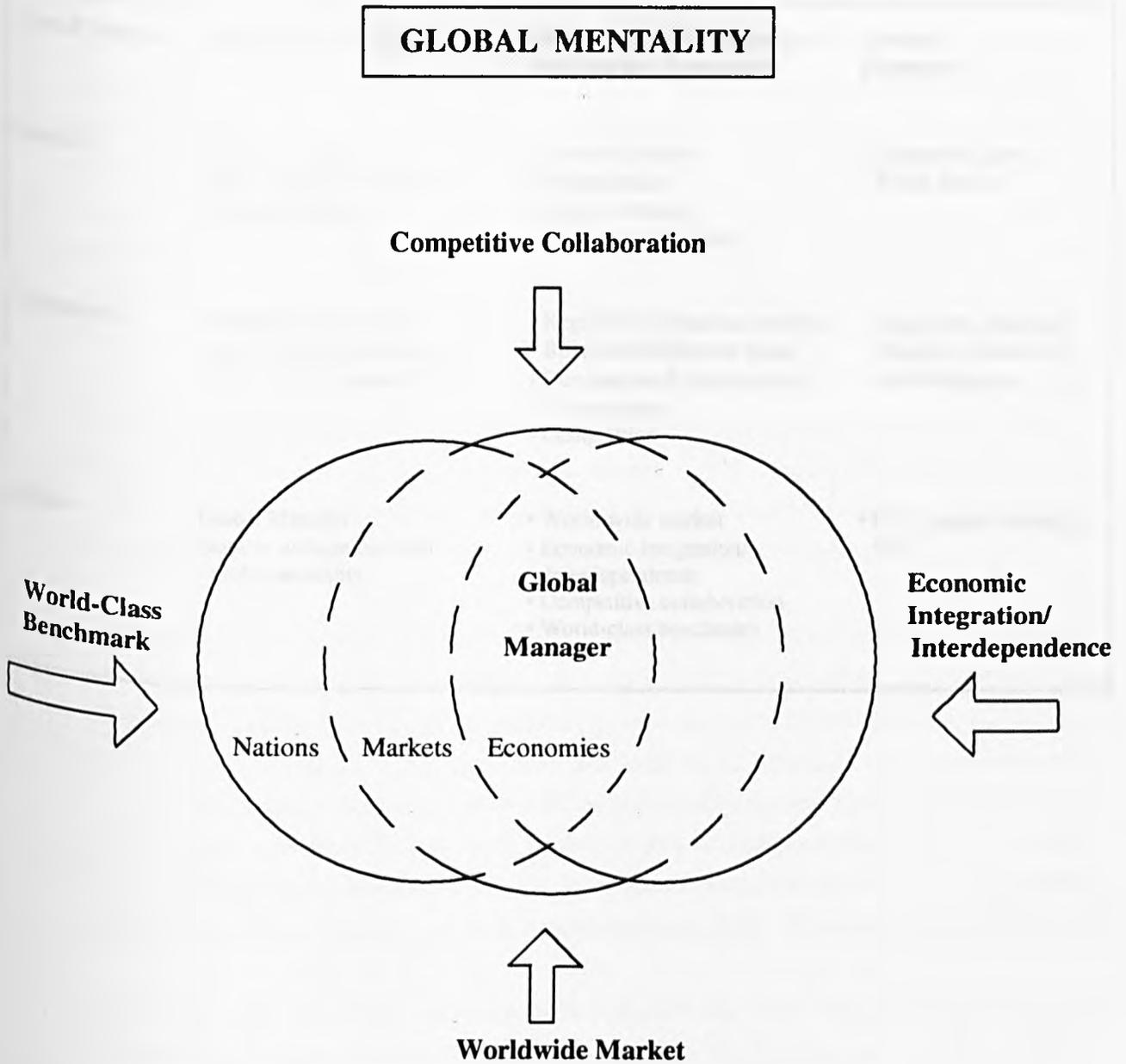
FIGURE 4.4

THE CHALLENGE OF INTERNATIONAL BUSINESS:
A MACRO PERSPECTIVE



Source: Author

FIGURE 4.5 THE CHALLENGE OF GLOBAL BUSINESS : A MACRO PERSPECTIVE



Source: Author

TABLE 4-4

MACRO PERSPECTIVE OF INTERNATIONAL BUSINESS

Type of Business	Mindset of the Manager	Characteristics of Nations, Markets and Economies	Country Examples
National	National Manager (within national borders) - insular mentality	<ul style="list-style-type: none"> • Domestic market • Protectionism • Close economy • Monopoly/Oligopoly 	<ul style="list-style-type: none"> • Myanmar, Laos, North Korea
International	International Manager (across national borders) - international mentality	<ul style="list-style-type: none"> • Regional/International markets • Bilateral/Multilateral trade • Deregulation/Liberalization/Privatization • Competition 	<ul style="list-style-type: none"> • Singapore, Malaysia, Thailand, Indonesia, the Philippines
Global	Global Manager (nations without borders) - global mentality	<ul style="list-style-type: none"> • World-wide market • Economic integration/Interdependence • Competitive collaboration • World-class benchmark 	<ul style="list-style-type: none"> • USA, Japan, Germany, UK

Source: Author

De-industrialization in many *developed* countries looks set to intensify as a consequence of the growing competitive advantage of *developing* countries in producing manufactured goods. The service sector tends to become larger than the industrial sector in advancing economies (Murdick et al., 1990). See Table 4-5. Success in export marketing has led companies to switch their market entry strategy and exports have been superseded by local production. Export and overseas production by MNCs make up 30 percent of the total world sales of goods and when added to the home production and sales of the companies concerned, it is estimated that half of the world production is now organized by international and multinational companies. Manufacturing businesses increasingly will have to locate in low-cost developing countries if manufacturers choose to compete on costs (Brown and Julius, 1993). If they choose to compete in high value added niches they will have to raise the service intensive customization of their products. Customers are willing to pay premium price because of differentiation arising from value added services (Payne, 1993). The line between products and services is fast eroding. What once appeared to be a rigid polarity now has become a hybrid - the servicization of products and the productization of services (McKenna, 1991). A manufacturing and services package is a differentiation strategy; the basic product is augmented through an adding of value thus providing a platform for achieving competitive operations advantage.

In many markets, it is becoming easier for companies to match the competition in such areas as product quality and product innovations ("add ons") because of the advent of manufacturing technologies aided by the speed of information technologies, and the adoption of world-class manufacturing techniques. The distinction that used to be drawn between products and services is meaningless because so much of value provided by the successful company, in fact the intangibles, represent the true value as they cannot be easily duplicated. The mythical choice between products and services is at an end. They are inextricably bound together, both necessary to achieve total customer solutions (Ketelhohn, 1993; Walden and Lawler, 1993).

Currently, with companies increasingly reliant on brain power and the interactions and interconnections between people, their challenge is to build "capability portfolios" consisting more and more of the "soft" skills (difficult to copy) rather than "product portfolios" (easy to duplicate and emulate). Value is derived not from the machines producing scale volumes according to the standards set by the corporation, but from people dealing with customers on a daily basis, at the critical value points, where and when services have to be performed (Simonson, 1993). This leads to the concept of mass customization (Pine II, 1993).

TABLE 4-5 SELECTED COUNTRIES REFLECTING THE IMPORTANCE OF MANUFACTURING VERSUS SERVICE INDUSTRY

Distribution of GDP (Percentage)

Year	OECD				ASEAN				
	USA	UK	GERMANY	JAPAN	SINGAPORE	MALAYSIA	THAILAND	INDONESIA	PHILIPPINES
1988	22	27	44	29	30	-	24	19	25
	65	56	47	57	61	-	48	40	44
1989	17	20	32	30	26	-	21	17	22
	69	62	62	56	63	-	47	39	43
1990	-	-	36	29	29	27	26	20	25
	-	-	59	56	63	42	48	38	43
1991	-	-	23	25	29	28	27	21	26
	-	-	59	56	62	43	49	39	44
1992	-	-	-	-	28	29	-	21	-
	-	-	-	-	68	44	-	38	-

Manufacturing Industry

Service Industry

Footnote: Percentage share is calculated based on value added of manufacturing and services over total GDP at current prices.

Source: World Development Bank; Yearbook of Statistics, Singapore; Bank Negara Annual Report; Asian Development Bank Annual Report.

The national strategy of industrialized nations should continue to focus on maximum value adding manufacturing which has a pivotal role in generating wealth and high-skilled employment. Nevertheless, industrialized nations and NIEs should compete on capabilities rather than low cost by sustaining the competitiveness of their manufacturing sector through R & D, upgrading of strategic manufacturing technologies, continuous investment in education and training to build up a large pool of scientific and technical talents in order to encourage strategic alliances between private companies and public sector organizations of host and home countries. The ultimate aim should be to build up core industrial capabilities specializing in key technologies through competitive operations advantage (manufacturing plus value added services) as a formidable weapon (Harrison, 1993). After all, manufacturing must be complemented by marketing and vice versa in order to go beyond world-class - marketing is often perceived as a service. Hence, although the service industry seems to play a more significant role over the manufacturing industry, it really means that service aspect of marketing has become an integral part of manufacturing (Peter, 1992).

4.2 The Computer Numerically Controlled Machine Tool Industry Environment

Machine tools are often called "machine-making machines" or "the mother of machines" because of their ability to produce accurately and cost-effectively the complicated precision parts for building all kinds of machines for manufacturing all types of products (see Figure 4.6). Machine tools are found in the general machine shop, the tool-room and production shop of machine tool builders, the manufacturers and users in different industries, and in the premises of their suppliers, distributors, sub-contractors, and definitely among rivals of machine tool builders, ie the whole chain of customer relationships (both internal and external). Industrialized nations (eg the USA, Germany, and Japan), with the belief that the machine tool industry is the nucleus of their entire machinery industry, make every effort to promote its growth. Nevertheless, the machine tool industry as a whole is a comparatively small industry, accounting for approximately five percent of metalworking output in the advanced industrialized nations (Huq and Prendergast, 1983).

Machine tools are broadly defined as "machines to process metals, woods or other materials into desired shapes by cutting, grinding, shearing, forging, rolling or other techniques." The Japanese Industrial Standards (JIS), however, gives a narrower definition, ie "machine tools are machines which form primarily metallic materials into desired shapes by removing unnecessary parts by cutting, grinding or other techniques, not including machines which are hand-held during use or fixed with magnet stand, etc." In Japan, the term "machine tools"

FIGURE 4.6

MACHINE TOOLS PRODUCE TOOLS AND MACHINES FOR MANUFACTURING ALL TYPES OF PRODUCTS: A DISTINCT CLASS OF MACHINERY

All Material Progress Begins With Machine Tools

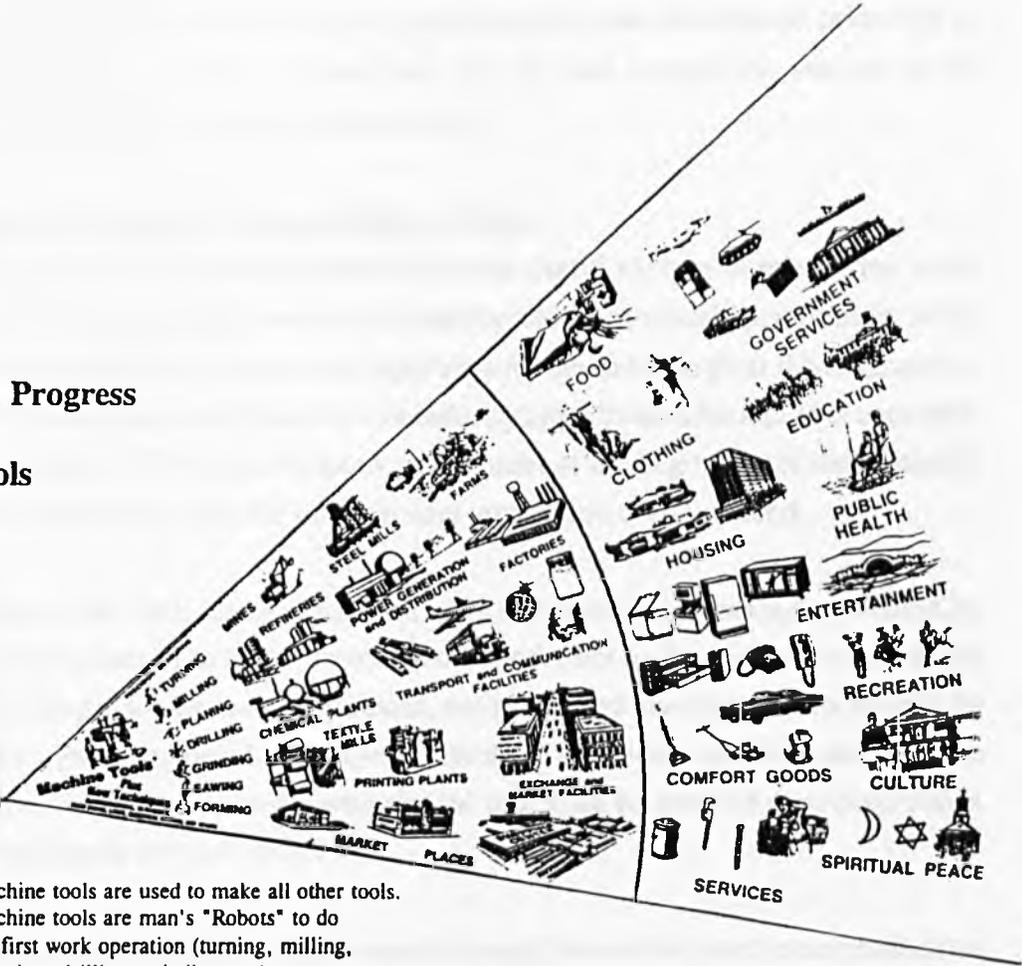


Machine Tools for New Technology

Machine tools are used to make all other tools. Machine tools are man's "Robots" to do the first work operation (turning, milling, planning, drilling, grinding, etc)

Besides making the special machinery used for all types of manufacturing, machine tools are often employed to directly manufacture the parts used in production.

The machine tool industry is relatively small but it is the key to all material progress.



Source: Adapted from Krar, Steve F. and Oswald, J. William (1990), Technology of Machine Tools, Fourth Edition, McGraw-Hill, New York, pp. 4.

usually refers only to machines which cut metals into desired shapes, and does not include forming machinery [Japan Machine Tool Builders' Association (JMTBA), 1992]. This definition is adopted in this thesis.

This section outlines the historical development and scenario of the machine tool industry during the last two centuries which fall into four distinctive eras determined primarily by technological innovations. Section 4.3 analyses the derived competitive success of the Japanese and Taiwanese CNC machine tool industry.

• **The Conventional Machine Tool Era (1800s - 1950s)**

The discovery that water, steam and electricity were useful sources of energy led to the production of power-driven machine tools which rapidly replaced manual operations for many applications. Based on these advances and together with the metallurgical development of alloy steels as tool materials, a new machine tool industry arose in the 18th and 19th centuries. The first steam engine in 1776 - seen by many as the onset of the beginning of the industrial revolution made it possible to provide power to any area where it was needed.

By the latter part of the 19th century, machine tools had become increasingly powered by electricity rather than steam. The basic machine tools underwent further refinement; multiple point cutters for milling machines were introduced, and automated machine tool operations by computer control were being developed. Even with these advances, conventional machine tool practices still relied on the principle whereby the tool must be made of a material that is harder than the workpiece that is to be cut.

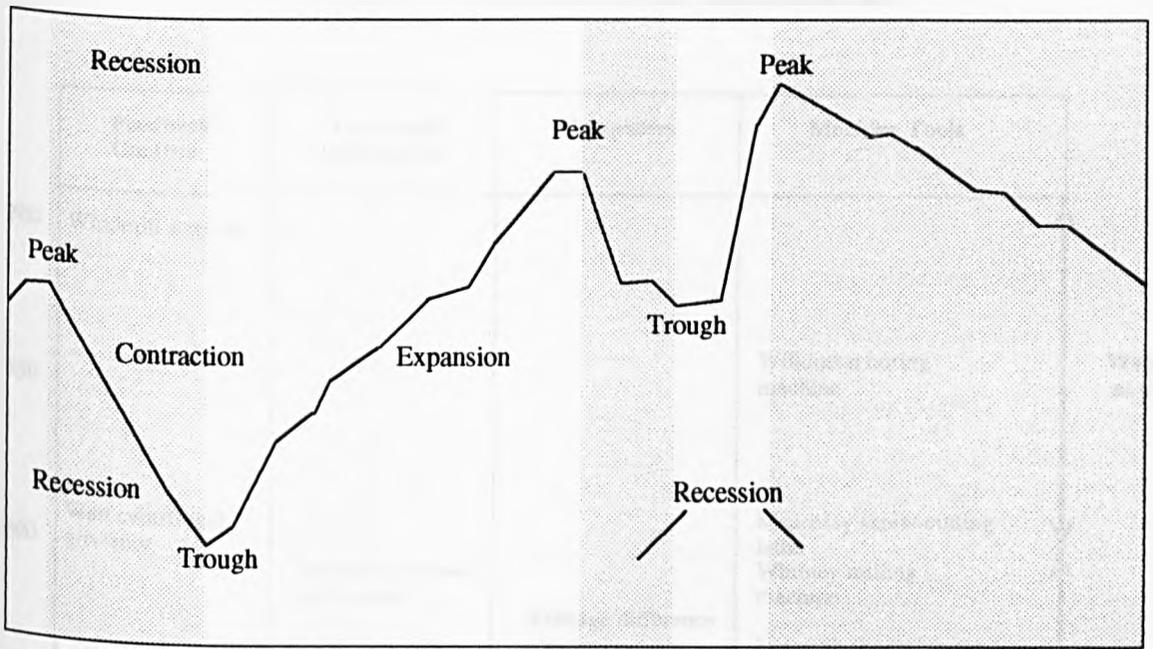
Prior to the 20th century, manufacturing methods changed very slowly and mass production techniques remained relatively undeveloped. It was not until the early 1930s that new and outstanding developments (mechanization and standardization/interchangeability of parts) in manufacturing began to affect manufacturing processes. Since then, progress has been very rapid. It is precisely because of this progress over the past fifty years or so that it has become possible to manufacture many products which enable many to enjoy very high standards of living (Krar and Oswald, 1990). Many goods are produced automatically by a continuous flow of finished parts from NC machines. Product control and high production rates allow us to enjoy the pleasure and convenience of automobiles, power lawn mowers, automatic washers, stoves, and scores of other modern appliances. Without the basic machine tools required for mass production and automation, the costs of many goods would remain prohibitively expensive luxuries enjoyed by only a rich minority.

Manufacturing prior to 1932 was done on standard types of machine tools with little or no automation. Engine lathes, turret lathes, drill presses, shapers, planers, and horizontal milling machines were the common machine tools of the day. Most of the cutting tools were made of carbon steel or early grades of high-speed steel which were not very efficient by today's standards. Production was slow and much of the work was finished by hand. This resulted in high costs of the items produced in relation to wages paid to the workers.

In the early 1930s, machine tool manufacturers in the USA took advantage of the lull in production and sales caused by the Great Depression (unemployment was at the rate of 27 percent in 1933; see Figure 4.7) to upgrade their machines by improving flexibility and controls. However, progress on new machine tools was slow during the first half of the 20th century except for spurts during the two world wars. World War II sparked an urgent need for new and better machines which resulted in more efficient production. The reasons for every major change in manufacturing technology can generally be traced to historical causes (Milner and Vasiliou, 1986); Figure 4.8 shows the four main lines of development that led to the first numerical control (NC) machine tool whilst Figure 4.9 indicates the accuracy of each machine type. (From the three general classifications of normal, precision and ultra-precision machining, the limitations of traditional machine tools/methods became clear. Taniguchi (1983) concluded that these fine accuracies cannot be obtained by the mechanical removal of chips of material employed by conventional methods of machining. Instead, the precision required can only be achieved by advanced methods in which atoms or molecules of materials are removed, either individually or in groups). NC and computer numerically controlled (CNC) machine tools fall under the category of normal machining. Over the years, the demand for computer control machine tools to meet the shortage of skilled workers resulted in the switchover from conventional to NC and later to CNC, contributing to its present market size.

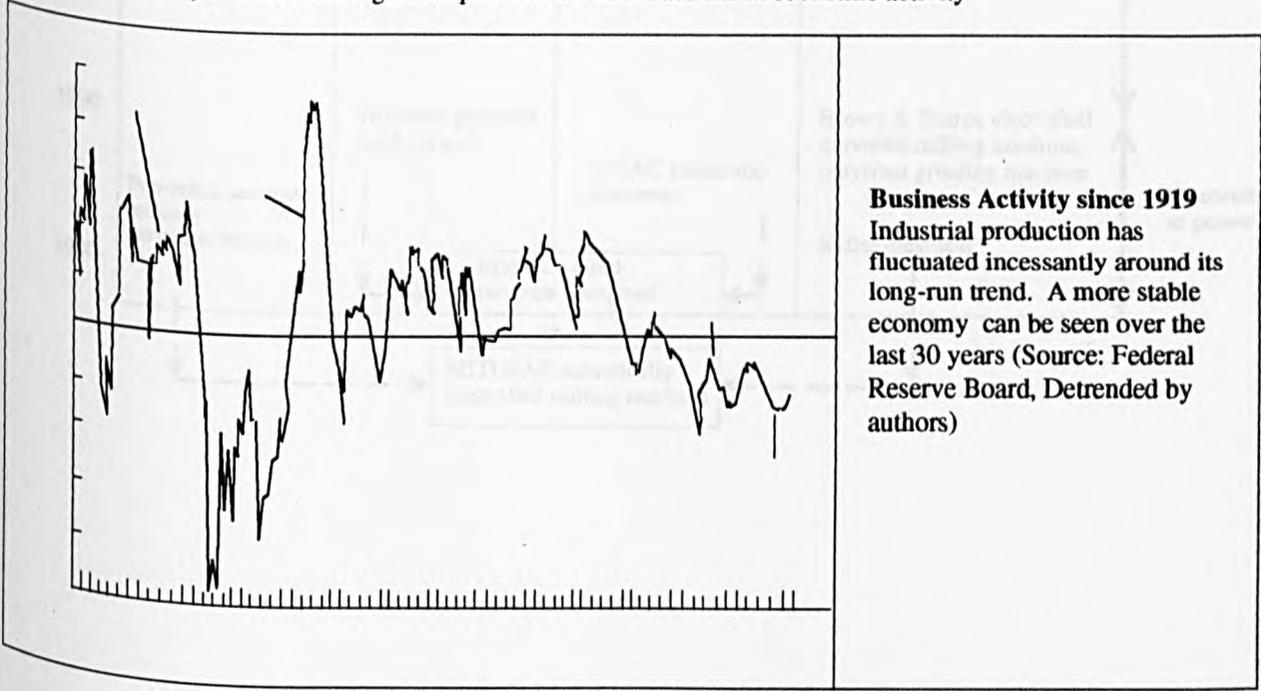
In the design of a machine tool, the machine itself is only part of a manufacturing system. The design and the resulting performance can be considered in relation to the other parts of the system, which is the machining system. In the example of a lathe, the finished size of the workpiece will depend not only on the accuracy of the machine movements but will also depend on the wear of the tool and also on the deflection of the workpiece due to bending under the action of the cutting forces. When considering the vibration and chatter of a machine tool, the characteristics of the tool and the workpiece will influence the factors causing vibration and chatter. The systems approach applied in the design of a machine tool is in Figure 4.10 (Chan, 1991). In reality, the development of machine tool, cutting tool, and material of workpiece are

FIGURE 4.7 BUSINESS CYCLES IN THE USA FROM 1919 TO 1990



A Business cycle, like the year, has its seasons

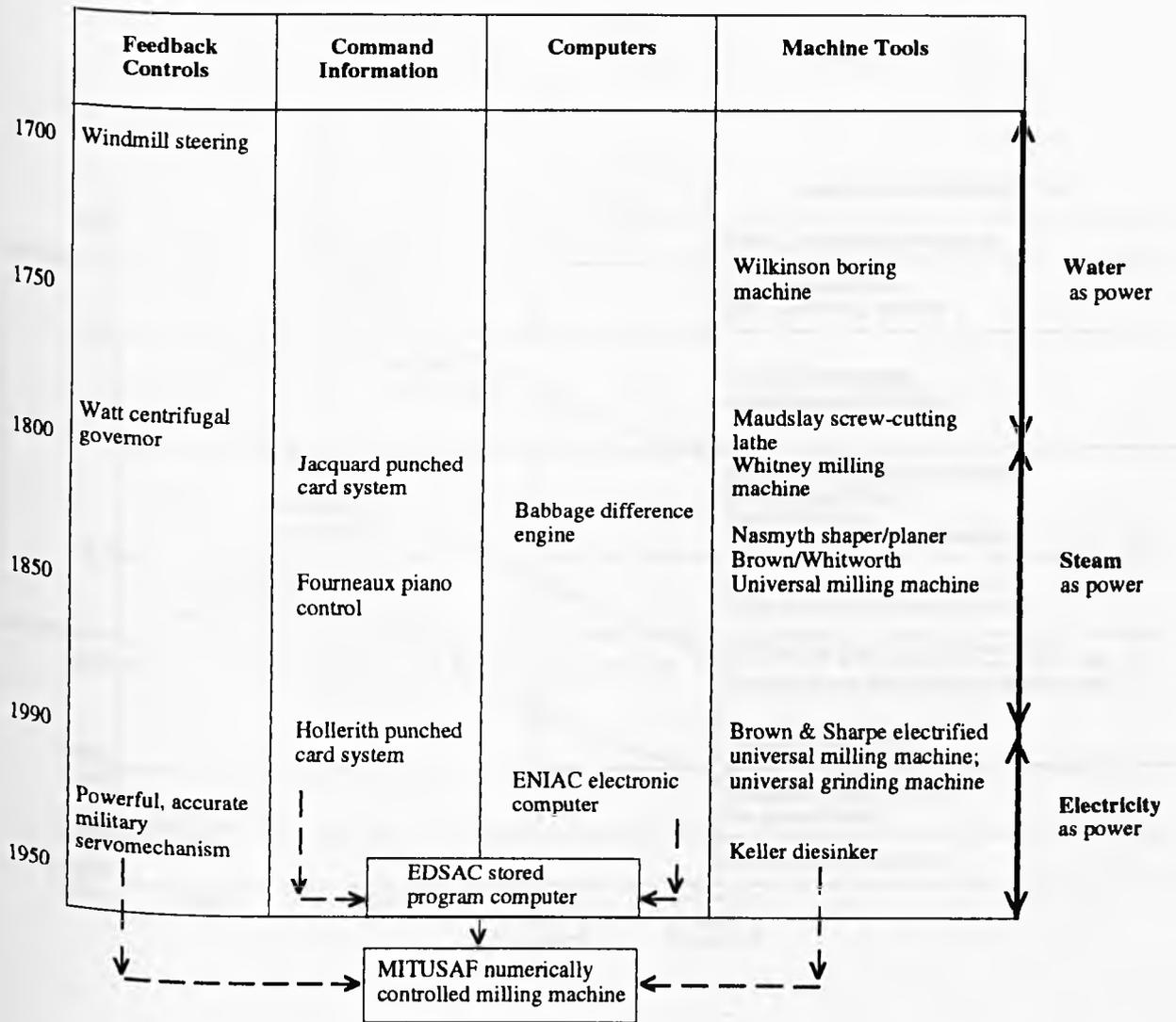
Business cycles are the irregular expansions and contractions in economic activity



Business Activity since 1919
 Industrial production has fluctuated incessantly around its long-run trend. A more stable economy can be seen over the last 30 years (Source: Federal Reserve Board, Detrended by authors)

Source: Samuelson, Paul A. and Nordhaus, William D. (1992), Economics, Fourteenth Edition, pp. 568.

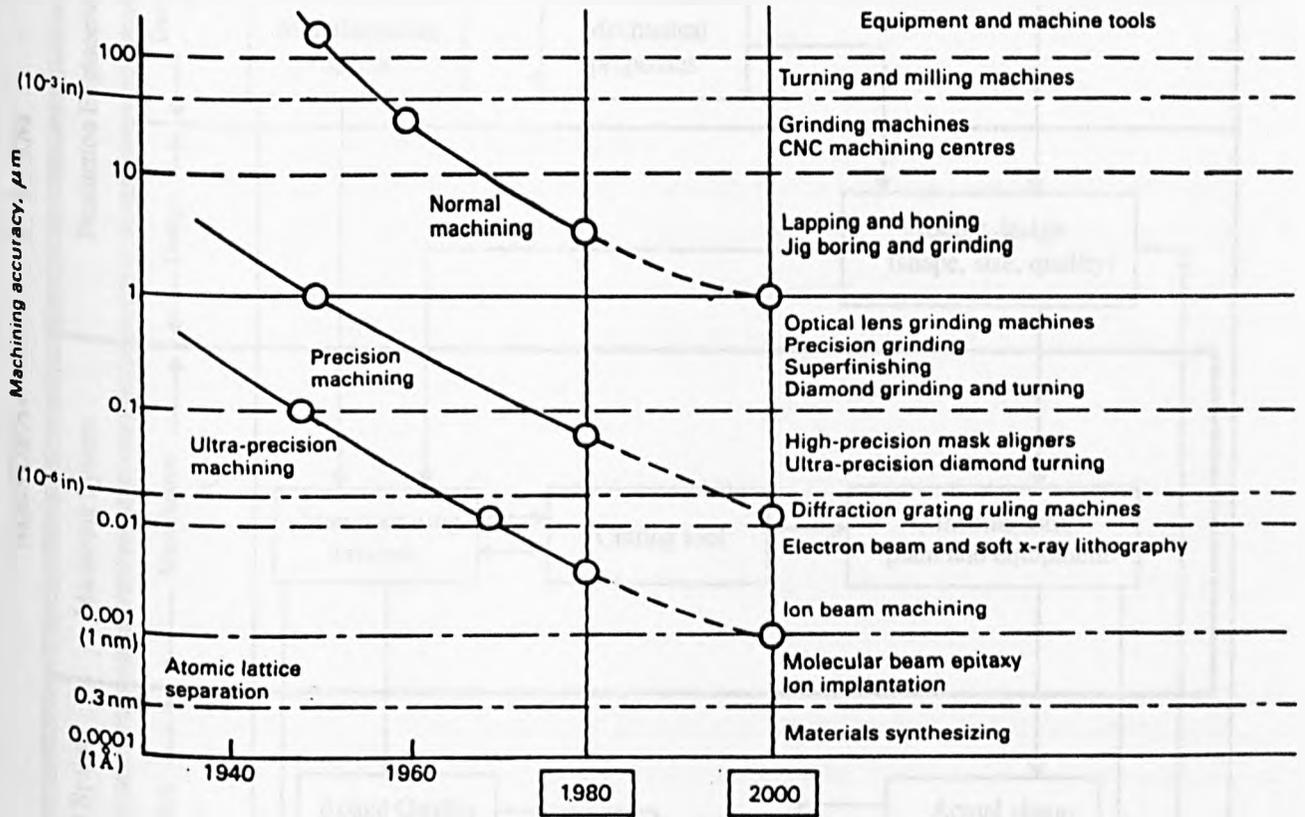
FIGURE 4.8 HISTORICAL DEVELOPMENT OF CONVENTIONAL MACHINE TOOL (AT THE THRESHOLD OF THE NC ERA)



Source: Adapted from Milner, D.A. and Vasiliou, V.C. (1986), Computer-Aided Engineering for Manufacture, Kogan Page, pp. 18; Kalpakjian, Serop (1991), Manufacturing Processes for Engineering Materials, Addison-Wesley, Reading, Massachusetts, pp. 6 - 7.

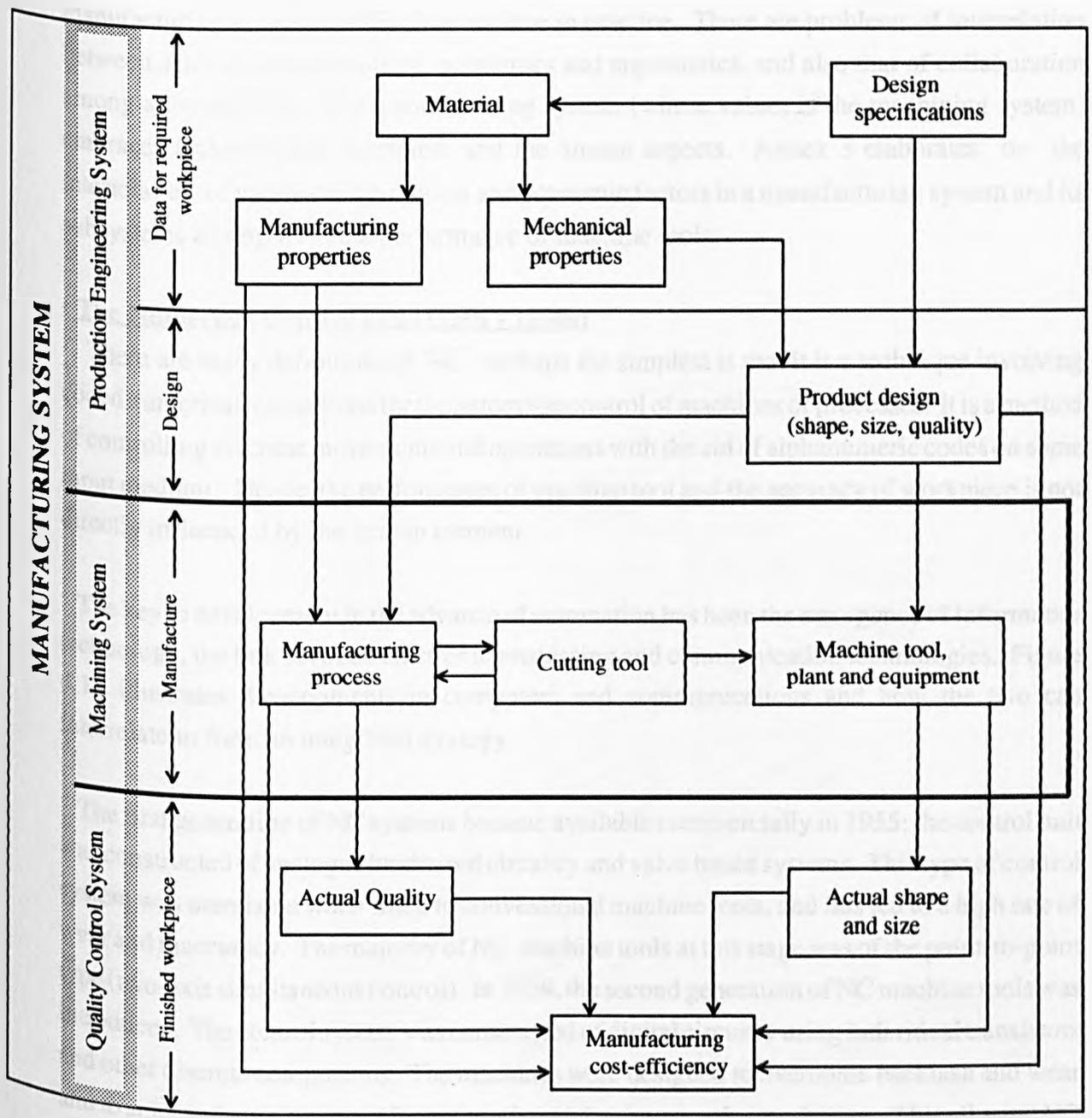
FIGURE 4.9

MACHINING ACCURACIES OF VARIOUS TYPES OF MACHINE TOOLS



Source: McKeown, P. (1986), "High Precision Engineering and the British Economy (James Clayton Lecture)", *Proceedings of the Institution of Mechanical Engineers*, Vol. 200, No. 76, pp. 1 - 18; Taniguchi, N. (1983), "Current Status in and Future Trends of Ultraprecision Machining and Ultrafine Materials Processing", *Annual of CIRP*, Vol. 32, No. 2, pp. 1 - 8.

FIGURE 4.10 INTERRELATION OF THE VARIOUS TECHNOLOGICAL AND ECONOMIC FACTORS IN A MANUFACTURING SYSTEM



(see Annex 5 for details)

Source: Author

often out of coordination (because no manufacturer can produce all the three items) resulting in optimization or sub-optimization of the manufacturing system. Maximization of a manufacturing system is difficult to achieve in practice. There are problems of interrelation between science and technology, economics and ergonomics, and also that of collaboration among all concerned. The manufacturing system (whose subset is the machining system) embraces technological, economic and the human aspects. Annex 3 elaborates on the interrelation of various technological and economic factors in a manufacturing system and its subsystems arising from the performance of machine tools.

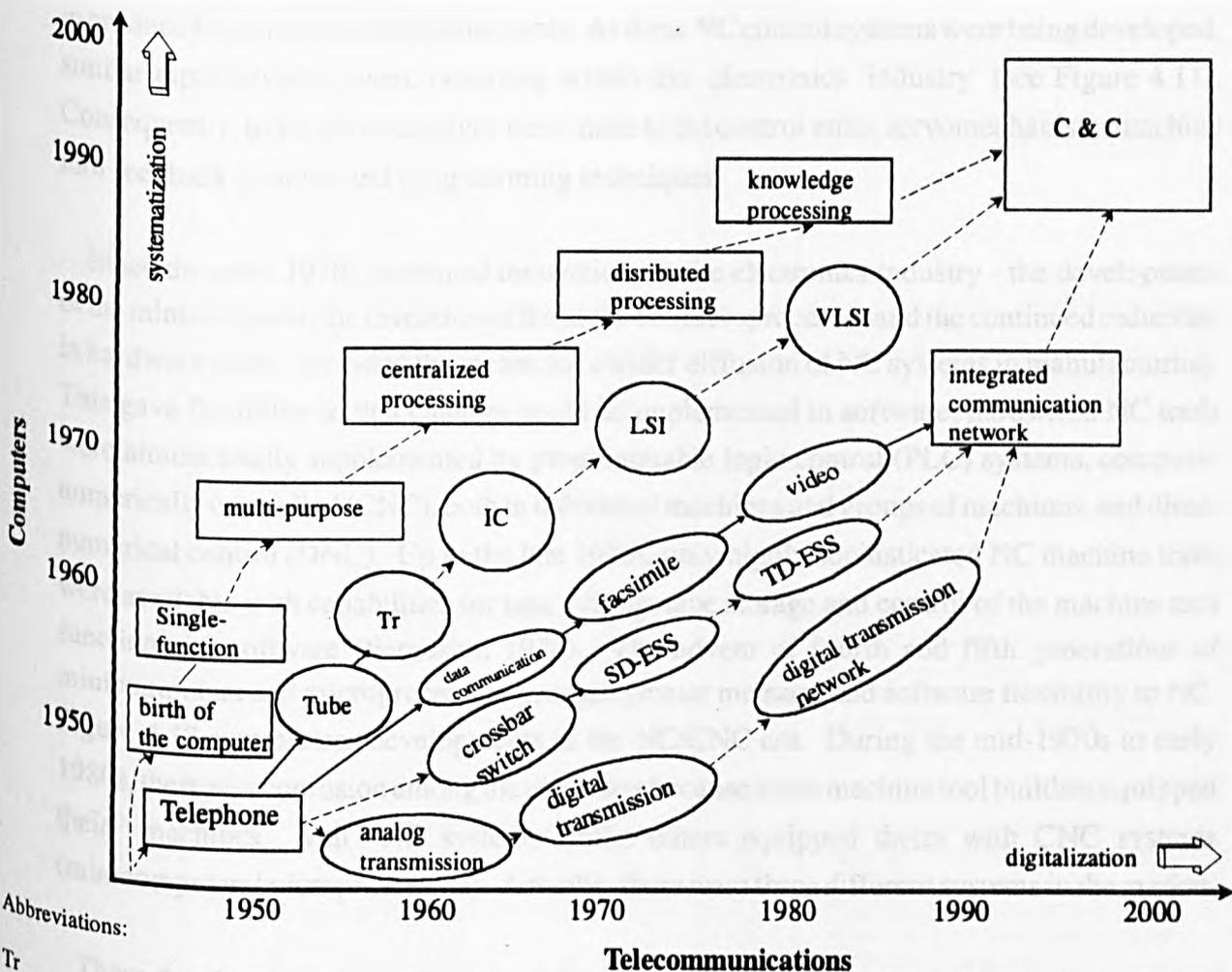
• **The Numerical Control Era (1950s - 1970s)**

There are many definitions of NC, perhaps the simplest is that it is a technique involving coded numerical instructions for the automatic control of machines or processes. It is a method of controlling machine movements and operations with the aid of alphanumeric codes on some input medium. Hence, the performance of machine tool and the accuracy of workpiece is not directly influenced by the human element.

The key to development in the advance of automation has been the emergence of informatics technology, the link between electronic processing and communication technologies. Figure 4.11 illustrates developments in computers and communications and how the two can interrelate to form an integrated strategy.

The first generation of NC systems became available commercially in 1955; the control unit was constructed of analogue hardwired circuitry and valve based systems. This type of control system was unreliable when fitted to conventional machine tools, and this led to a high rate of wear and inaccuracy. The majority of NC machine tools at this stage was of the point-to-point type (two-axis simultaneous control). In 1959, the second generation of NC machine tools was introduced. The control system was constructed of digital circuitry using individual transistors and other discrete components. The machines were designed to overcome backlash and wear and to achieve better accuracy for contouring and point-to-point machining. This allowed NC machine tool manufacturers to promote more aggressively and by the mid-1960s a large range of NC systems had been developed, together with programming languages to assist in the preparation of input data. During these early years of development, NC systems were faced with the inherent limitations of high cost, unreliable electronics, programming difficulties and lack of flexibility. The third generation of NC machine tools with integrated circuit boards were introduced in 1965. This advancement provided easier maintenance and better utilization.

FIGURE 4.11 THE PROGRESS IN THE FUSION OF COMPUTERS AND TELECOMMUNICATIONS



Abbreviations:

- Tr = Transistor
- IC = Integrated circuits
- LSI = Large-scale integration
- VLSI = Very large-scale integration
- C&C = Computer and communications
- SD-ESS = Super group distribution - electronic switching system
- TD-ESS = Trunk distribution - electronic switching system

Source: Franko, Lawrence G. (1983), *The Threat of Japanese Multinationals : How the West can Respond*. John Wiley & Sons, Chichester, pp. 93.

Subsequently, machine tools were functionally better designed and cheaper machining centres were developed.

By 1970, an NC system could provide all the necessary control functions for traditional machine tools such as lathes and milling machines. A new range of machining centres was developed for use with NC to allow for the maximum number of machining operations on a component at a single setting. A wide range of NC machine tools is available and may be used for producing accurate holes, contour turning and milling complex shapes that were impossible to produce by conventional machine tools. As these NC control systems were being developed, similar rapid advances were occurring within the electronics industry (see Figure 4.11). Consequently, tremendous changes were made to the control units, servomechanism, machine tool feedback systems and programming techniques.

Since the early 1970s, technical innovations in the electronics industry - the development of the minicomputer, the invention of the eight-bit microprocessor and the continued reduction in hardware costs - provided the means for a wider diffusion of NC systems in manufacturing. This gave flexibility in that changes could be implemented in software; hardwired NC tools were almost totally supplemented by programmable logic control (PLC) systems, computer numerically controlled (CNC), both in individual machines and groups of machines, and direct numerical control (DNC). Up to the late 1970s, only highly sophisticated NC machine tools were available with capabilities for tape editing, tape storage and control of the machine tool functions by software (Ferguson, 1978). The advent of fourth and fifth generations of minicomputers and microprocessors brought greater memory and software flexibility to NC. Figure 4.12 summarises developments in the NC/CNC era. During the mid-1970s to early 1980s, there was confusion among the end-users because some machine tool builders equipped their machines with NC systems whilst others equipped theirs with CNC systems (minicomputers/microprocessors). Actually, there were three different systems in the market.

These developments in machine flexibility have an important impact on the sixth generation of NC, the integrated manufacturing system. This system is the combination of NC, CNC and DNC, with integration of transfer lines between machines and robot manipulation. As such, the manufacturing unit is self-contained. By the 1980s, NC controllers were replaced by CNCs when the sixteen-bit microprocessor technology became relatively cheaper and readily available. During the mid-1960s to the early 1980s, the great improvements in machine accuracy and design (expedited by computer-aided design) made machine tools more suitable

FIGURE 4.12 HISTORICAL DEVELOPMENT OF NC TECHNOLOGIES (1952-1980)

PHASE	YEAR	EVENT	REMARK
1st Generation (Relay & Vacuum Tube)	1952	• Development of first NC at MIT	<p style="text-align: center;">DAWNING PERIOD</p> <ul style="list-style-type: none"> • NC development support from US military; proved too expensive to be commercially profitable
	1955	• Launching of 1st generation NC machine	
	1956	• Introduction of NC Jig Borer	
	1958	• Emergence of machining center	
	1959	• Practical application of APT	
2nd Generation (Transistor)	1960		<p style="text-align: center;">REALIZATION PERIOD</p> <ul style="list-style-type: none"> • Automatically programmed tool (APT) programming language • Weeding out of methods, establishment of unification standards (ISO, EIA) • Mainly for boring machines and machining centers • Advanced-APT vocabulary words used on small computers to control machine operations • Greater NC reliability; profitability assured • Rapid inputs, mainly of lathe types
	1961	• First industrial robot used in the USA • NC development began in Japan (Fanuc, Okuma, Hitachi)	
	1963	• First Japanese NC system for machine tools • Development of ADAPT programming language	
	1964		
	1965		
	1966	• Introduction of adaptive control • EXAPT introduced	
3rd Generation (Integrated Circuit)	1967	• Introduction of CNC for lathe	<p style="text-align: center;">GROWTH PERIOD</p> <ul style="list-style-type: none"> • Allowed the operation of machines directly from the mainframe computer without use of tapes • Extended-APT vocabulary for easier programming of complicated parts • Transfer of NC programmes from computer to machines and vice versa • Single purpose computer that could control as many as 64 machines using APT-created programmes • NC machine tools widely used in the USA and Germany (see Figure 4.20) • NC applications expanded (eg injection moulding machine, laser cutting, robot welding, wire-cutting, EDM, etc)
	1968	• Direct numerical control (DNC) developed	
	1969	• Introduction of programmable controller	
	1970	• First forerunner of the automatic factory tried out using "System GEMINI" - a supervisory computer and a distribution computer controlled several machines in the total manufacture of a part	

PHASE	YEAR	EVENT	REMARK
4th Generation (CNC Mini-Computer)	1971	• Development of robotic sensory capabilities	
	1973	• Development of robot vision	• Utilized a television camera and image processing equipment to permit the robot to "see"
	1974	• Remote machine diagnostics	• Allowed diagnosis of CNC machine problems in a plant by a computer in the manufacturer's head office by tying both computers into the telephone system
	1975		• More than 10,000 CNC machines in operation in Japan
5th Generation (CNC Micro-processor)	1976	• Development of automated computer-aided process planning	• When a part was required, allowed the computer to determine the "family" the part belongs to, called up the drawing, made any necessary changes, then directed the production of the part in the shop • Full-scale adoption of microprocessors
	1977	• Distributed plant management system	• Allowed a DNC computer system in a plant to be controlled and programmed by a remote computer from another plant
	1978	• Automated programmable assembly systems	• Utilized several programmed robots to assemble parts into a unit
	1979	• Implementation of FMS production in the USA, Germany and Japan	• CNC machine tools were interfaced with robots, automated-guided vehicle (AGV), conveyor system to form cell(s) for complete manufacturing with the computer controlling the whole operations
	1980	• Development of CNC grinders	• Japanese NC technologies were catching up with the West; some of the American and German machine tool builders equipped their machines with Fanuc controllers (because of price and service advantage)

DIVERSIFICATION PERIOD

Source: Author

for NC operations. Machine tools could now remove metal more efficiently and with an improved finish because of reductions in vibration and chatter. Developments in throw-away carbide tools and carbide drills were essential to complement the higher power range of NC machine tools, resulting in less machine down-time and reduced cutting time.

Major advances within the realm of control devices (which are being revolutionized by the introduction of informatics technology) have extended the applications of automation technology in the latter half of the 20th century. Also involved is the use of logic (control), data processing and communications within electronics technology.

NC technology originated primarily for use with machine tools but robots, testing equipment, process controllers, transfer lines, etc operate on a similar logic. (The numerical control principle has been applied to robots, which are capable of handling materials and changing machine tool accessories as easily and probably more efficiently than a person can. Robotics has become the fastest-growing phase of the manufacturing industry). The development of NC technology has greatly increased production and improved the quality of finished products. Consistent accuracy over many hundreds of parts is one of the features of these machines. With the introduction of numerous special NC machines and special cutting tools, production has increased tremendously over that attained with conventional machines.

Through constant improvement, modern machine tools have become more accurate and efficient. Improved production and accuracy have been made possible through the application of hydraulics, pneumatics, fluidics, and electronic devices such as numerical control to basic machine tools. However, some machine tools were adapted relatively easily to NC, having been developed from hydraulic copying machines that already contained servomechanism, and as a result provided designers with valuable experience. Other more conventional machines were adapted less easily to NC because of their inaccuracy.

• **The Computer Numerically Controlled Era (1970s - 1990s)**

After the development of the first numerical control machine tool at MIT in 1952, numerical control progressed rapidly, in line with advancements in computer and electronic technology. NC is associated with hardware control whilst CNC is associated with software control. The difference is in the editing and processing speed of information. NC used functional modules such as decoder, buffer stores, interpolator, etc to process simultaneously the data in functional modules; CNC has only one processing unit and processes these data only consecutively (see

Figure 4.13). The prime reasons for the development of CNC are:

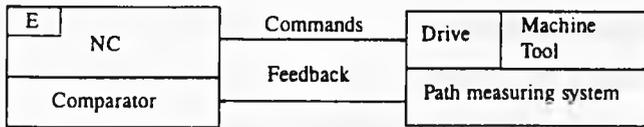
- Need for cost reduction
- Need to realise new tasks and functions
- Need to increase flexibility

The variety of CNC structures is manifold. It covers the conventional hardware control employing microprocessors and fixed stores via hybrid designs with, for example, hardware interpolators to the CNC, in which the mini-computer is complemented only by an input/output hardware. Further, a software interface is more easily altered than a hard-wired one. Hence, editing an NC programme at the machine is easily done on a CNC machine but not with a NC machine. For a NC machine, editing must be done on a tape preparation unit, whereas CNC editing may be placed directly onto the control panel (Baisch, 1975). Consequently, programming a NC machine is much more time-consuming than programming a CNC machine. As such, by mid-1980s, all machine tools fitted with NC controllers became uncompetitive and obsolete due to technological advancement. In the future, CNC will be standardised for two applications - CNC for series-produced machine tools and CNC for special machine tools. These two types of control require different software structures. Nevertheless, the manufacturing strategy through standardization will result in overall cost reduction for hardware (60 percent) and software (40 percent). However, this reduction in cost from the economies of scale is offset from the cost arising from the economies of scope/features offered as part of the marketing strategy.

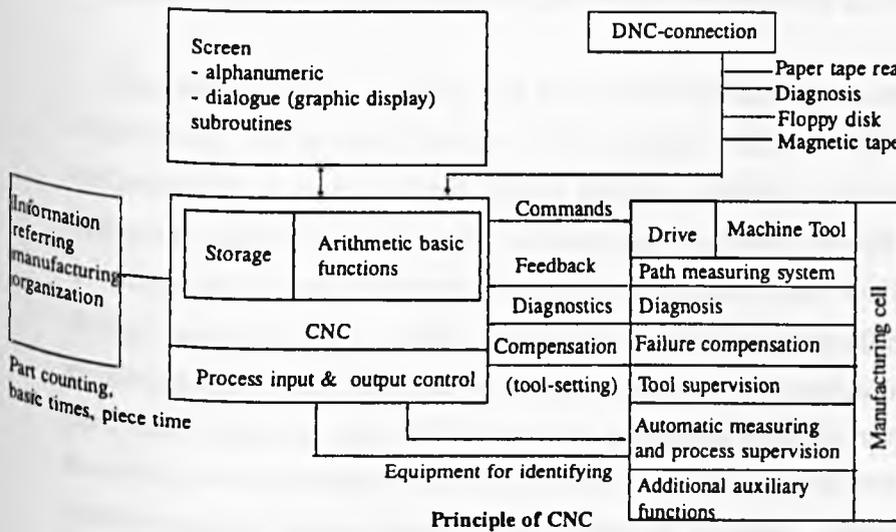
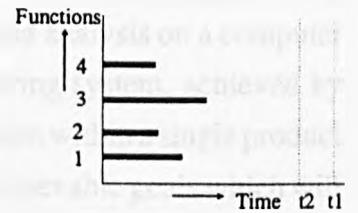
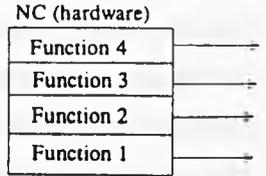
CNC machine tools are available with many advanced computerized systems (thirty-two bit) being used in machine control units. The advent of numerical engineering has not only made for a remarkable change in the manufacturing sector, but also in production planning and design.

Numerical control development is just one phase in the overall application of computers in the manufacturing and marketing processes. Computer technology has been applied successfully to individual aspects of manufacturing and many computer aided manufacturing (CAM) systems have resulted. A CAM system covers many aspects of manufacturing by introducing a hierarchical computer structure to monitor and control the various phases of the manufacturing process.

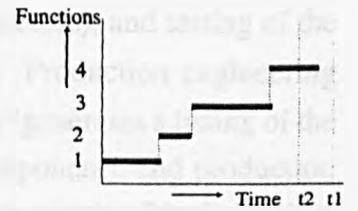
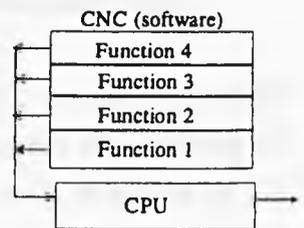
FIGURE 4.13 OPERATIONAL DIFFERENCES BETWEEN NC AND CNC



Principle of NC



Principle of CNC



Information referring manufacturing organization
Part counting, basic times, piece time

Source: Compiled by Author

A CAM system spans two major areas related to product realization (see Figure 4.14):

- Manufacturing
- Marketing and Finance

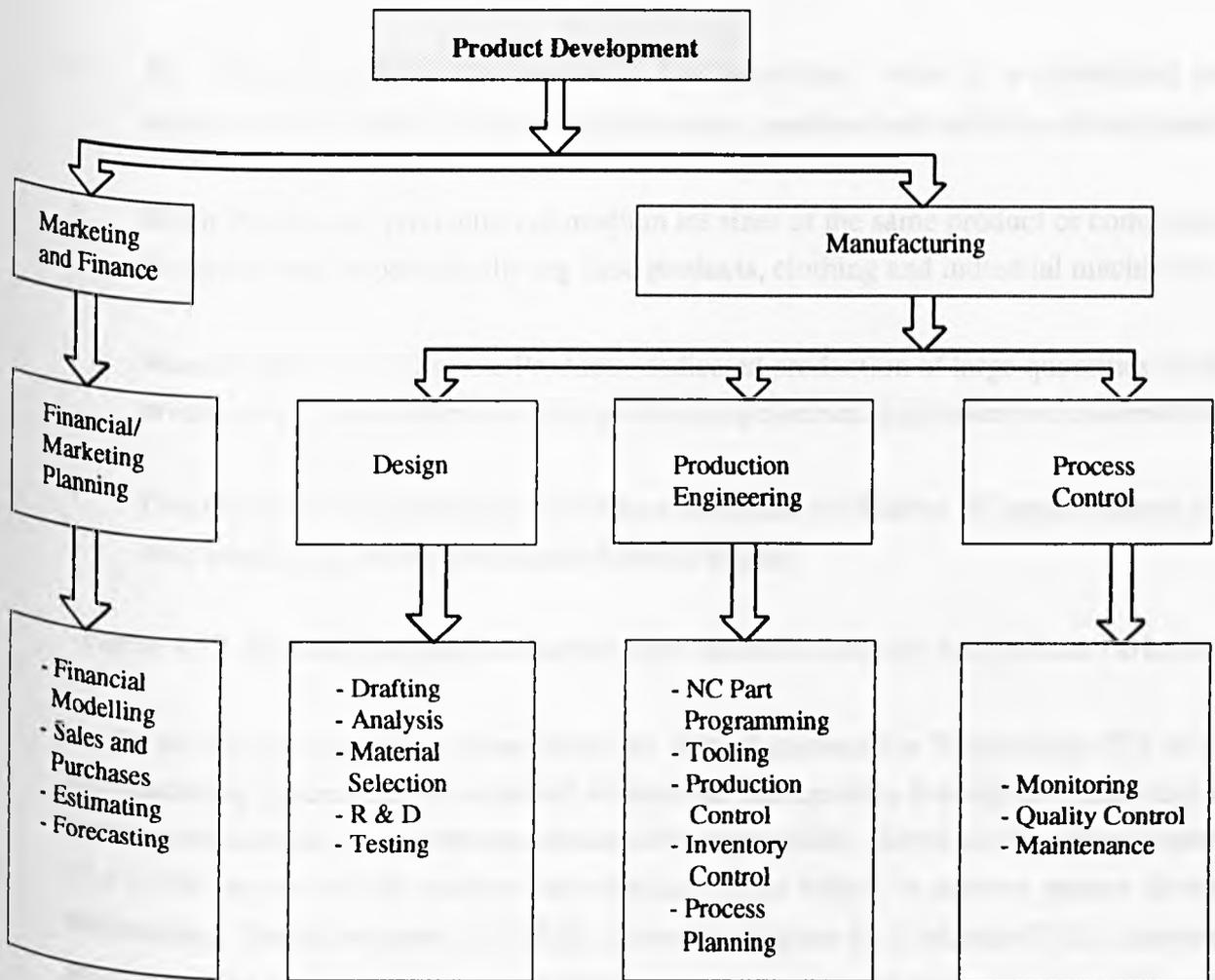
Each area comprises sub-tasks which are controlled directly by the computer. The hardware of a CAM system includes numerical control of machine tools, inspection machines, computers and its peripherals. CAM software comprises computer programming systems that are used to monitor operations and ultimately to control the flow of manufacturing data and hardware. The integration of CAM with both engineering design and analysis on a computer aided design (CAD) system provides a highly automated engineering system, achieved by planning and controlling the creation of all product-related information within a single product database. This forms the standard against which to pursue a set of achievable goals which will influence future planning, purchase and implementation of all computer-based tools.

The manufacturing element can be subdivided into three categories: design; production engineering; and process control. The design module will encompass the drafting of mathematical product analysis (stress analysis, loading calculations, etc), selection of the optimum materials (both from metallurgical and cost benefit viewpoints), research and development of new techniques (with emphasis on product manufacture), and testing of the design specifications to ensure design standards are maintained. Production engineering encompasses the generation of NC part programs, process planning (generates a listing of the operation sequence required to process a particular product or component), and production control (covers the requirements of planning, scheduling and work standards of the individual components and sub-assemblies that make the product). Process control involves on-line monitoring of the production process to obtain feedback information for quality control (assuring that the quality of the product and its components meet the standards required by the designer) and maintenance (planned to minimize stoppages in production) purposes.

The marketing and finance modules cover financial accounting (sales, ledger, purchase ledger, profit/loss accounts, balance sheets, etc) and financial planning and marketing of the product. This in turn can be subdivided into modelling (simulation), estimating sales and despatch, and forecasting of future product demand (as this forms part of an integrated factory control system, it does not affect the CAM system).

CAM can therefore be defined as the use of computer systems to plan, manage and control

FIGURE 4.14 COMPUTER-AIDED MANUFACTURING AND PRODUCT DEVELOPMENT



Source: Milner, D.A. and Vasiliou, V.C. (1986), Computer-Aided Engineering for Manufacture. Kogan Page, pp. 10.

the operations of a manufacturing plant through either direct or indirect computer interface with the plant's production resources.

Production manufacturing requirements in terms of NC can be divided into four main streams:

- Job Shop Production: production of low quantities, often of a specialized and technologically complex product (eg prototypes, machine tools and aircraft equipment)
- Batch Production: production of medium lot sizes of the same product or component, produced once or periodically (eg food products, clothing and industrial machinery)
- Mass Production of Discrete Products: dedicated production of large quantities of one product or a small number of similar products (eg electrical appliances and automobiles)
- Continuous Flow Production: continuous dedicated production of large amounts of a bulk product (eg oil refineries and chemical plants)

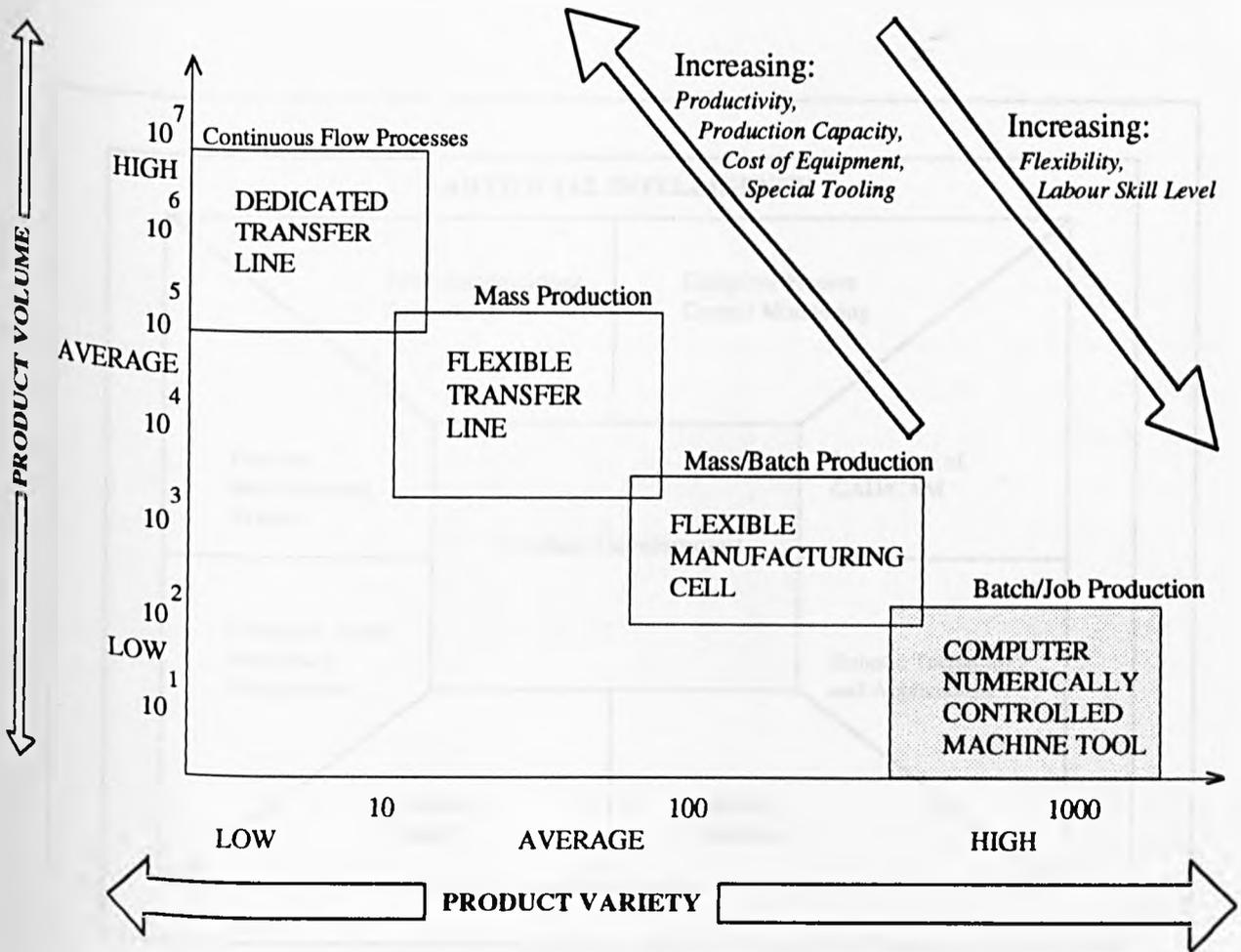
Figure 4.15 illustrates the four production types related to quantity and product variation.

As the cost of computing power falls, the role of Information Technology (IT) in the manufacturing process can be expected to increase substantially leading to a reduction in energy consumption, manpower requirement and raw materials. Hence, the functional aspects of a CAM system and the various technological inputs help it to achieve greater factory automation. The main inputs to a CAM system (see Figure 4.16) include CAD, computer process control monitoring, communications networking, robotics and artificial intelligence. This leads to highly automated system such as flexible manufacturing system (FMS).

- **The Factory Automation Era (1990s Onward)**

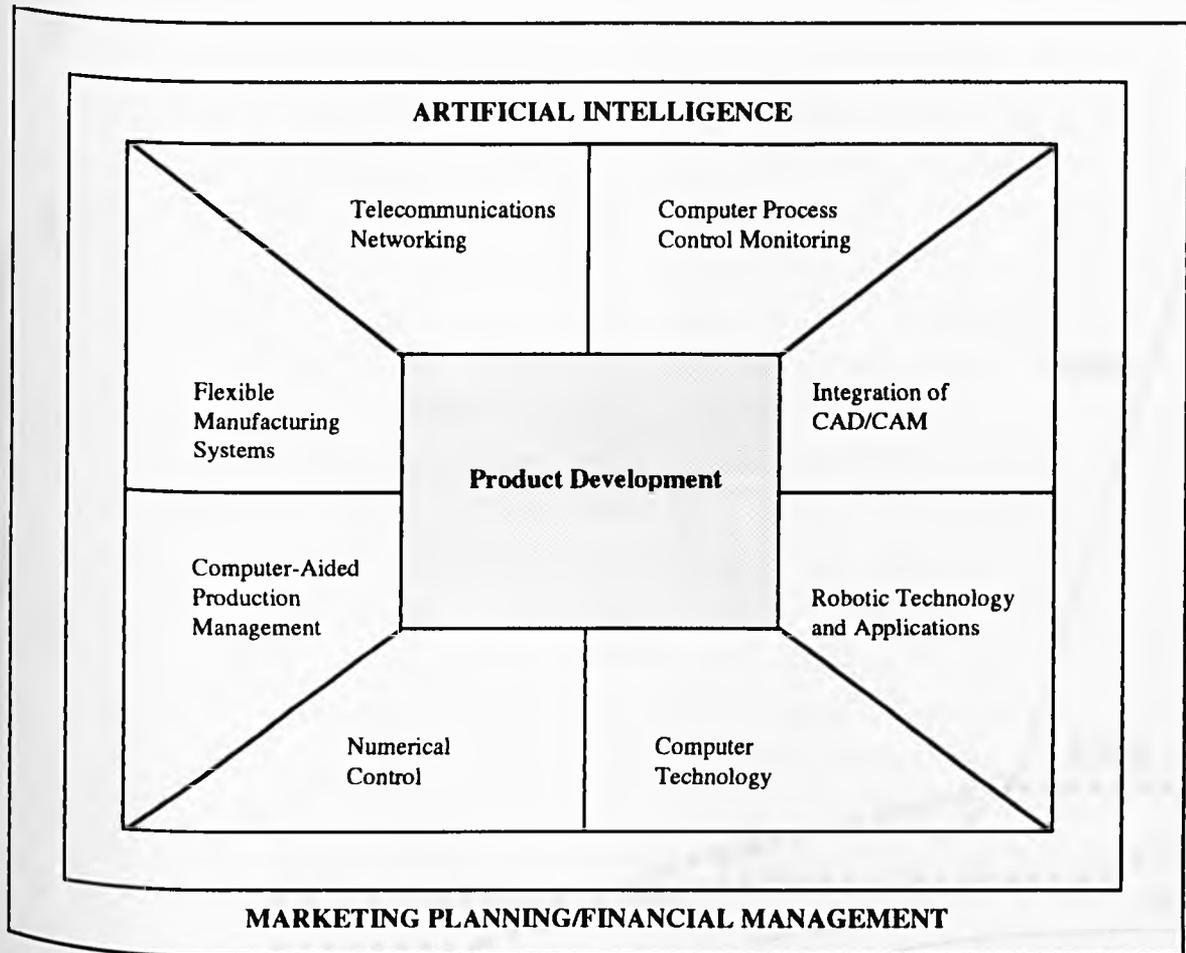
The former Federal Republic of Germany was a forerunner in the development, production, and use of NC machine tools, see Figure 4.17 (Kochan, 1986). German-made products were recognised as the best in quality from Europe (Usunier, 1993). The steady increase in production of NC machines during the past two decades testified to the general importance of this type of flexible automation (Parkinson, 1984). In the metalworking industry, there had been a shift in production from the original milling machines to turning machines; this was

FIGURE 4.15 FOUR PRODUCTION TYPES RELATED TO QUANTITY AND PRODUCT VARIATION



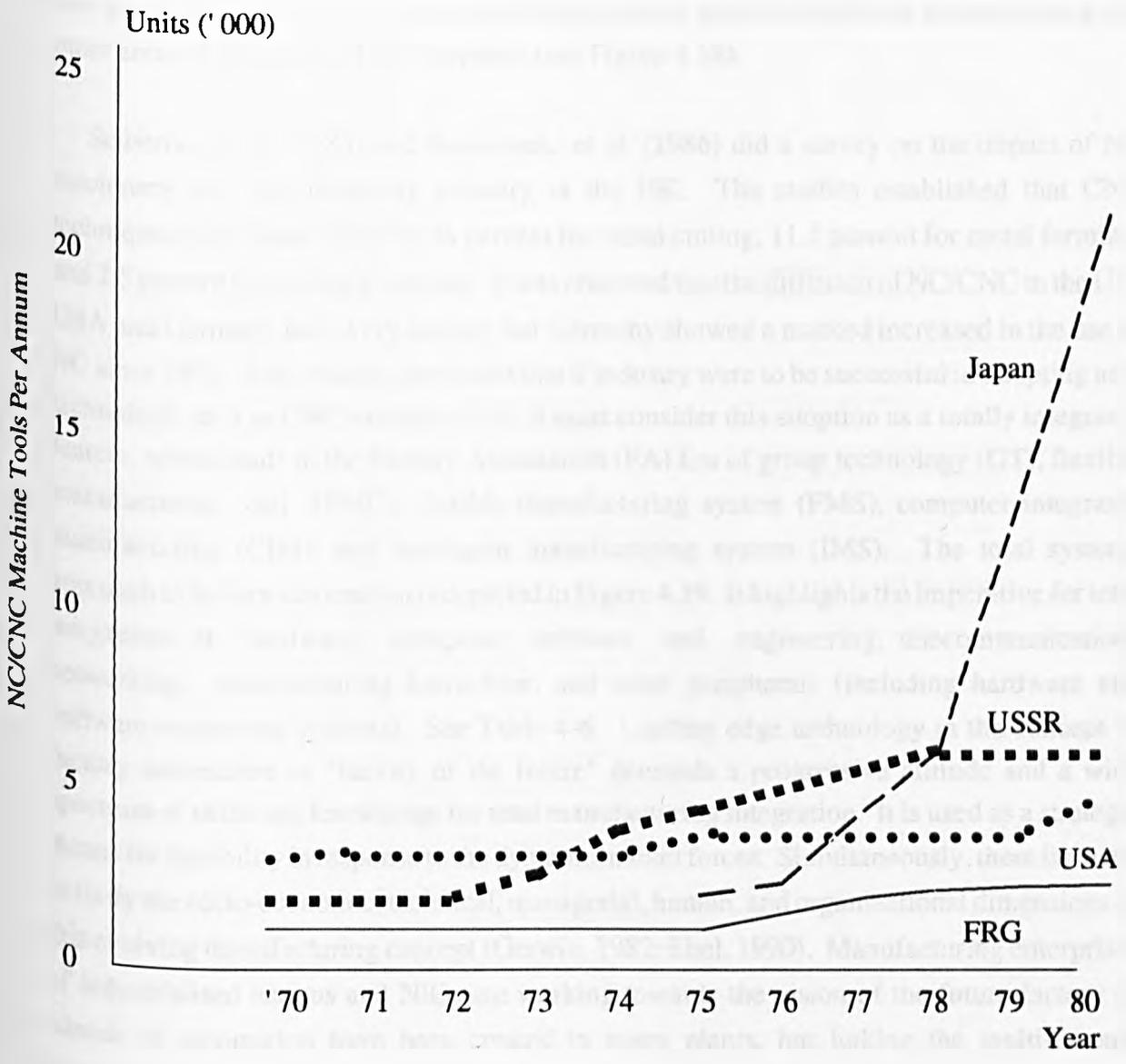
Source: Author

FIGURE 4.16 OVERVIEW OF COMPUTER-AIDED ENGINEERING FOR MANUFACTURE



Source: Milner, D.A. and Vasiliou, V.C. (1986). Computer-Aided Engineering for Manufacture. Kogan Page, London, pp. 13.

FIGURE 4.17 ANNUAL PRODUCTION OF NC MACHINES IN SELECTED COUNTRIES



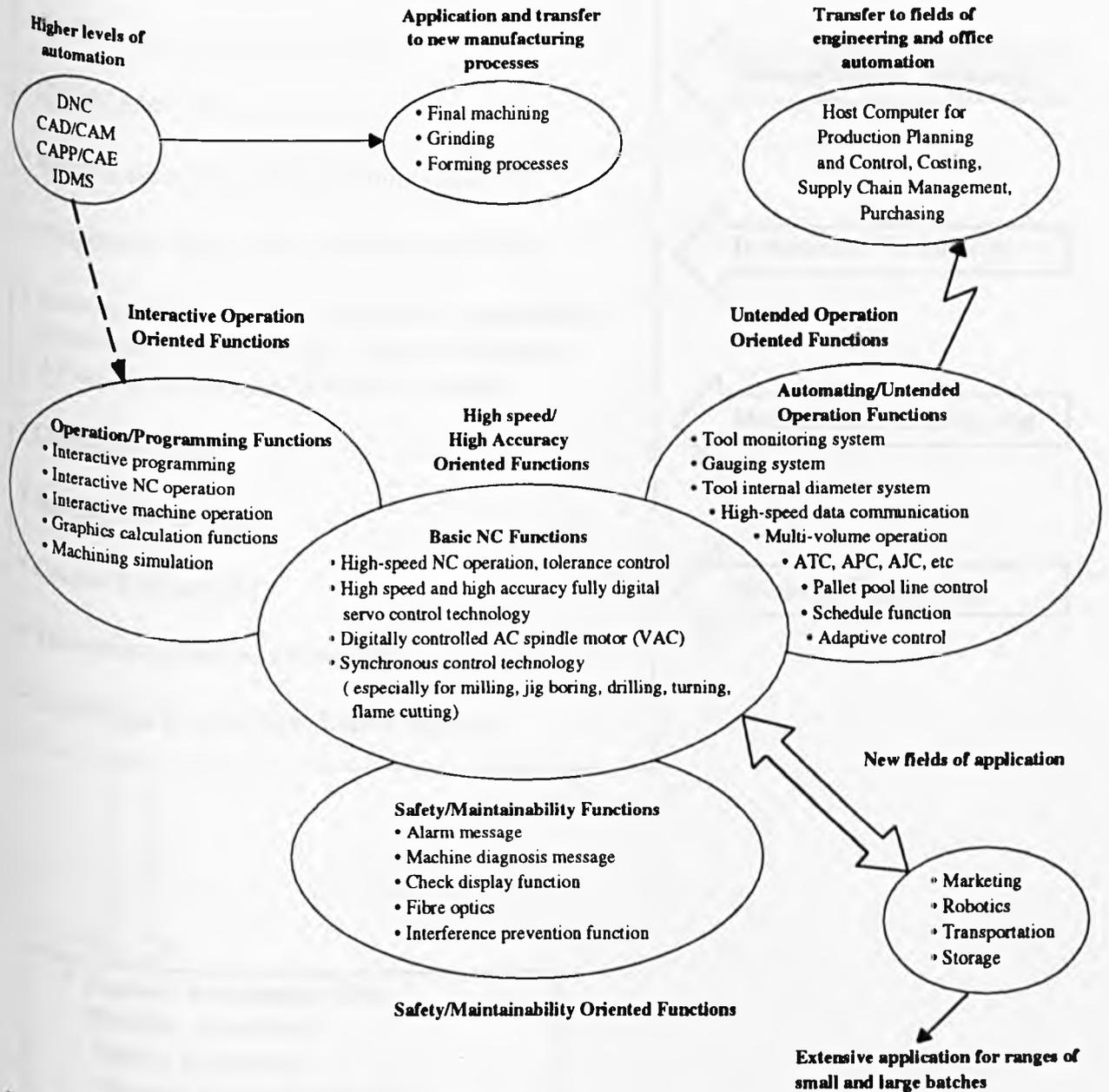
Source: Kochan, D. (Ed.) (1986), Developments in Computer-Integrated Manufacturing. Springer-Verlag, Berlin Heidelberg, New York, pp. 7.

because turning machines had a larger assortment of parts (Crookall, 1970). NC was considered as one of the most significant basic innovations of our century; the breakthrough in mechatronics technology (an integrated discipline using mechanics, electronics and computer technologies to enhance the performance of products, systems and processes) had gone beyond the original cutting-machine tools and revolutionised manufacturing and other areas of human productive system (see Figure 4.18).

Sciberras, et al. (1985) and Beaumont, et al. (1986) did a survey on the impact of NC machinery and manufacturing industry in the UK. The studies established that CNC techniques were made use of in 86 percent for metal cutting, 11.5 percent for metal forming, and 2.5 percent for joining processes. It was observed that the diffusion of NC/CNC in the UK, USA and Germany were very similar, but Germany showed a marked increase in the use of NC since 1978. Both studies concluded that if industry were to be successful in adopting new technology such as CNC machine tools, it must consider this adoption as a totally integrated feature, which leads to the Factory Automation (FA) Era of group technology (GT), flexible manufacturing cell (FMC), flexible manufacturing system (FMS), computer integrated manufacturing (CIM), and intelligent manufacturing system (IMS). The total systems approach to factory automation is depicted in Figure 4.19. It highlights the imperative for total integration of hardware, computer software and engineering, telecommunications networking, manufacturing know-how, and other peripherals (including hardware and software supporting systems). See Table 4-6. Leading edge technology in the concept of factory automation or "factory of the future" demands a progressive attitude and a wide spectrum of skills and knowledge for total manufacturing integration. It is used as a strategic means for flexibility in response to the dynamic market forces. Simultaneously, there is a need to study the socio-economic, technical, managerial, human, and organizational dimensions of this evolving manufacturing concept (Gerwin, 1982; Ebel, 1990). Manufacturing enterprises of industrialised nations and NICs are working towards the vision of the future factory as islands of automation have been created in many plants, but linking the multi-faceted dimensions of manufacturing system is a daunting task (see Figure 4.20).

Rapidly changing technology in the machine tool industry has seen a shift in its marketing focus. For the manufacturers of machine tools, the 1970s saw the marketing of NC/CNC machine tools products on a piecemeal basis whereas in the 1980s the marketing was focused on whole manufacturing systems and, in the 1990s the marketing shall be of automated factories (Noori, 1990). See Figure 4.21. The trends impacting the manufacturing sector

FIGURE 4.18 NC TECHNOLOGY AS BASIC INNOVATION IN THE FIELD OF MANUFACTURING

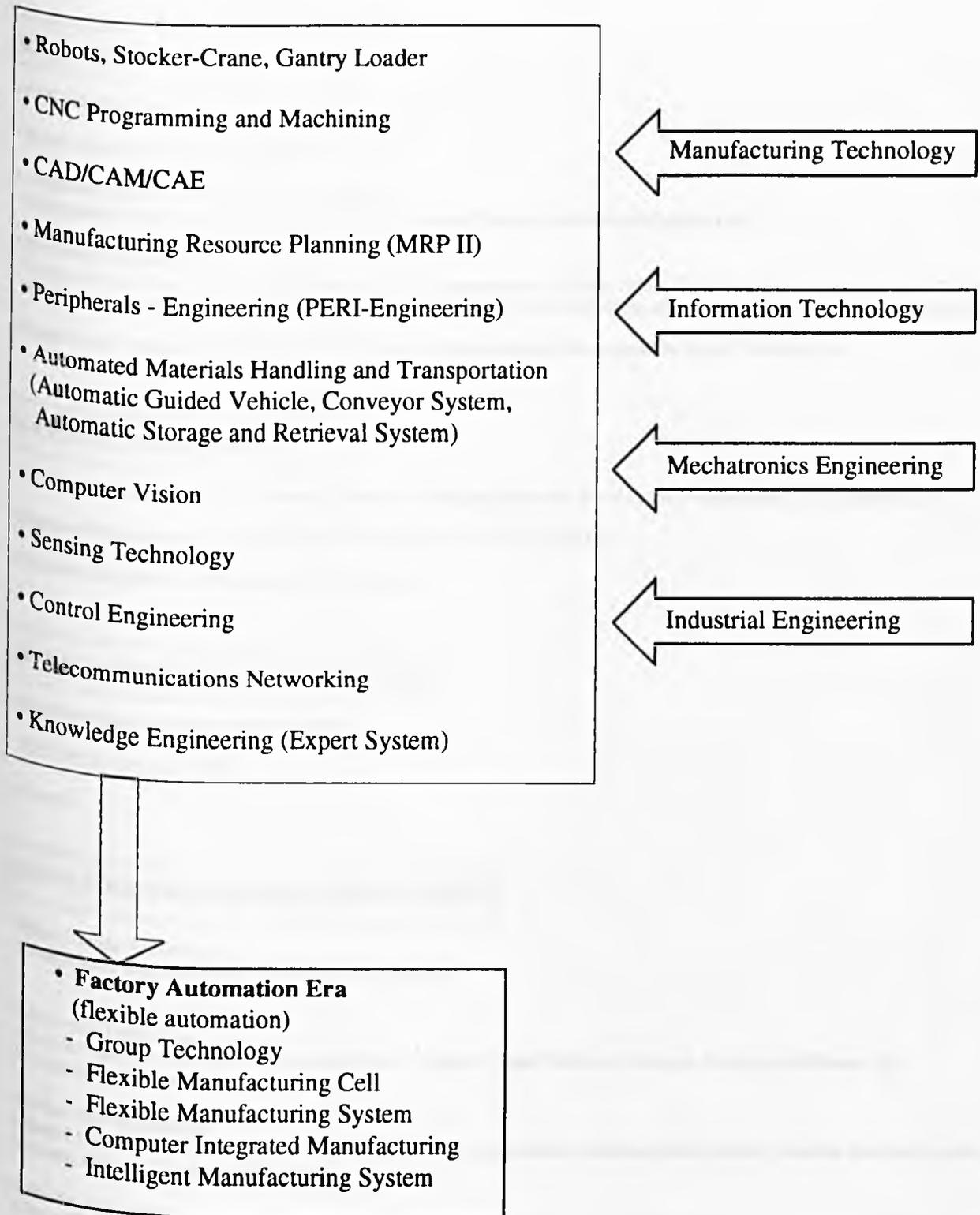


Footnote: The functions of NC technology include:

- the NC basic function that controls the machine tool accurately at high speeds
- the interactive operation/programming function (man-machine interface)
- the automation/untended operation function
- the safety/maintainability function

Source: Author

FIGURE 4.19 TOTAL SYSTEMS APPROACH TO FACTORY AUTOMATION



Source: Author

TABLE 4-6

HARDWARE

- CNC Machine Tools
- Robots, Stocker-Crane, Gantry Loader
- Automated Materials Handling and Transportation
(Automated Guided Vehicle, Conveyor System, Automatic Storage and Retrieval System, etc)
- Peripherals Engineering
(In-process and Post-process Gauging System, Tool Compensation and Zero-Offset, Tool Monitoring using Adaptive Control Sensor, Automatic Bar Feeder, Parts Catcher, Tool Breakage Detector, Inductosyn/Precision Transducer, Robot Vision, etc)
- Supervisory Computer, CAD/CAM/CAE Workstation, Minicomputer, Programmable Logic Controller, etc

SOFTWARE ENGINEERING

- CNC Programming, Robot Programming, Interactive Graphic Software, Sub-Routine Programming for Peripherals, etc
- Interface Programming for Direct Numerical Control for the Transfer of Data
- Manufacturing Resource Planning (MRP II) software

TELECOMMUNICATIONS NETWORKING

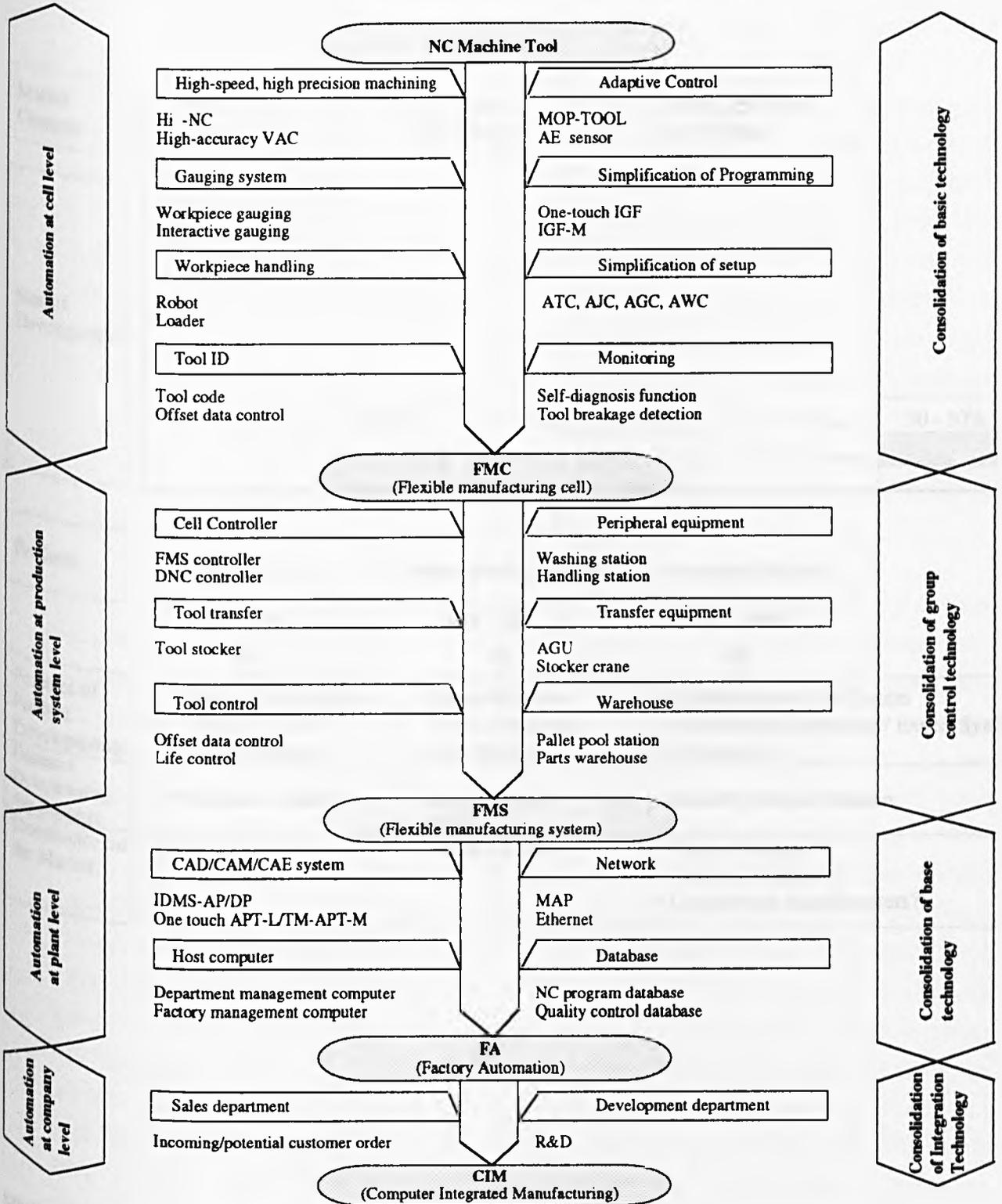
- Manufacturing Automation Protocol (MAP)
- Total Office Protocol (TOP)
- Ethernet

KNOWLEDGE ENGINEERING/EXPERT SYSTEM

- Manufacturing Technology
(Economics of Manufacturing, Machining Data Bank, etc)
- Information Technology
(Systems Analysis on Design of Information Flow, Computer-Aided Software Packages, Simulation Software, Die Manufacturing Software, etc)
- Mechatronics Engineering
(Control Engineering, Sensing Technology, Adaptive Control, Controller, Brushless Servo Motor, Absolute Position Encoder, Magnetic Encoder, Design of PCB's, etc)
- Industrial Engineering
(Group Technology Layout, Ergonomics of Machine Tool Design, Design of Production Planning and Control System, etc)

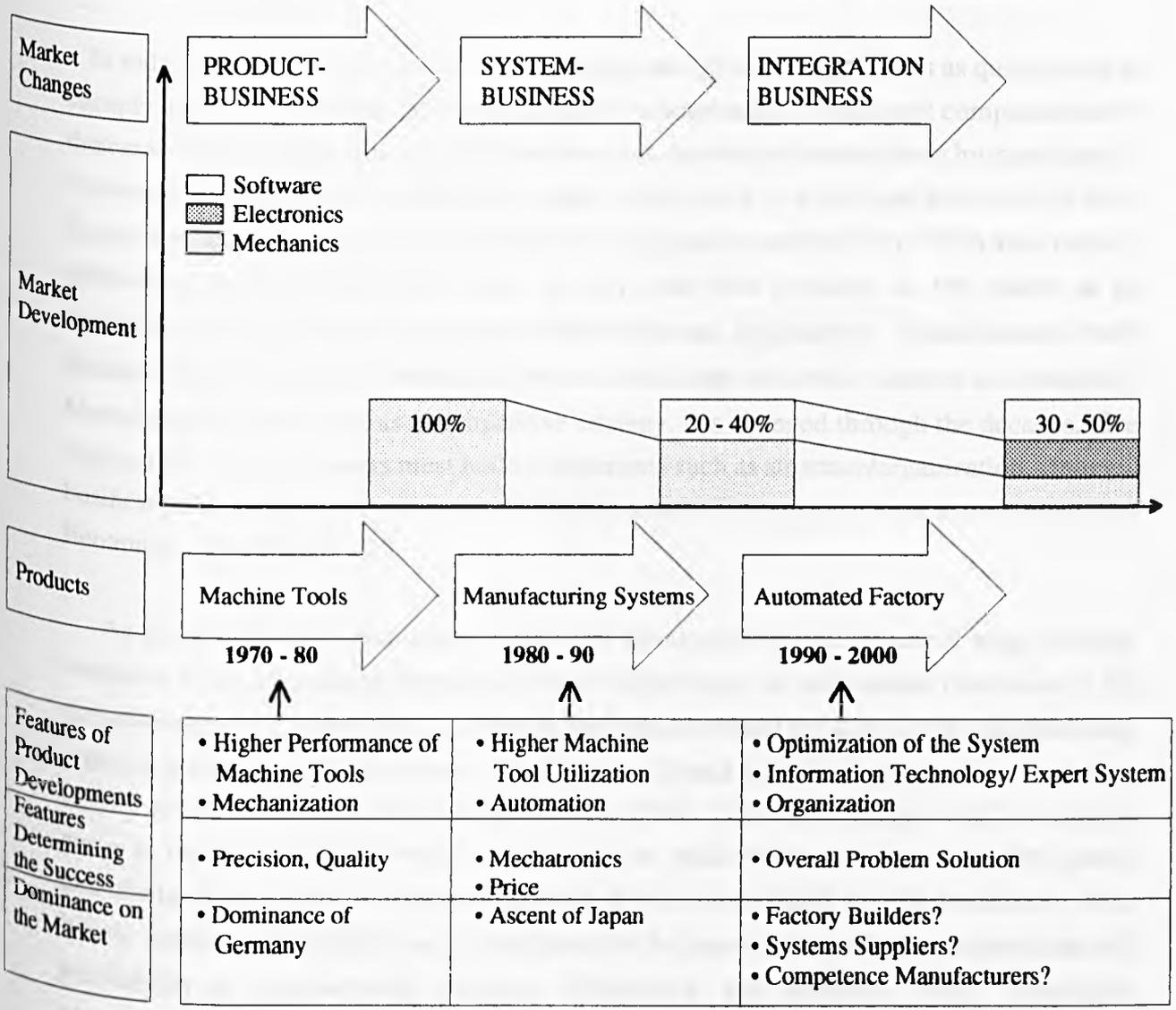
Source: Author

FIGURE 4.20 DEVELOPMENT OF CNC MACHINE TOOL TO FA/CIM



Source: Author

FIGURE 4.21 AN EXAMPLE OF TRENDS IN MANUFACTURING SYSTEMS



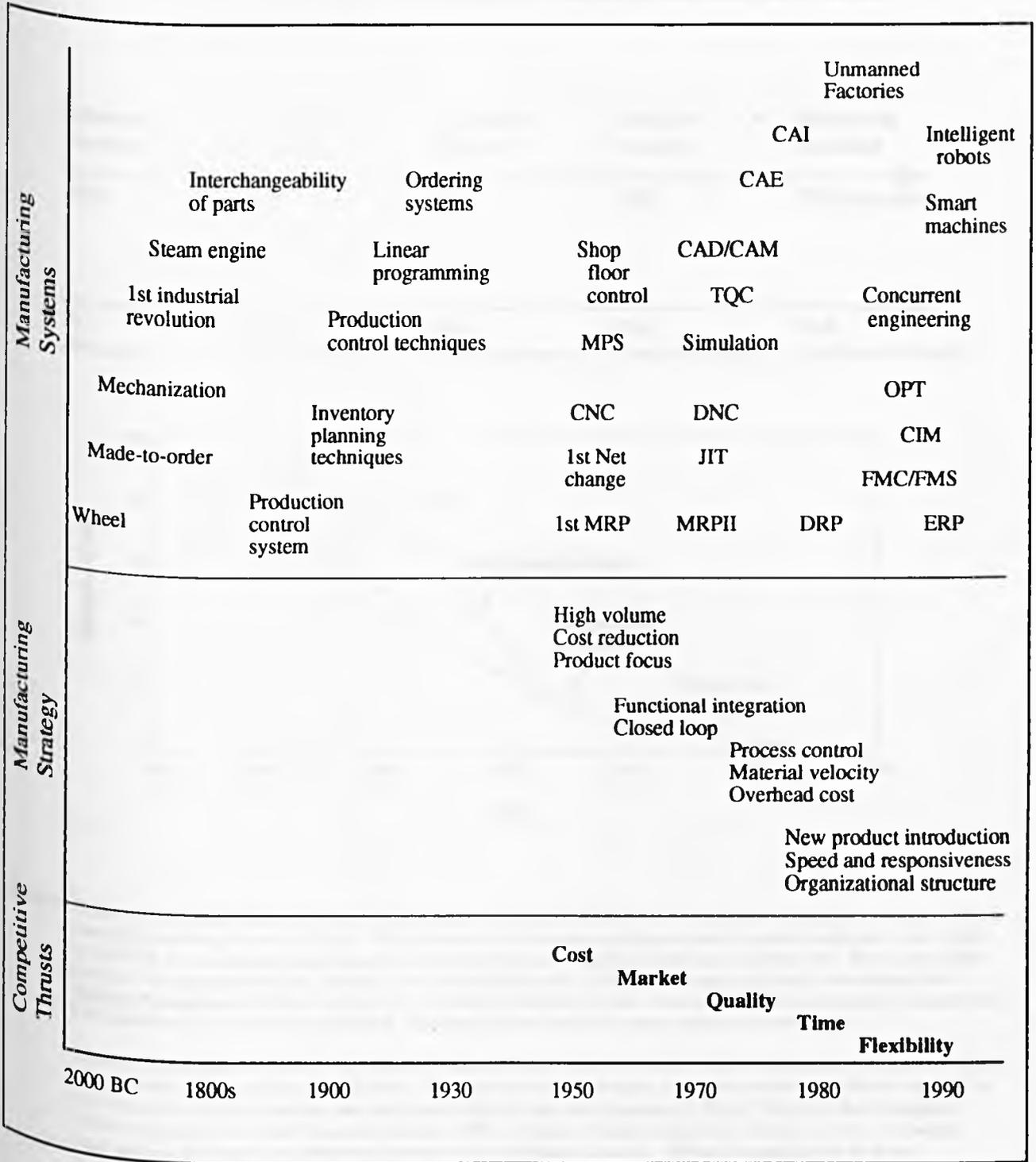
Source: Bullinger et al. (1985), "Towards the Factory of the Future", in Towards the Factory of the Future, Springer-Verlag, New York, pp. xxx.

include increased competition, increasingly knowledgeable and affluent customers, shorter product life cycle, product differentiation, skilled manpower shortage, emerging technologies, green movement, mass customization, decentralisation/diversity, and globalization.

In today's business environment, it is no longer enough to make products as quickly and as cheaply as possible because customers demand customization. Intelligent companies wield their manufacturing operations as business weapons, carving out market share by meeting their customers' demand for innovative, high quality products at low cost and delivered on time. Customers have come to expect competitive pricing, quality and delivery. With the advent of technology, product life cycles shrink as they want new products on the market at an accelerated rate - the need for concurrent/simultaneous engineering. Manufacturers must increase their flexibility by learning to produce both large and small volumes economically. Manufacturing advantage, as a competitive strategy, has changed through the decades. See Figure 4.22. Manufacturers must build components such as structure/organization, strategy, business policies, practices, management attitude and facilities for the future in the Knowledge Economy . See Figure 4.23.

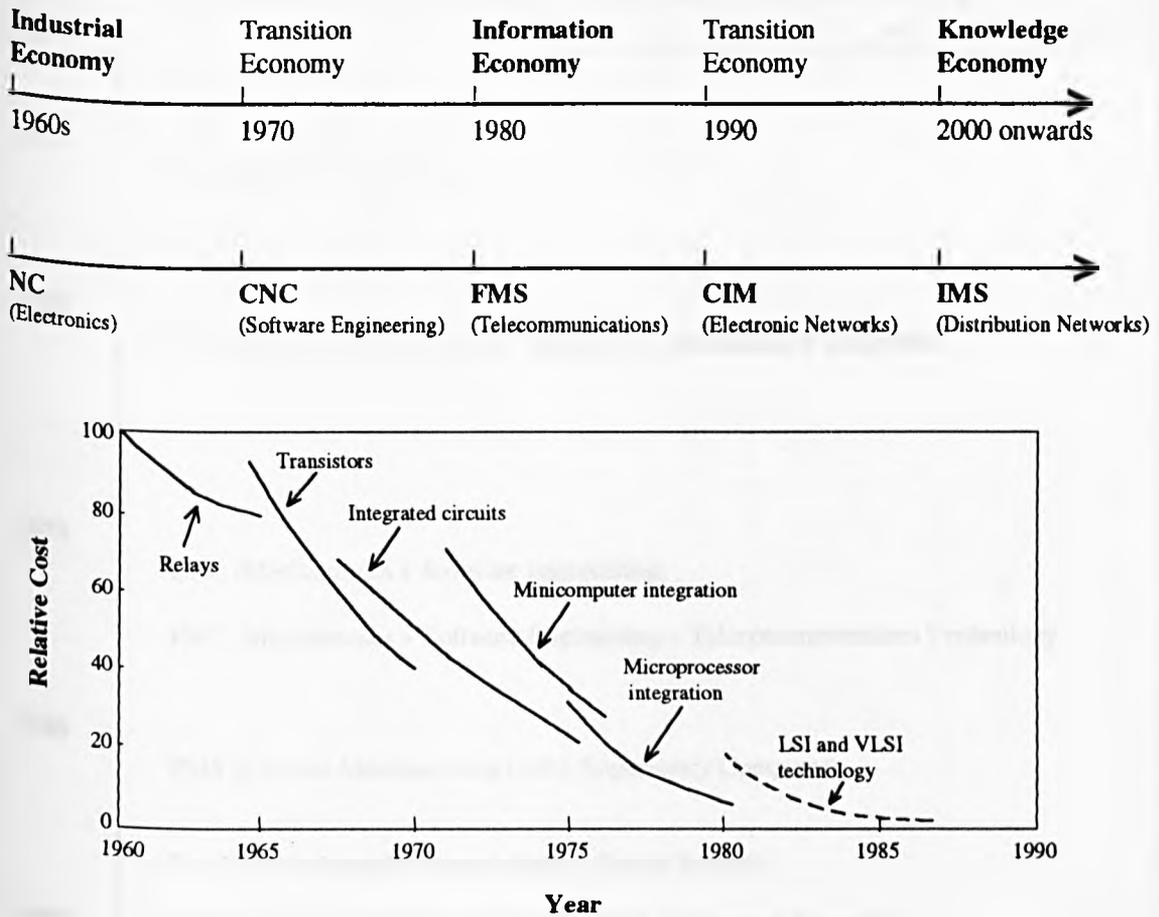
As the nature of the economy evolves and develops from the industrial stage through transition to the information stage and the knowledge stage, we see parallel revolution in the manufacturing machinery from progress in mechanistic-based systems to the manufacturing vision in knowledge-based systems. See Figures 4.24 and 4.25. It is apparent that the future factory is CNC dominant, followed by FMS and CIM. (About 75 percent of all metal parts made in the industrialised world are produced in small-batches of less than fifty; batch manufacturing accounts for a large proportion of the industrialised world's production, there is little doubt that FMS offers significant potential for improvements in competitiveness and profitability in manufacturing industry.) (Parkinson and Avlonitis, 1986). Intelligent Manufacturing System (IMS), the incorporation of intelligence to make the systems more autonomous and flexible for applications in FMS and CIM, will be the aim of the next generation CIM system (see Figure 4.26). In the same vein, as there was a breakthrough from NC (integrated hard-wired circuit) to CNC (microprocessor soft-wired RAM/ROM), the breakthrough from islands of automation to fully integrated communication networks for manufacturing will lead to the Factory Automation Era (Pimentel, 1990). This will enable CNC machines and computers (of different makers) to imitate the analysis, inference, conception, judgement and decision making activities of human experts for various manufacturing operations. IMSs will ultimately provide manufacturing industries with the

FIGURE 4.23 CHRONOLOGY OF MANUFACTURING TRENDS



Source: Narayanan, V. and Saw, Ken Wye (1992), "Information Technology for Tomorrow's Manufacturers", The Institution of Manufacturing Engineer: Singapore Section Year Book, 1992, Singapore Branch, pp. 42.

FIGURE 4.24 IMPACT OF THE NATURE OF THE ECONOMY ON THE EVOLUTION OF TECHNOLOGY IN THE CNC MACHINE TOOL INDUSTRY



Footnote: During the mass production period in the Industrial Economy, Integrated Circuits (ICs) were produced cheaply in countries which had comparative advantage in low cost labour. The hardware cost of computers was high as many integrated circuit parts were required. In the 1970s, the breakthrough in microprocessor technology resulted in significant reduction in hardware cost. Further, it provided flexibility for manipulation of data. During the first Transition Economy (1970s), the software engineering cost escalated due to shortage of programmers, software engineers, etc. To achieve economies of scale, companies deployed one computer to control many CNC machines (direct numerically controlled). Electronic communication links were needed for transfer of data.

The need for information technology was critical as companies set up factories all over the world. Information was transferred among factories within the country and across the world. The mammoth task of transferring information must be cost effective which led to the advent of the electronic networks due to the breakthrough in Large Scale Integration (LSI) and Very Large Scale Integration (VLSI) technology in the second Transition Economy (1990s). Because of intense competition, information alone is inadequate, value added to information is of paramount importance in the Knowledge Economy. IMS will be a reality with the future development of distribution networks which hinges on international protocol for compatibility and interface.

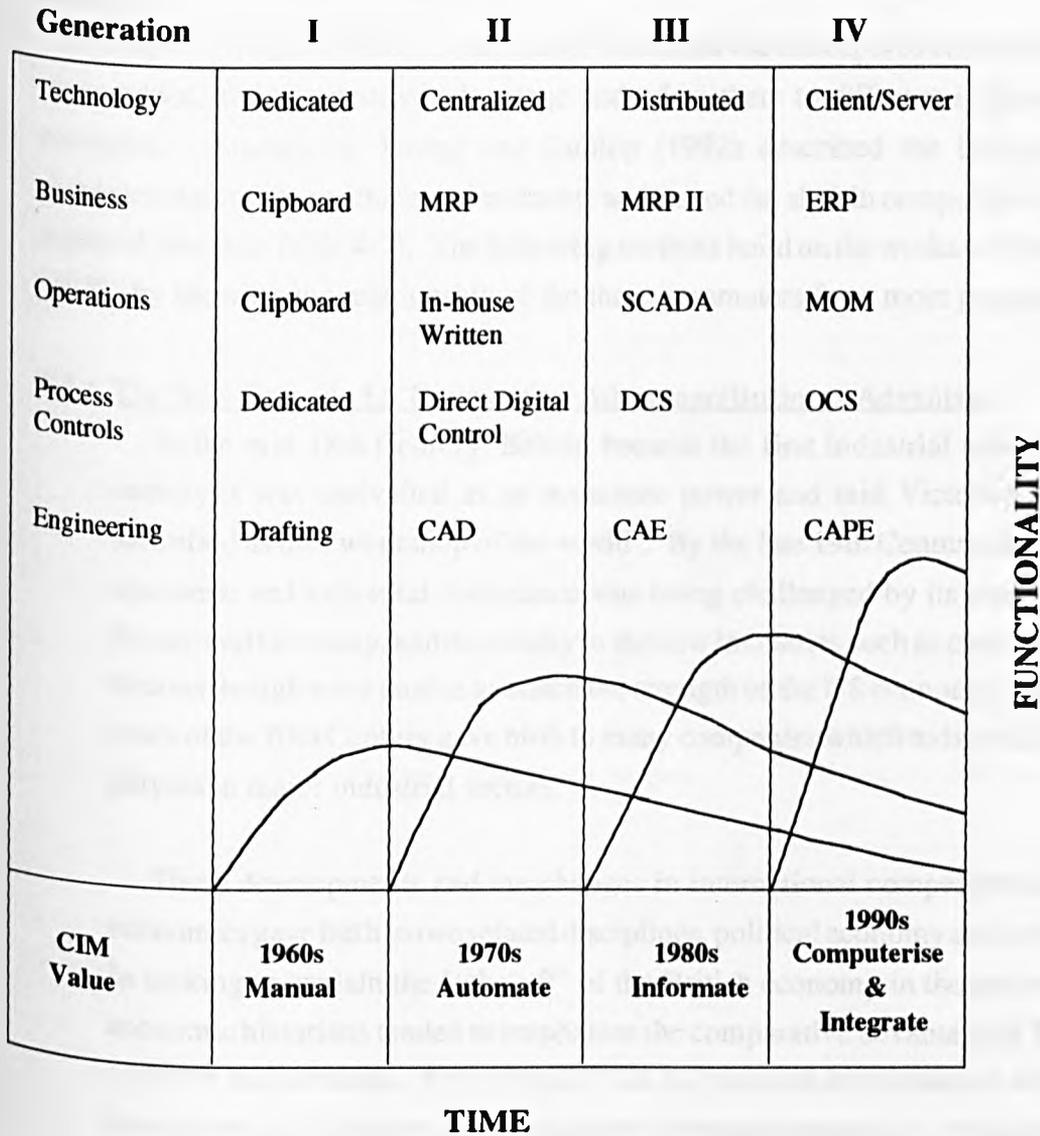
Source: Author

FIGURE 4.25 DEVELOPMENT IN MACHINE-BASED TO KNOWLEDGE-BASED MANUFACTURING

Year	Development Towards Knowledge-Based Manufacturing
1950	Machine Tool Technology
1960	NC (Mechatronics Technology : mechanics + electronics + computers)
1970	CNC (Mechatronics + Software Engineering) FMC (Mechatronics + Software Engineering + Telecommunications Technology)
1980	FMS (Flexible Manufacturing Cell + Supervisory Computer) FA (Flexible Manufacturing System + Expert System)
1990	CIM (Factory Automation + Manufacturing Automation Protocol)
2000 Onwards	IMS (Computer Integrated Manufacturing + Artificial Intelligence)

Source: Author

FIGURE 4.26 FOUR GENERATIONS OF CIM



CAPE - Concurrent art-to-product environment
 DCS - Distributed control system
 ERP - Enterprise resource planning

MOM - Manufacturing operations management
 MRP/MRP II - Material/manufacturing resource planning
 OCS - Open control system
 SCADA - Supervisory control and data acquisition

Source: Report from the Gartner Group Seventh Annual Computer Integrated Manufacturing Conference, 1993.

capability to meet the demand for higher flexibility, improved decision making and timely response to dynamic changes in the international business arena.

4.3 Comparative Advantage, Value Added and Competitive Advantage in the CNC Machine Tool Industry

In Chapter 1 (pages 10 and 11), the author discussed the concepts of comparative advantage, value added, and competitive advantage and relate them to different industries in different countries. Studies by Young and Dunlop (1992) described the industry/environment characteristics of the machine tool industry, and traced the shift in competitive advantage over a span of time (see Table 4-7). The following sections build on the works of Young and Dunlop (1992) by showing the relationship of the three parameters for a more pragmatic approach.

4.3.1 The New Formula for Competitive Advantage/Business Advantage

In the mid 18th Century, Britain became the first industrial nation. For the next century it was unrivalled as an economic power and mid Victorian Britain became identified as the "workshop of the world". By the late 19th Century, however, Britain's economic and industrial dominance was being challenged by its continental rivals, ie France and Germany, and especially in the new industries such as chemicals. Even these nations though were unable to match the strength of the US economy, which in the early years of the 20th Century gave birth to many companies which today still rank as leading players in major industrial sectors.

These developments and the changes in international competitiveness of national economies gave birth to two related disciplines, political economy and economic history. In seeking to explain the "take-off" of the British economy in the period 1780 - 1830, economic historians tended to emphasize the comparative advantage of Britain in terms of factor endowments. They stressed that the physical infrastructure of the island was conducive to urbanisation and market development domestically, while its geographical location on the periphery of Northern Europe gave it a unique advantage in terms of international trade, especially with the "new world". Above all, though, it possessed an abundant supply of natural resources, as well as a growing population spiritually disposed to entrepreneurship and hard work based on the Protestant ethic. Moreover, the well developed education system provided the scope for the stream of inventions made in Britain during this period, giving the UK a temporary critical advantage, as these major technologies soon spread overseas. In short, it appeared to economic historians that

TABLE 4-7

INDUSTRY/ENVIRONMENTAL CHARACTERISTICS IN THE MACHINE TOOL INDUSTRY

Pre-1970s, Pre-CNC Era	1970s to 1980s CNC Era	1990s "Factory of the Future" Era
<ul style="list-style-type: none"> • Incremental technical change and established trajectories • Long product life cycles • High materials and skills intensity • High levels of vertical integration • Market structure - mature <ul style="list-style-type: none"> - differentiated - oligopoly • Limited economies of scale across model types or in large plants • Mostly small, specialist firms • Limited sales/service requirements • Flourishing period for demand in machine tools 	<ul style="list-style-type: none"> • Introduction of electronics-based technologies, electrical and fluid engineering • Substantial increase in rate of product change with shorter product life cycles (increase in R & D expenditures) • Emergence of new machine tool concepts, eg machining centres • Lower levels of vertical integration with emphasis on design, assembly and greater use of outside suppliers (possibly on a global basis) • Dominance of Japan in NC/CNC machine tools • Increased economies of scale and scope; sales volume, larger and multi-product companies; increased levels of concentration • Importance of sales and service networks • New end-user industries, eg instrument engineering, office machinery 	<ul style="list-style-type: none"> • Introduction of new materials and technologies, eg ceramics, composites, laser technology, affecting level and structure of demand and corporate competitiveness • Rising R & D costs. Need for development work with advanced users • Development of new systems, eg FMS, CIM, IMS • New entrants in systems business, such as software houses, computer consultancies, electronics companies - general battle for the role of turnkey contractor • Rising protectionism because of Japanese market dominance in key segments • New entrants in CNC business, such as Taiwan • Increase in economies in scope with FMS • Trend to direct marketing/sales and service subsidiaries/engineering centres at home and abroad (linked to growth of systems business, and protectionism) • Slow but steady decline in overall demand

FACTORS IN COMPETITIVE ADVANTAGE IN THE MACHINE TOOL INDUSTRY

Pre-1970s, Pre-CNC Era	1970s to 1980s CNC Era	1990s "Factory of the Future" Era
<ul style="list-style-type: none"> • Reliability and performance (rather than price) • Product specialization (by machine tool type and end-user industry) • Engineering driven • Reputation and customer loyalty • Mostly entrepreneurs (founder was designer of machines) 	<ul style="list-style-type: none"> • Price (initially, but now low cost and price are sine qua non factors) • Speed of product change, product features • Product choice (type, standardization and breadth) • Relationship with NC/CNC industry • International marketing, sales and service networks • Company size and capital provision given the the cyclical nature of the industry 	<ul style="list-style-type: none"> • Reliability, with price decisive in stand-alone machines • Suppliers' turnkey expertise, engineering assistance and training in personnel in systems • Mass customization • World-class manufacturing • System design and integration capabilities, and customer interfacing for cells and systems • International strategic alliances, mergers and acquisitions

Source: Adapted from Young, Stephen and Dunlop, Stewart (1992), "Competitive Dynamics in the World Machine Tool Industry: Battleground UK", in Young, Stephen and Hamill, James (Eds.) (1992), Europe and the Multinationals: Issues and Responses for the 1990s, Edward Elgar, Aldershot, Hants, pp. 80 - 103.

Britain possessed a unique cocktail of the factors most conducive to economic development during this period. This led to the development of Ricardo's concept of comparative advantage based on a nation's factor endowment. Obviously, the concept of comparative advantage suited well the vested interests of Britain and the other most developed nations, as inherent in the concept was the notion that the less developed nations should gladly accept their role as suppliers of raw materials to the more developed nations rather than try and compete with them. In other words, the concept of comparative advantage justified and perpetuated the existing levels of economic development rather than stressed the whole dynamic nature of international competitiveness.

Soon though the USA had outstripped Britain and given that it possessed quite different attributes from Britain, economic historians again looked closely in order to unearth the causes of economic development in the USA. Apart from considering macro economic factors, economic historians looked closely at the characteristics of the companies which were transforming US industry. It soon became clear that the main source of competitive advantage of companies such as Ford lay in their new production techniques, namely mass production which resulted in lower unit costs through economies of scale.

Of course, developing nations eventually recognised the disadvantage in their unquestioning acceptance of the concept of comparative advantage. On achieving political independence from their colonial masters, mainly in the 1960s, they soon realised that economic independence was equally important if they were to attain the levels of economic development required to enhance substantially the quality of life of their population. They thus began to seek ways of changing their role in the international economy in order to reduce their vulnerability, and this necessitated a switch from merely supplying developed country markets with commodities to supplying manufactured products. Among the first developing country economies, to have made this switch were Asia's NIEs, especially Japan and Singapore. The great success of these economies has been achieved though despite the fact that they were poorly equipped in terms of factor endowments, and lacked the finance necessary to invest in capital equipment to maximise economies of scale. In essence, their sole asset was their human resources.

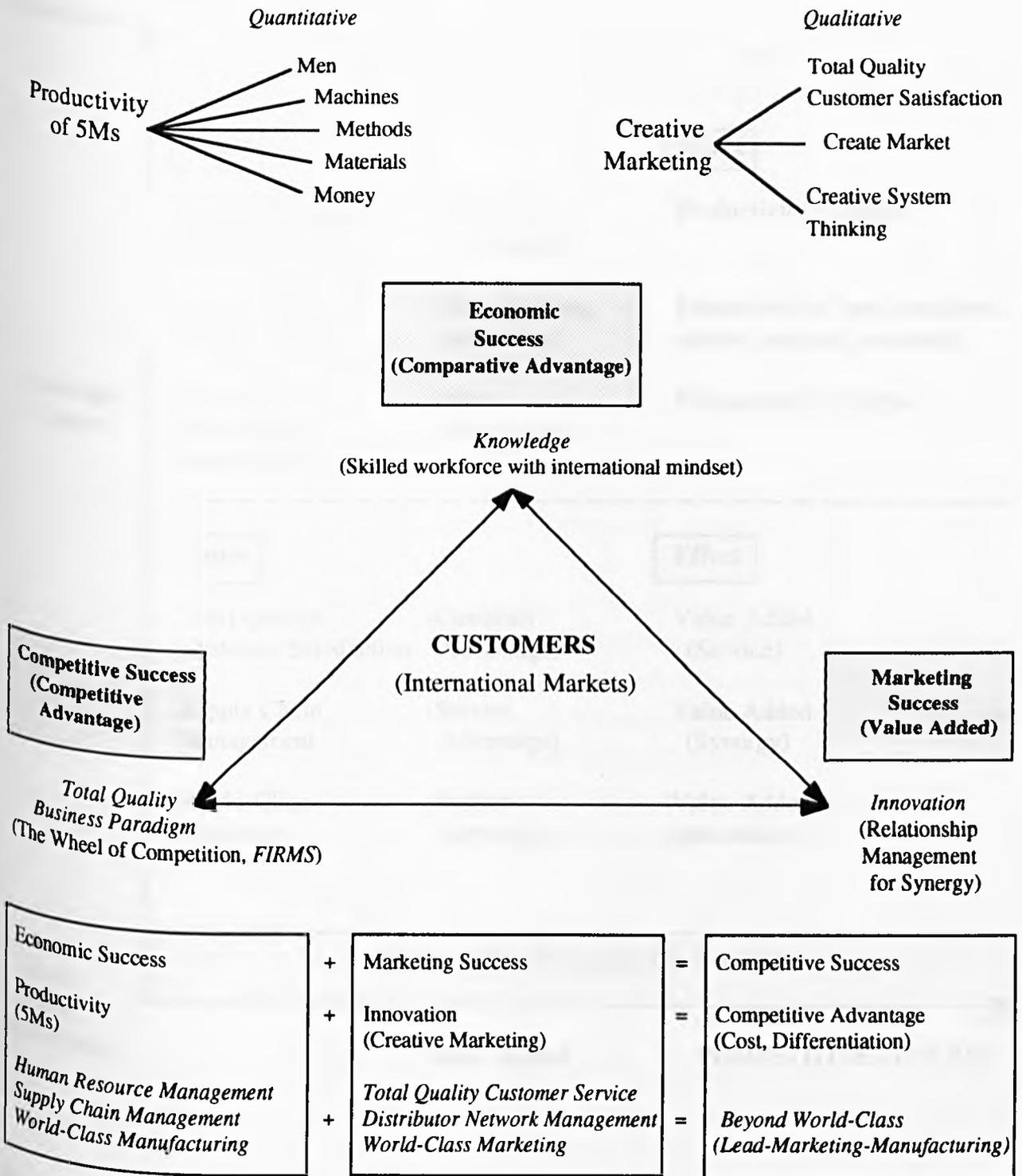
The success of these developing nations has rekindled the debate on the sources of the competitive advantage of nations (see Porter 1990; Drucker 1992, 1993; The World Bank, 1993). Contrary to the inherent logic contained in Ricardo's comparative advantage, it would now appear that nations can create competitive advantage. Economic destiny is not and cannot be predetermined by the nation's natural endowments. Given that this proposal now appears indisputable, the key question is now to identify the means by which competitive advantage may be created. As we enter the 21st Century and the age of information and technology, it would appear that the critical success factors in economic development will be innovation, technological advancement and processes. For instance, we can add value to human resources through education and knowledge (see Figures 4.27 and 4.28 for details):

$$\begin{array}{lcl}
 \text{Comparative advantage} + \text{Value added} & = & \text{Competitive advantage} \\
 \text{People} & + \text{Entrepreneurship} & = \text{Business advantage} \\
 & \text{(Skills \& Knowledge)} &
 \end{array}$$

The above equation underlines the importance of the quality of human resources in determining business advantage. If human resources are to play such a vital role in determining business advantage, then it is vital that those resources include a majority with a desire to accept new skills and knowledge and the wherewithal to assimilate and apply their new found skills. At the same time, it is crucial that a minority of the population already possess the skills required and have the capability to transfer these effectively to the majority. Indeed, one could even go further and suggest that for any nation, the most important point is to ensure the open-mindedness of the majority, as even if the minority lack the skills but at least recognise their importance, then they simply have to ensure the importation of such skills from wherever they may be found. Indeed, a close examination of Asia's NIEs indicated that education is one area where these countries have a major trade deficit.

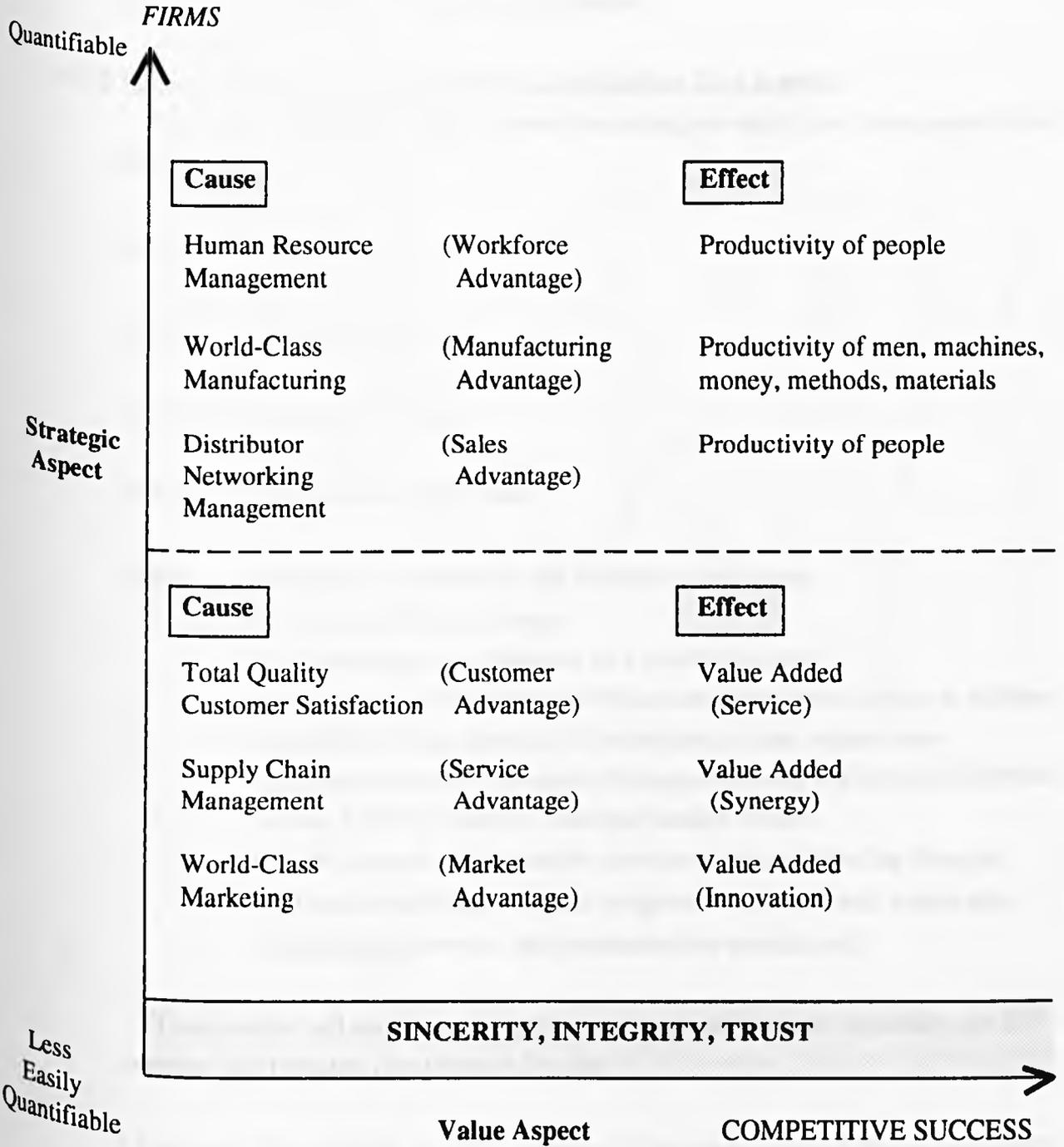
In terms of corporate efficiency, it is essential that business educators ensure that their output (ie their students) meets the quality threshold of their customers (ie "the business community"). Perhaps a major weakness of business education worldwide at the moment is that the graduates have mastered the theoretical concepts and in some cases even been exposed to some practical exposure, but have failed to appreciate fully the purpose of their endeavour. They are investing in self development in order to increase

FIGURE 4.27 THE ADAPTIVE - INTEGRATIVE - DERIVATIVE - EVALUATIVE MODE



Source: Author

FIGURE 4.28 TOTAL QUALITY BUSINESS PARADIGM (TOBP)



Source: Author

their market value to potential employers whose priority is to satisfy their customers. Often though, the new graduates fail to recognise that their prospects are ultimately determined by the level of customer satisfaction.

4.3.2 Impact of Significant World Events on the Machine Tool Industry

The international business environment has undergone significant developments (see Figure 4.29):

- 1972: • Nixon Shock

- 1973 : • First Oil Crisis

- 1979 : • Second Oil Crisis

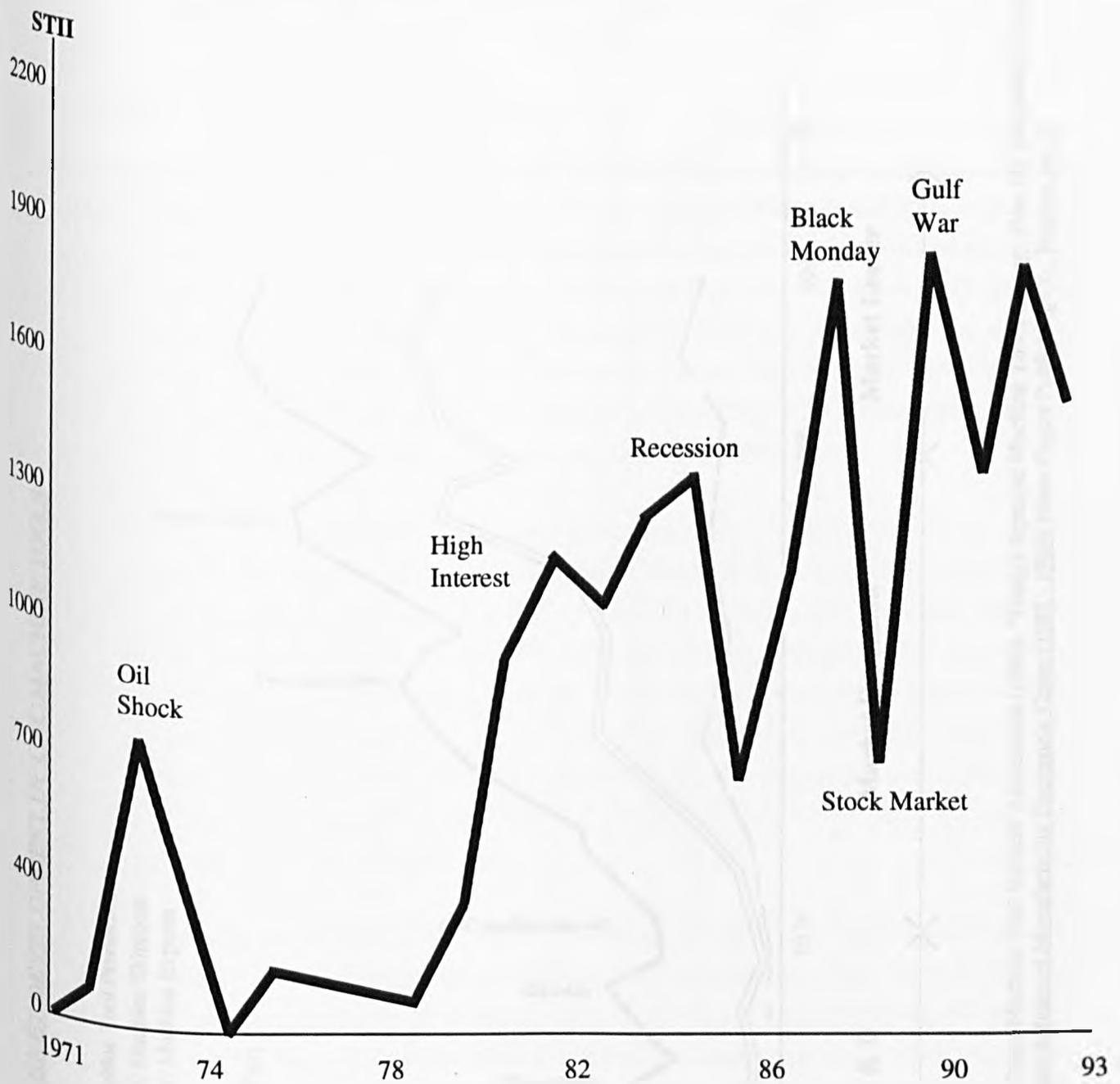
- 1980 : • International Debt Crisis

- 1990s: • Demise of communism and triumph of capitalism
 • Opening of Eastern Europe
 • Curb on weaponry, ordnance on a worldwide scale
 • Cost driven competition in manufacturing worldwide leading to offshore assembly, foreign sourcing of production, ie lean organization
 • Emphasis on world-class quality for manufacturing and services (ISO 9000 series; Malcolm Baldrige National Quality Award)
 • World economy dominated by service sector activities (eg financial services, consulting, computer programming, hotels and restaurants, transportation service, telecommunication service, etc)

These events had significant impact on international business especially the CNC machine tool industry, (see Figure 4.30) viz:

- Under the Nixon-shock in 1972, former US President Richard Nixon unilaterally suspended US' willingness to convert US dollars into gold at \$35 an ounce, thereby spelling the end of the gold-backed international monetary system. In the early 1970s, the USA placed a surcharge on imports, embargoed the export of soya beans, moved to establish diplomatic relations with the People's Republic of China, and began to

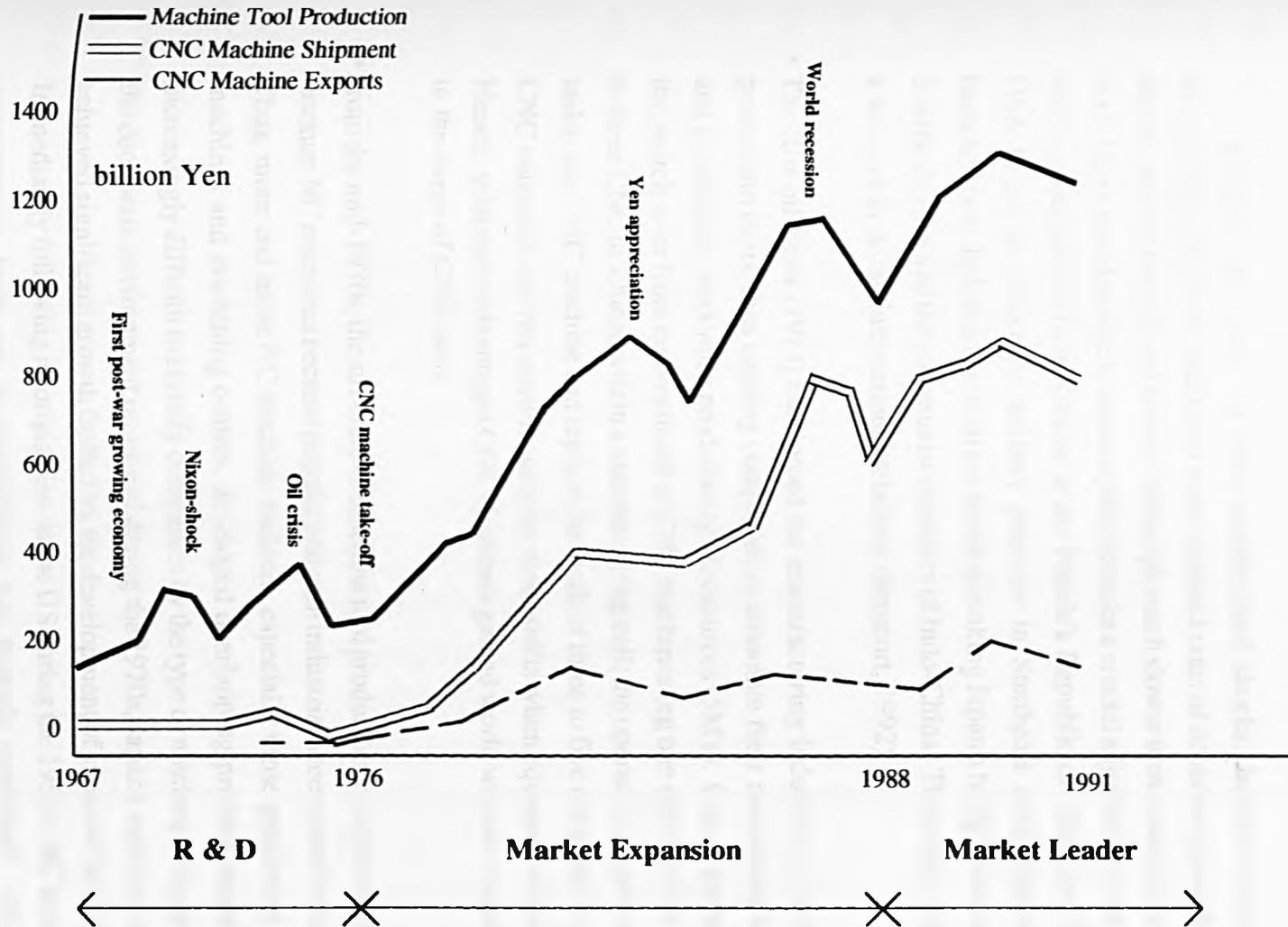
FIGURE 4.29 1970s TO 1990s : THREE DECADES OF TUMULTUOUS EVENTS



Footnote: STII = Straits Times Industrials Index

Source: Journal of Singapore Business. "Where Next?", December 1993, pp. 1.

FIGURE 4.30 MARKET DEVELOPMENT OF CNC MACHINE TOOLS



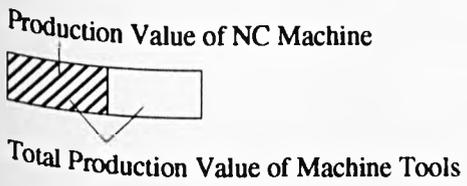
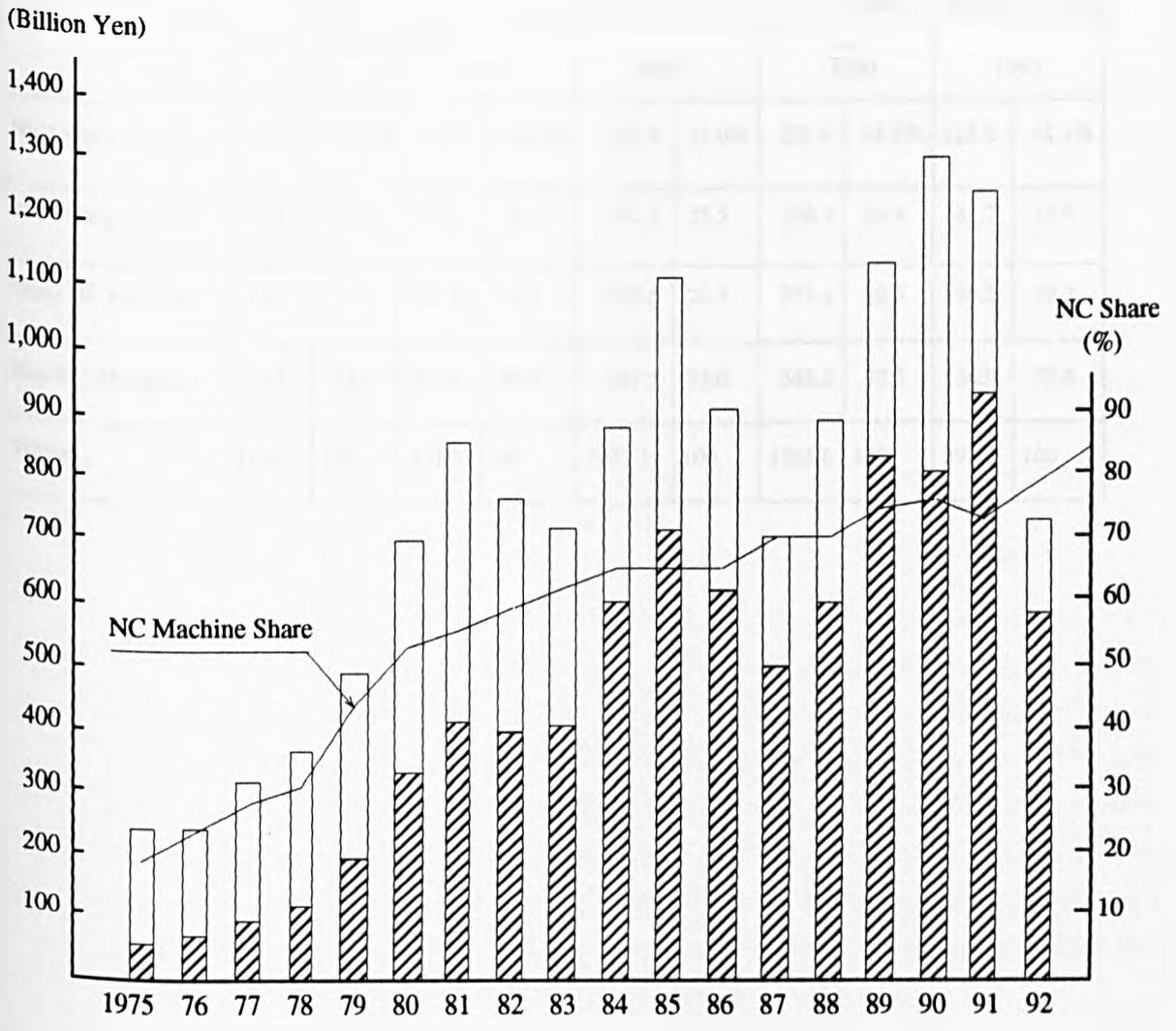
Source: Adapted from Japan Machine Tool Builders' Association (1988), "Today's Japanese Machine Tool Industry : How NC Machines Influence Markets", *Japan's Advanced Manufacturing Equipment Guide (1988 - 1989)*. News Digest Publishing Co., Nagoya, pp. 5.

disengage from its commitment to the security of the government of South Vietnam. Meanwhile, rapid oil price increases help to trigger global stagflation, precipitating the first postwar sputter in the Japanese economic machine.

Despite the force of these accumulated shocks, Japan's economy proved astonishingly resilient, and Japan soon resumed rates of economic growth faster than did the other industrialized nations (although much slower than during the high-growth era). Japan was also able to move rapidly to make a crucial adjustment in its diplomacy, shifting recognition from Taiwan to the People's Republic of China in 1972. As the USA began to reduce its military presence in Southeast Asia, Japanese leaders launched new diplomatic initiatives aimed at making Japan a bridge between capitalist Southeast Asia and the communist countries of Indo-China. Thereafter, Japan entered a new era in Asian international relations (Emmott, 1992)

- The first oil crisis (1973) had forced the manufacturing industries to reduce overall production costs, thus causing companies to automate their manufacturing facilities and processes to maximise productivity of resources (5M's). One of the key factors is the switch-over from conventional to CNC machines (eg one operator can handle two to three CNC machines within a manufacturing cell; the operator can perform multiple tasks; one CNC machine can replace the work of three to five conventional machines; CNC machines can run continuously for three shifts when equipped with robots, etc). Hence, with these advantages CNC machines gained world wide acceptance resulting in the surge of CNC users
- From the mid-1970s, the structure of machine tool production in Japan began to change because NC machines became popular and gain industrial acceptance for its flexibility. Thus, more and more NC machine builders, especially those producing NC turning machines and machining centers, developed overlapping product ranges, making it increasingly difficult to classify companies by the type of machines they produced. As the economic environment improved during the 1970s, Japan's machine tool industry achieved significant growth fuelled by the development of superior NC machine tools. Immediately following its origination in the US during the 1950's, NC technology was introduced to Japan and its development was strongly promoted. After 1975, the production of NC machine tools accelerated rapidly in Japan (see Figure 4.31 and Table 4-8).

FIGURE 4.31 NC/CNC MACHINE TOOL SHARE IN JAPAN (1975 - 1992)



$$\text{NC Machine Share} = \frac{\text{NC Machine Tools}}{\text{Total Machine Tools}} \times 100(\%)$$

Source: MITI Machinery Production Statistics (1993)

TABLE 4-8 MACHINE TOOLS PRODUCTION SHARE IN JAPAN BY NC-TYPE AND NON-NC MACHINES

(Value: Billion Yen)

	1977		1981		1985		1991		1993	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
NC Lathes	42.7	13.7%	161.3	19.0%	221.0	21.0%	235.8	18.6%	125.2	21.1%
Machining Centers	23.1	7.4	165.4	19.4	267.3	25.5	308.4	24.4	141.7	23.9
Other NC Machines	14.7	4.7	107.4	12.6	215.5	20.5	373.4	29.5	190.5	32.2
Non-NC Machines	232.3	74.2	417.4	49.0	347.3	33.0	348.2	27.5	134.9	22.8
TOTAL	312.8	100	851.3	100	1051.1	100	1265.6	100	592.3	100

Source: Japan Machine Tool Builders' Association (1994) Year Book, pp. 6.

A number of factors contributed to Japan's NC machine tool boom. First, NC machine tools were able to satisfy diversifying user needs. Further, increased NC functions and reduced NC unit size due to the introduction of micro processor together with quantity production capability, lowered NC machine tool prices.

Japanese machine tool production more than quadrupled in value between 1976 and 1985, from Yen 229 billion to Yen 1,051 billion. Over the same period, the production value of NC machine tools soared from Yen 51 billion to Yen 704 billion, expanding its share of total machine tool production value from 22 percent to 67 percent.

The NC equipment became capable of combining various lathe-turning functions which used to be provided according to each specific application by center lathes, turret lathes, automatic lathes and the like. A new type of machine, called the turning center with milling and other functions, was introduced. These developments began to supplant traditional non-NC turning machines.

Machining centers contributed to increased manufacturing efficiency because of their ability to perform automatically different functions - such as drilling, boring and milling - at a single workstation. The NC turning machines and machining centers both became more popular in Japan, eventually accounting for nearly 50 percent of the total machine tool production value. Their growth in Europe and the USA has been rather moderate compared with Japan, but the shares of NC machine tools in their markets has also risen steadily in recent years (Table 4-9). As in Japan, technical progress and increased use of NC/CNC machine tools are bringing about changes of unprecedented dimensions in the structure of machine tool industry worldwide.

Some significant events impacting the machine tool industry are:

- After the second oil crisis (1979), those companies which managed to survive through turbulent times were those that were equipped with CNC machines. Manufacturers gradually realised that low energy consumption and high value added were two requirements for future products.
- In 1980, the international debt crisis of the Western countries had caused the Japanese Yen to appreciate against the US Dollar. But, it did not hinder the export aggression

TABLE 4-9

NUMBER OF NC/CNC MACHINE TOOLS PRODUCED IN JAPAN

Year	NC lathes	Machining Centers	Other NC machines	NC machines Total Units
1975	1,355	401	432	2,188
1976	2,073	526	713	3,312
1977	3,677	926	833	5,436
1978	4,986	1,377	979	7,342
1979	8,203	2,927	3,187	14,317
1980	12,007	5,231	4,814	22,052
1981	12,133	7,394	6,399	25,926
1982	10,344	6,942	6,852	24,138
1983	10,020	7,791	8,597	26,408
1984	16,555	10,252	11,229	38,036
1985	19,084	13,345	12,540	44,969
1986	15,976	10,857	11,943	38,776
1987	15,241	9,027	11,192	35,460
1988	20,942	11,474	15,234	47,650
1989	24,491	14,828	18,723	58,042
1990	25,406	15,820	20,739	61,965
1991	19,749	13,766	18,865	52,380
1992	11,977	8,548	11,512	32,037
1993	10,188	6,368	9,237	25,793

Source: MITI Machinery Production Statistics (1994)

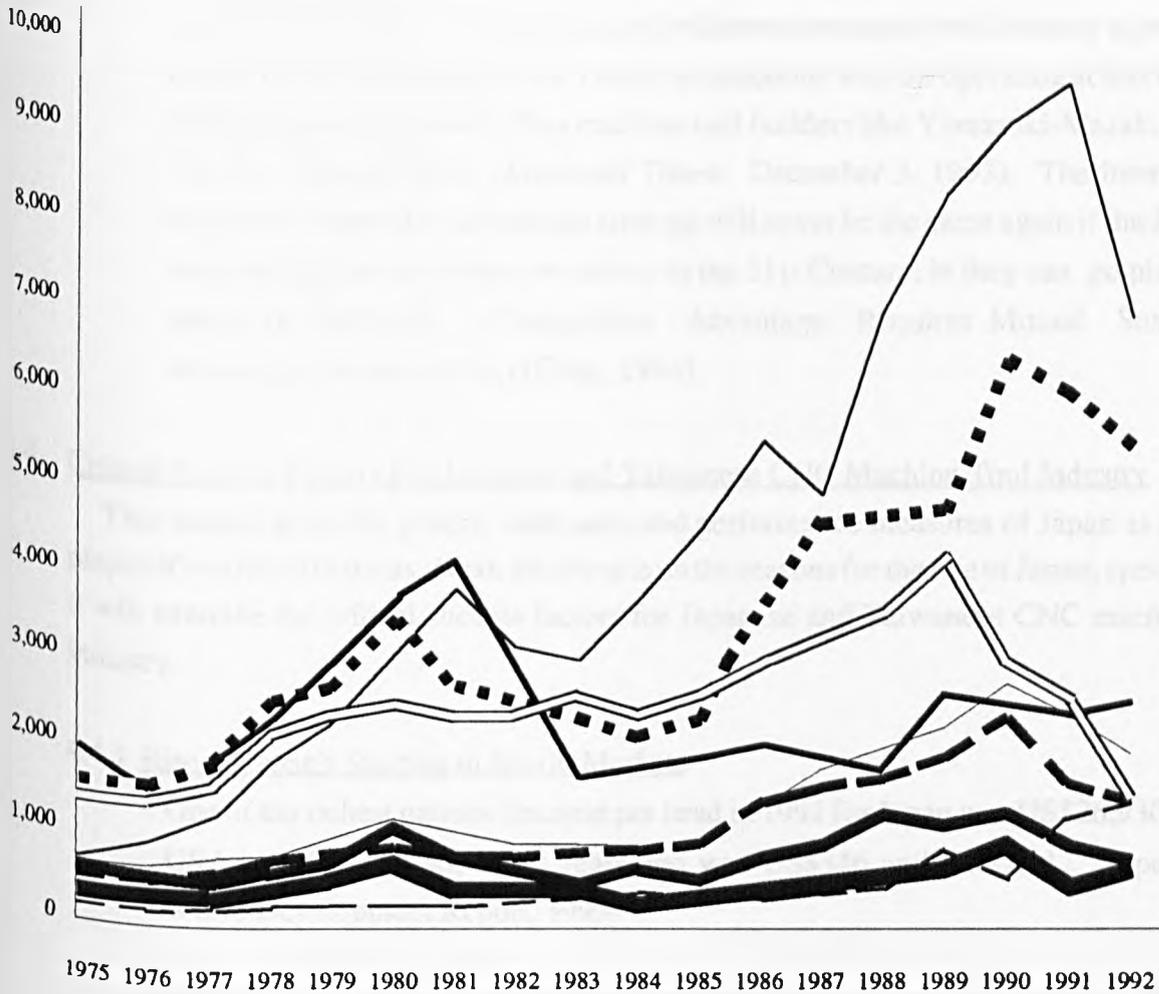
of Japanese machine tools. Japanese CNC machine tools were still cheaper than most of its Western rivals, in addition to its faster delivery schedule and product quality with built-in reliability.

- After the G5 (USA, UK, Germany, Japan and Canada) Meeting in September 1985, the value of the Japanese Yen to the US Dollar and the Deustch Mark soared and this crippled Japanese export-oriented industries in 1986 and 1987 - triggering nationwide recession. Nevertheless, Japanese machine tool industry managed to rebound back to an all time high by 1991. However, the world's global production and consumption fell by 10 percent to US\$40.9 billion (*Financial Times Survey on Machine Tool Industry*, May 6, 1992). The main reasons were the downturns of varying length and intensity in leading Western markets, the collapse of markets in Eastern Europe and the former Soviet Union following the demise of communism. The world's defense industries suffered a significant recession since East and West are no longer confronting each other. And, with an economic slump in most countries, this had sharply reduced the demand for machine tools, making it difficult for machine tool producers to secure viable mass economies of scale.
- In 1992, the consumption of machine tools in Japan, which was also the world's largest market, fell by about 30 percent to US\$6.79 billion from a record high of US\$9.43 billion (in 1991) - according to statistics from the *American Machinist*. See Figure 4.32. One of the reasons for the rapid fall in demand for machine tools was the excess capacity in the automotive industry (consuming about 18 percent of machine tool orders) and general machinery (about 27 percent). Further, stagnant demands in the USA and Europe, and the appreciation of the Japanese Yen, accounted for 20 percent decline in monetary value for the export orders from the previous year (1991) - though the percentage of foreign orders had increased. COCOM and MITI imposed more stringent control on the export of CNC machines to communists countries that might use such equipment to produce military hardware (*Financial Times*, January 15-16, 1994).

As a corollary, between 1967 to 1976 - Japan machine tool industry focused their efforts and resources on research and development to bring the quality of machine tools to world-class standard. They expanded their market domestically, internationally and then globally between 1977 to 1988, maintaining the number one position for eleven

FIGURE 4.32 WORLD MACHINE TOOL PRODUCTION (METAL-CUTTING TYPE)

(Value in Millions of US Dollars)



- Japan
- ■ ■ Germany
- USA
- Italy
- Switzerland
- Russia
- U.K.
- France
- P.R. China

Source: American Machinist (1993)

years since overtaking the USA and Europe in 1982 as the world leader in production. Since then, the Japanese machine tool industry has been recognised as a global market leader with state-of-the-art technology. However, with the burst of the Japanese "bubble economy" in 1990, no one in the Japanese machine tool industry is predicting a return to the heady days of the 1980s - productions were all operating at less than half of full capacity for world-class machine tool builders like Yamazaki-Mazak, Amada, Okuma, Hitachi-Seiki (*Financial Times*, December 3, 1993). The international corporate competitive advantage strategy will never be the same again if the Japanese machine tool builders want to survive in the 21st Century, ie they can go placidly in search of *CARMSA* (Competitive Advantage Requires Mutual Sustainable Advantage) in the next lap (Chan, 1994).

4.4 Critical Success Factors For Japanese and Taiwanese CNC Machine Tool Industry

This section gives the generic indicators and performance measures of Japan as a global player of world-class status. Next, the focus is on the reasons for the rise of Japan; specifically, it will examine the critical success factors for Japanese and Taiwanese CNC machine tool industry.

4.4.1 Rise of Japan's Success in World Markets

- One of the richest nations (Income per head in 1991 for Japan was US\$26,930 and for USA was US\$22,240; thirty years ago was US\$346 and US\$2,612, respectively; World Development Report, 1993)
- Japanese corporations achieved leadership positions in many industries. By early 1980s, Japanese companies dominated world markets in a whole range of consumer and industrial products
- Growing trade surpluses in the 1980s and 1990s
- Japan's GNP real growth rate consistently outpaced that of the USA and the EU
- Highest per capita GNP among the G-7 leading industrial nations in 1988
- Huge exports of capital

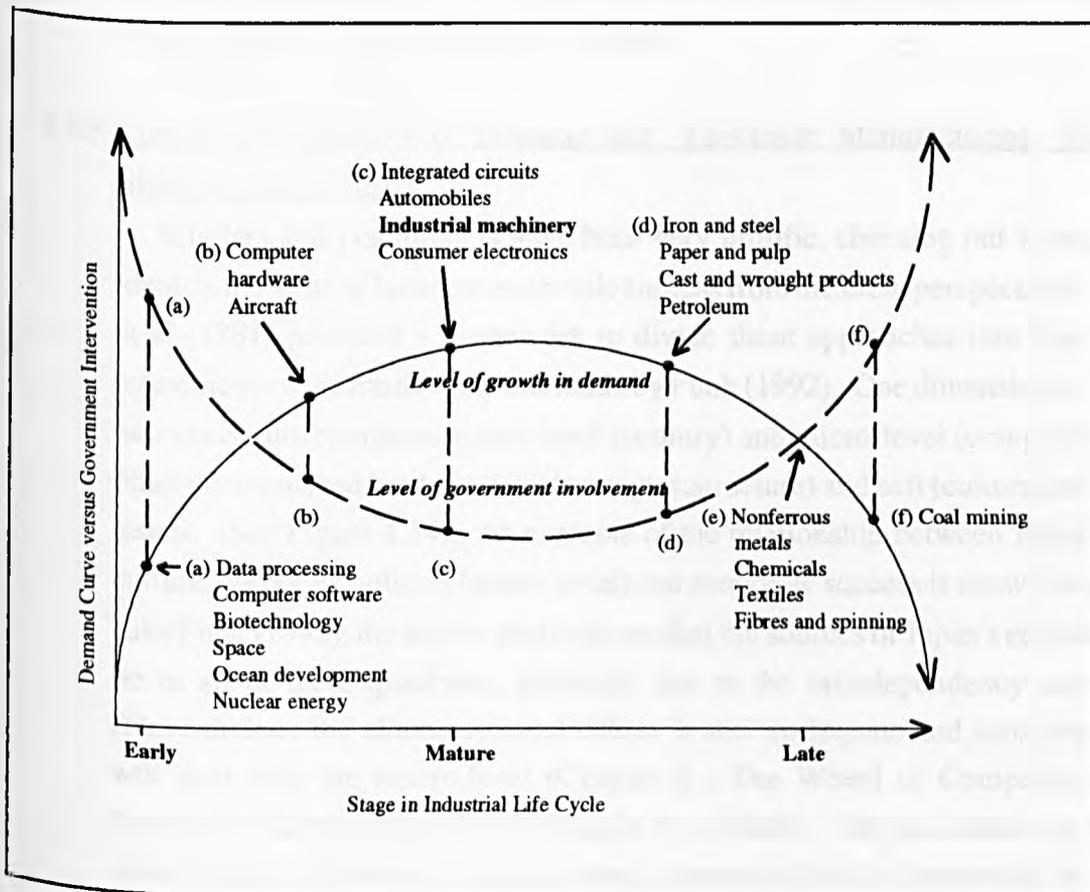
- World largest net creditor
- Net external assets stood at US\$4,006 billion in 1989
- Between 1985 to 1988, Japanese annual direct investment in the EU surged from US\$2 billion to US\$10 billion

4.4.2 Reality or Myth Behind Japan's Success in International Business: Scholars' Contentions

From the literature review on Japan's postwar phenomenal success, the following reasons were put forth to explain its astounding achievements:

- Government direction and support (see Figure 4.33)
- Strong business-government ties
- Sound Japanese management practice
- Cooperative labour-management
- Socio-cultural features of Japan
- Motivated labour force
- Cheaper labour cost amongst the OECD
- Flexibility and willingness to learn
- Japanese manufacturing systems/distinctive production techniques
- High labour productivity
- Technological innovation
- Supportive financial system
- Long term success versus short term profit
- Fierce competitive home environment
- Role of market segmentation
- Role of product
- Role of product quality
- Role of product innovation
- Role of price
- Role of promotion
- Role of distribution
- Role of marketing strategies and practices in international business

FIGURE 4.33 THE RELATIONSHIP BETWEEN JAPANESE GOVERNMENT INTERVENTION AND STAGE IN THE INDUSTRY LIFE-CYCLE



Footnote:

MITI has used an industrial life-cycle model as the basis for deciding its strategic priorities. As Okimoto had shown, although the degree of intervention tends to follow a curvilinear trajectory: ie extensive involvement during the early stages of an industry's life cycle when market demand is still small, falling off significantly as the industry reaches full maturity and demand reaches its peak, and rising again as the industry loses its comparative advantage and faces the problems of senescence - saturated markets, the loss of market share and excess capacity.

Source: Okimoto, D. I. (1989), Between MITI and the Market: Japanese Industrial Policy for High Technology. Stanford University Press, pp. 50.

Amongst the scholars and practitioners, there is no consensus for the reasons underlying Japan's success (see Table 4-10). While some may favour one or more critical success factors, the author would concur with Wheelwright (1981), Blinder (1987) and Saunders (1991) that there are various contributing factors and interrelated socio-politico-cultural features of Japan.

4.4.3 Comparative Analysis of Japanese and Taiwanese Manufacturing Success: The Machine Tool Industry

Scholars and practitioners have been very prolific, churning out works seeking to identify the roots of Japanese economic success from different perspectives. Abernathy, et al (1981) provided a framework to divide these approaches into four categories; refinement on the framework was made by Funk (1992). One dimension of the two-by-two matrix differentiates macro-level (country) and micro-level (company) issues; the other distinguished hard (policies/strategies:structure) and soft (cultural:infrastructure) issues. (See Figure 4.34). An example of the relationship between Japan's corporate culture, corporate policies (micro-level) and economic success is shown in Figure 4.35. Like Funk (1992), the author also believes that the sources of Japan's economic success lie in all of these quadrants, primarily due to the interdependency amongst them. [Nevertheless, the aforementioned debate is still inadequate and subsequent chapters will deal with the macro-level (Chapter 5 : The Wheel of Competition of Asian Producers) and the micro-level (Chapter 6 : *FIRMS*). The parameters in the author's Total Quality Business Paradigm using Abernathy/Funk's framework is depicted in Figure 4.36].

With specific reference to the machine tool industry, the author uses the same framework to tabulate the works of scholars and practitioners seeking to explain the manufacturing success of Japanese and Taiwanese machine tool builders. See Figures 4.37 and 4.38.

In the 1940s and after its defeat in World War II, Japan was dependent on the West for technology. Japan industrial leaders endeavoured to import a few foreign machine tools as models and then, through purchase of patents, or reverse engineering, to produce them locally. In the early 1950s, Japan's machine tool industry was recognised as strategically vital to the development of a manufacturing infrastructure, and yet it was not internationally competitive. As a result it was designated a high-priority industry for

TABLE 4-10 REASONS UNDERLYING JAPAN'S SUCCESS

For	Against
<ul style="list-style-type: none"> • Government Direction and Support Duus (1976); Vogel (1978, 1985); Inose (1979); Beresford (1981); Bishop (1981); Johnson (1982); Taylor (1983); Brown and Read (1984); Prentice (1984); Sautter (1984); Scott (1984); Buckley (1985); Pepper, Janow and Wheeler (1985); McCraw (1986); Dicken (1988); Majumdar (1988); James (1989); Samson (1993) 	<p>Patrick and Rosovsky (1976); Patrick (1977); Wheelwright (1981); Abegglen (1984); Abegglen and Stalk (1985); Morita (1987); Huggler (1987)</p>
<ul style="list-style-type: none"> • Strong Business - Government Ties Kaplan (1972); Sethi (1974); Kassem (1974); Drucker (1981); Wolf (1985); Zimmerman (1985) 	<p>Hayes (1981); Trevor (1983); Abegglen (1984); Sethi, et al. (1984); Abegglen and Stalk (1985); Pepper, Janow and Wheeler (1985); Fukuda (1987); Briggs (1988); Taira (1988); Mroczkowsk and Hanaoka (1989)</p>
<ul style="list-style-type: none"> • Sound Japanese Management Practice¹ Drucker (1971, 1981); Keidal (1981); Pascale and Ethos (1981); Lee and Schwandiman (1982); Ouchi (1982); Wilkinson (1983); Takeuchi (1985); Thurow (1985); McMillan (1985); Morita (1987); Koike (1988) 	<p>Sethi, et al. (1984); Tsuda (1987); Mroczkowsk and Hanaoka (1989)</p>
<ul style="list-style-type: none"> • Cooperative Labour/Management Ways (1967); Morita (1987) 	<p>Wheelwright (1981)</p>
<ul style="list-style-type: none"> • Socio-Cultural Features of Japan Sethi (1974); Vogel (1979); Ohmae (1982); Ouchi (1982); Johnson (1983); Hamaguchi (1988) 	<p>Vogel (1979)</p>
<ul style="list-style-type: none"> • Motivated Labour Force Inose (1979); Vogel (1979); Hamaguchi (1988) 	
<ul style="list-style-type: none"> • Cheap Labour Cost 	
<ul style="list-style-type: none"> • Flexibility and Willingness to Learn James (1989); Mroczkowsk and Hanaoka (1989); Turpin (1993) 	

Footnote : ¹ Japanese human resource management includes on-the-job training, lifetime employment, seniority-based wage system, decision-making by consensus, long-term planning.

For

Against

• ***Japanese Manufacturing Systems/Distinctive Production Techniques***

Abernathy, et al. (1981); Hayes (1981); Saso (1981);
Takeuchi (1981); Wheelwright (1981); Carinto (1984);
Hutchins (1984); Ishikawa (1984), Sasaki and Hutchins
(1984); Weiss (1984); Sepehri (1986); Schonberger (1986);
Skinner (1986); Bicheno (1987); Buffa and Sarin (1987);
Gunn (1987); Parnaby (1987); Hunt (1988); Oliver and
Wilkinson (1988); Prestowitz (1988)

Franko (1983); Ozawa (1983); Weiss (1984);
Alston (1986)

• ***High Labour Productivity***

Takeuchi (1981)

Bolton (1993)

• ***Technological Innovation***

Inose (1979)

• ***Supportive Financial System***

Bishop (1981); Taylor (1983); Brown and Read (1984);
Gregory (1984); Kotler (1985); Zimmerman (1985);
Dore (1986); Popham (1988)

• ***Long Term Success versus Short Term Profits***

Vogel (1979); Limprecht and Hayes (1982); Keegan (1983);
Anderson (1985); Thurow (1985), Wong, Saunders and
Doyle (1987)

• ***Fierce Competitive Home Environment***

Saso (1981); McKinsey (1983); Sautter (1984); Pepper,
Janow and Wheeler (1985); Zimmerman (1985);
Abegglen and Stalk (1986); Porter (1990)

• ***Various Contributing Factors***

Wheelwright (1981); Blinders (1987); Saunders (1991)

• ***The Role of Market Segmentation***

Rose (1978); Kleiman (1980); Magaziner and Hout (1980);
Fahey and Radnor (1982); Kotler and Fahey (1982);
Keegan (1983); Lampert (1983); Lazer, et al. (1985);
McMillan (1985); Sims (1986); Taylor III (1989)

• ***The Role of Information Gathering/Market Intelligence***

Aoyama (1982); Vogel (1978, 1982); Burton and Saelens
(1983); Murata (1984); McMillan (1985); Rugman (1985);
Zimmerman (1985); Jain (1987); Michaelson (1987);
Dicken (1992)

Against

For

• *The Role of the Product*

Ball (1981); Kotler and Fahey (1982); Arnott (1983);
Johansson and Nonaka (1983); Keegan (1983); Clark (1984);
Karim (1984); Kono (1984); Anderson (1985);
Manasian (1985); Nagisa (1986); Michaelson (1987)

• *The Role of Product Quality*

Edwards (1967); Main (1980); Muaser (1980); Wyller
(1981); Fahey and Radnor (1982); Naisbitt (1982); Arnott
(1983); Garvin (1984, 1987); Ishikawa (1984); Kono (1984);
Parkinson (1984); McKenna (1984); Prentice (1984);
Anderson (1985); Manasian (1985); Zimmerman (1985);
Meissner (1986); Taylor III (1989)

Kotler (1985)

• *The Role of Product Innovation*

Vogel (1987); Hayes and Abernathy (1980); Kono (1984);
Murata (1984); Pepper, Janow and Wheeler (1985);
Baker (1988); Hunt (1988); Moss (1988); Nishikawa (1989);
Shibata (1993)

Kikuchi (1982); Nadler (1984); Alston (1985);
Esaki (1985); Yakawa (1985)

• *The Role of Price*

Abegglen and Rapp (1970); Nevin (1978); Rose (1978);
Smoch and Hoefler (1982); Taylor III (1989); Krisher (1981);
Piercy (1982); Johanson and Nonaka (1983); Keegan (1983);
Karim (1984); Cortazzi (1985); Kotler, et al. (1985);
Sims (1986); Hamel and Prahalad (1989)

• *The Role of Promotion*

Yoshino (1978); Suzuki (1980); Johansson and Nonaka
(1983); Keegan (1983); Stone (1984); Zimmerman (1985)

• *The Role of Distribution*

Kleiman (1980); Fahey and Radnor (1982); Keegan (1983);
Kono (1984); Vivabharathy (1984)

• *Japanese Marketing Strategies and Practices in International Business*

Monroe (1987); Ohmae (1978, 1982, 1987); Rose (1978);
Baker (1979); Harroth and McMillan (1980); Magaziner and
Hout (1980); Kraar (1981); McGraw (1981); Nakanishi (1981);
Pascale and Athos (1981); Turnbull and Cunningham (1981);
Kotler and Fahey (1982); Piercy (1982); Redy and Rao (1982);
Thurrow (1982); Johansson and Nonaka (1983); Keegan (1983);
Morland (1983); Abegglen and Stalk (1984); Murata (1984);
Pascale (1984); Anderson (1985); Cortazzi (1985); Jatusripitak,
Fahey and Kotler (1985); Kotler (1985); Lazer, et al. (1985);
Lorenz (1985); Manasian (1985); Zimmerman (1985); Cravens
and Woodruff (1986); El-Morsy (1986); Sims (1986); Takeda
(1986); Wensley (1987); Main (1989); Kheir -El-Din (1990);
Wong, Saunders and Doyle (1987, 1992); Benjamin (1993)

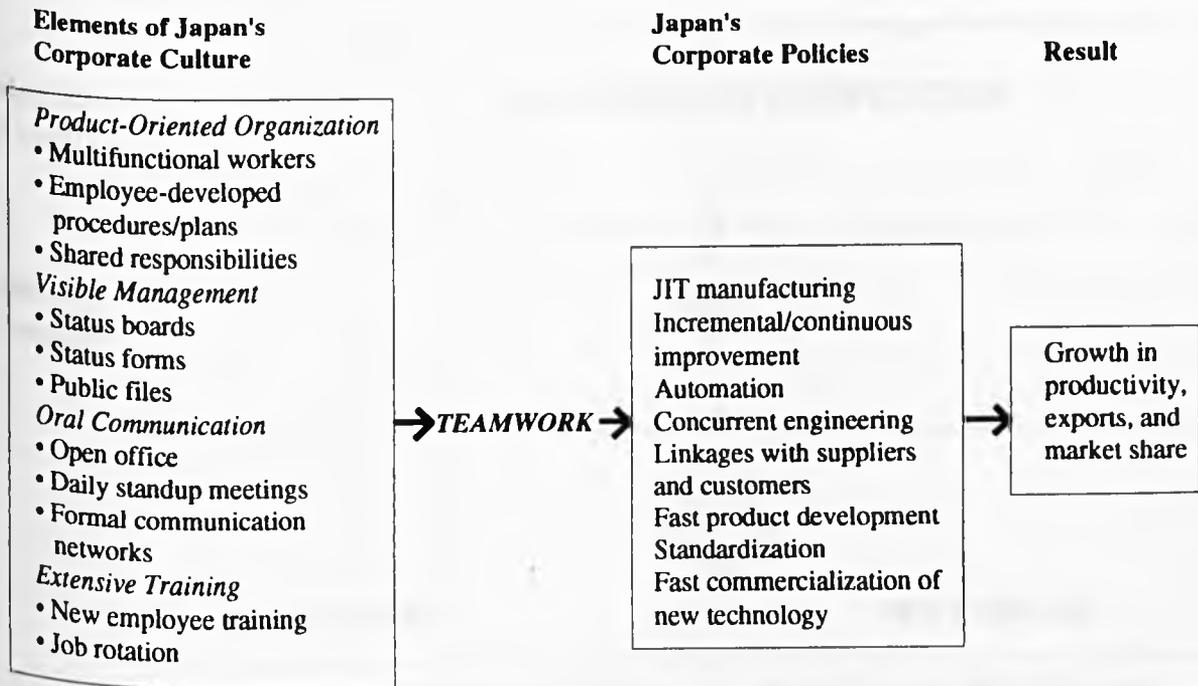
FIGURE 4.34

REASONS GIVEN FOR JAPAN'S ECONOMIC SUCCESS, CLASSIFIED INTO FOUR AREAS RELATED TO A COUNTRY'S ECONOMIC COMPETITIVENESS

	STRUCTURE	INFRASTRUCTURE
MACRO (Country)	<p>Government Policies</p> <ul style="list-style-type: none"> • Ministry of International Trade and Industry • Import restrictions • Low-cost capital financing 	<p>Social Infrastructure/Culture</p> <ul style="list-style-type: none"> • Education • Work ethic • Group-oriented culture
MICRO (Company)	<p>Corporate Policies</p> <ul style="list-style-type: none"> • Just-in-time manufacturing • Focused factory • Product innovation • Concurrent engineering • High debt-to-equity ratios • Fast introduction of new products • Close relations with suppliers 	<p>Corporate Infrastructure/Culture</p> <ul style="list-style-type: none"> • Lifetime employment • Seniority system • Enterprise unions • Nonspecialized career paths • Collective decision making • Collective responsibility • Extensive training programs

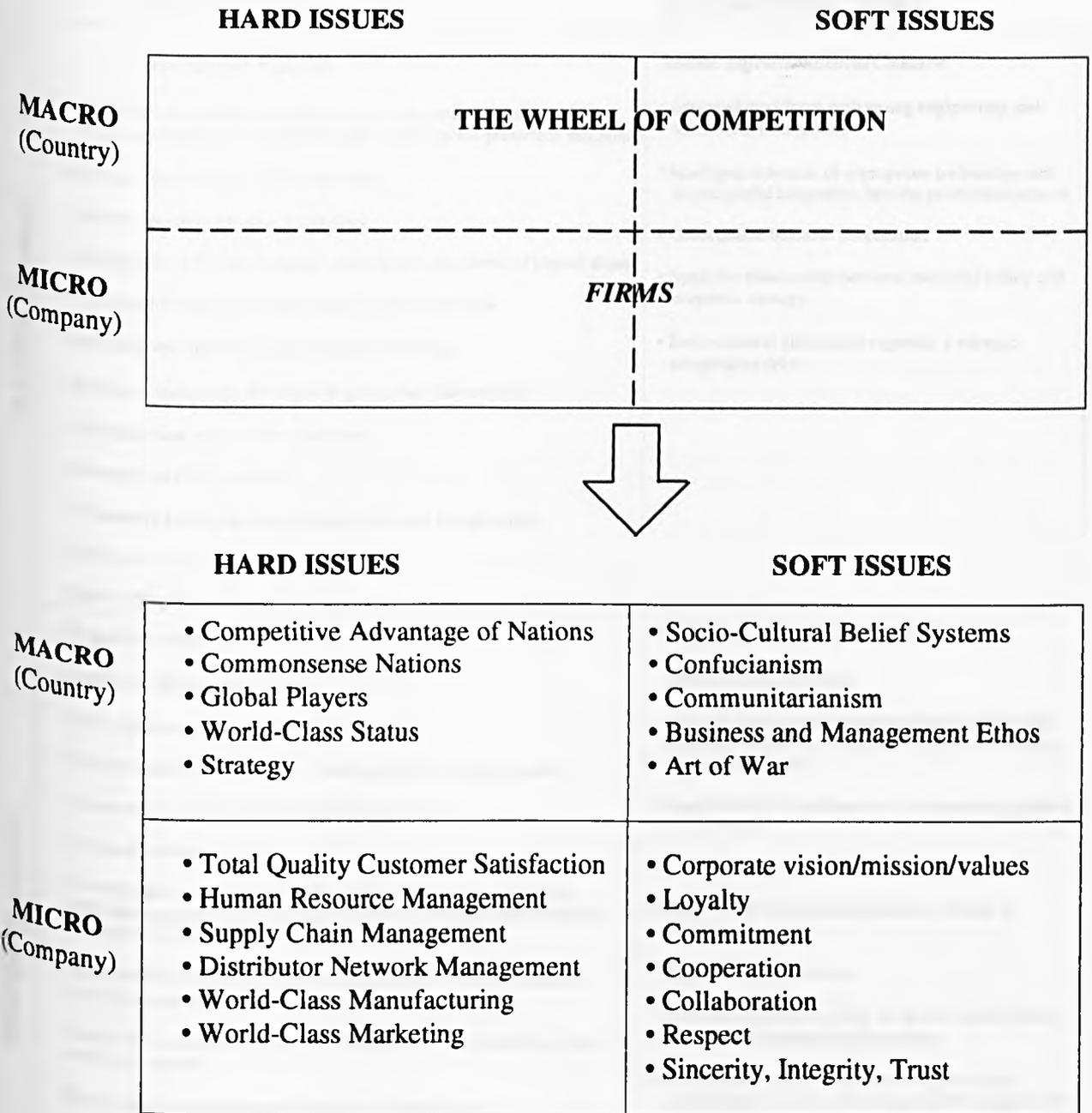
Source: Adapted from Abernathy, William, Clark, Kim and Kantrow, Alan (1981), "The New Industrial Competition," Harvard Business Review, September-October, pp. 72.

FIGURE 4.35 THE RELATIONSHIP BETWEEN JAPAN'S CORPORATE CULTURE, CORPORATE POLICIES, AND ECONOMIC SUCCESS



Source: Funk, Jeffrey L. (1992), Teamwork Advantage: An Inside Look at Japanese Product and Technology Development, Productivity Press, Cambridge, Massachusetts, pp. 49.

FIGURE 4.36 TOTAL QUALITY BUSINESS PARADIGM



Source: Author

FIGURE 4.37 CRITICAL SUCCESS FACTORS FOR JAPANESE MACHINE TOOL INDUSTRY

	STRUCTURE	INFRASTRUCTURE
MACRO (Country)	<p>Government Policies</p> <ul style="list-style-type: none"> • 1956 Plan: extraordinary measures law for the promotion of specified machinery industries (financial incentives and market-protection measures) • Strategic protectionism and cartelization • National receptivity to new technology • Strategic use of foreign exchange controls and assessment of import duties • Subsidies for experimental production of advanced tools • Importing and improving upon Western technology • Release of technology developed at government laboratories • Rationalisation programs for machinery • Promotion of CNC products • Proprietary funding to counterbalance low-cost foreign credit • Massive export drive • Japan seems to only export 	<p>Social Infrastructure/Culture</p> <ul style="list-style-type: none"> • Educated workforce with strong engineering and electronics background • Intelligent selection of appropriate technology and its successful integration into the production process • Government-business cooperation • Symbolic relationship between industrial policy and corporate strategy • Socio-cultural differences engender a stronger competitive drive
MICRO (Company)	<p>Corporate Policies</p> <ul style="list-style-type: none"> • Quality products at lower prices • Scale-intensive, product standardization strategy • Flexible manufacturing systems enabling faster delivery schedule • Technological assistance from the USA, Germany • Overseas production • Overseas direct investment to offset increased costs from the Yen's appreciation, eases impact of export restriction measures and facilitates response to user's needs • Strenuous R&D efforts. Focus on useful product development rather than basic research • Long term commitment to increase market share on a global basis - the world as a market • Heavy investment in advanced methods of manufacture 	<p>Corporate Infrastructure/Culture</p> <ul style="list-style-type: none"> • Global strategic thinking • Superior links to outside systems (networking with customers, suppliers, distributors, trade associations, subcontractors, etc) • Innovative CNC machine tools incorporating superior CNC devices • Great value engineering efforts in designs • High rate of technological progress, willing to modernize • High level of innovation • Low cost of capital, arising out of low market rates and highly leveraged balance sheets • More market-oriented, showed a high level of commitment more flexible framework for innovation, teamwork and problem solving • A clear sense of mission to be a leader in the market

Source: Author

FIGURE 4.38 CRITICAL SUCCESS FACTORS FOR TAIWANESE MACHINE TOOL INDUSTRY

STRUCTURE

INFRASTRUCTURE

MACRO (Country)

MICRO (Company)

<p><i>Government Policies</i></p> <ul style="list-style-type: none"> • Tax exemptions • Low rate loans • Barriers to imports • Priority field selected by government for special encouragement through investment, incentives, loans and technical assistance • Taiwan's Industrial Development and Investment Centre monitors transfer of technology, trade and investment policies • Analysis of foreign machine tools • Incentives, assistance from research institutions like Metal Industrial Research Laboratories • Development of national industrial muscle • Government-industry joint development program 	<p><i>Social Infrastructure/Culture</i></p> <ul style="list-style-type: none"> • Educated workforce with strong engineering and electronics background • Low cost, skill labour • Improvement in electricity supply, industrial parks, roads and port facilities impacted favourably on the industry's cost structure • Supplier's credits to help finance purchases are done through the export-import Bank of China
<p><i>Corporate Policies</i></p> <ul style="list-style-type: none"> • Pricing policy • Flexible manufacturing systems enabling faster delivery schedules • Seeks new markets by promoting OEM exports to Europe; market product diversification strategy • Technological assistance from Japan • Seek overseas partners to enhance technological capabilities • Low-end, low-price position in international market • Strategy of producing high-end products to sidestep price-cutting competition 	<p><i>Corporate Infrastructure/Culture</i></p> <ul style="list-style-type: none"> • Global strategic thinking • Superior links to outside systems (networking with customers, suppliers, distributors, etc) • Avoid mimicing Japanese products, develop own design capabilities, promote own brand names • Significant upgrading in product quality and manufacturing technology • Stepping up development and production of automated models

Source: Author

government support. Specific programs included the provision of capital to the industry. A series of tax breaks, such as accelerated depreciation, reserve funds, and export deductions, were also instituted, which reduced the overall corporate tax rate by 20 percent. The main role of the Japanese government in the 1980s was to provide a broad 10 to 15 percent R&D subsidy to the machine tool industry (Sarathy, 1989). It reflected a conscious industry policy decision to assign the machine tool industry the role of improving the productivity of industry in general by making the core NC technology broadly available (Collins, 1988; Bessant, 1991).

By the late 1970s, Japan had become a major world producer of CNC machine tools, having gained tremendously from widespread domestic usage of these machines. The Japanese metal-cutting industries understood the concepts and applications of this technology. They provided useful feedback to the machine tool builders to upgrade machines to suit customers' needs, and to develop more advanced, versatile, flexible and highly productive machining systems (Yano Research Institute, 1981; News Digest, 1989). Japan's rise to the top position was partly due to the prolonged slump in the global economy in the 1980s, which caused considerable decline in equipment investment demand in the USA and Europe. The setback in Japan's equipment investment demand was comparatively mild, boosting the Japanese industry's relative position. Nevertheless, Japanese manufacturers held on to the commitment to develop and supply user-oriented machines.

Today, Japan has overtaken the West to lead in the production of machine tools for twelve consecutive years (the strategy of innovation, entrepreneurship, value added chain, productivity, skills, knowledge and attitude). Japan has emerged as one of the most influential suppliers of machine tools for the global market, serving the interest of the variety of users through value-oriented marketing understanding the imperative of management of technology through extensive R&D investments (Roussel et al., 1991).

The Japanese machine tool industry rose to become number one in the world by 1982, severely damaging the American machine tool industry on the way. From importing its first robots from the USA in 1967, the Japanese robotics industry had almost completely destroyed the competition and had achieved world domination just 15 years later in 1982. And with a world lead in FMS and other state-of-the-art manufacturing systems, Japanese companies like Fujitsu Fanuc, Yamazaki and Hitachi-Seiki look set to control the means of production well into the 21st century (Forester, 1993).

With reference to the Taiwanese machinery industry, it is one of the country's oldest manufacturing sectors. The Taiwan Association of Machinery Industry (Tami) was founded in 1948 and has established 13 product based committees to overseas members' activities, one of which includes machine tools. See Table 4-11. By 1988, just six products accounted for nearly half of total machinery exports. See Table 4-12.

During the 1950s and 1960s the Taiwan market for machinery, especially machine tools, grew rapidly in response to strong demand from the country's flourishing light industries. The creation in 1966 of the first export processing zone (EPZ) at Kaohsiung, and a further two in 1969, at Nantze and Taichung led many foreign multi-nationals to establish a manufacturing presence in Taiwan. This foreign investment boosted further the domestic machine tool market, as the multi-nationals equipped their plants.

On the demand side, the business environment may have been very favourable, but Taiwan's machine tool manufacturers were losing market share to imports. Japanese manufacturers in particular had been very successful in penetrating the Taiwan market.

The competitiveness of all manufacturing sectors is determined in no small part by the nature of machinery employed. There are obvious disadvantages in relying heavily on imported machine tools and the Taiwan government took decisive action. In 1969, it introduced for the first time specific measures to bolster the indigenous industry. Firstly, it erected barriers to imports. This protectionism also included reserving a specific share of the domestic market for locally manufactured machine tools. Those foreign exporters who found that their products have ceased to be competitive, could retain their share of the Taiwan market only if they established a plant in the country. However, they could only invest in Taiwan if their proposal was approved by Taiwan's Industrial Development and Investment Centre. Approval was forthcoming if the potential investor undertook to transfer technology to Taiwan and/or export the bulk of production.

Trade and investment policies were not the only means by which the Taiwan government promoted the industry. Indigenous manufacturers were all small and medium sized enterprises (SMEs) and lacked financial resources to undertake R&D to improve existing products and/or launch new models. They also had insufficient funds to undertake marketing activities (eg market research, establish better distribution

TABLE 4-11

SECTORAL DISTRIBUTION OF MEMBERS OF TAIWAN ASSOCIATION
OF MACHINERY INDUSTRY

Machine tools
Textile machinery
Foundry
Plastic and rubber processing machinery
Gears
Tools
Mould and dies
Woodworking machinery
Automatic vending machines
Electrical discharge machines
Industrial plants
Shoe making machinery
Metal forming machine tools

Source: Taiwan Association of Machinery Industry (1991)

TABLE 4-12 TAIWAN'S MACHINERY EXPORTS BY TYPE OF PRODUCT
(1986 - 1988)

Rank 1986	Rank 1987	Rank 1988	Products	1986 Value (NT\$mn)	(%)	1987 Value (NT\$mn)	(%)	1988 Value (NT\$mn)	(%)
1		1	Machine tools	9,148	15.2	10,775	14.3	12,290	13.5
2	1	2	Sewing machines	7,177	11.9	8,237	10.9	9,258	10.2
4	2	3	Wood working machinery	4,127	6.8	5,529	7.3	7,236	8.0
3	4	4	Valves	5,094	8.4	5,812	7.7	5,982	6.6
7	3	5	Rubber & plastic making machines	2,189	3.6	3,091	4.1	5,632	6.2
5	5	6	Air compressors & pumps	2,815	4.7	3,565	4.7	3,826	4.2
9	6	7	Weaving & knitting machines	1,386	2.3	2,391	3.2	2,475	2.7
6	7	8	Jacks	2,399	4.0	2,805	3.7	2,258	2.5
8	8	9	Paper making equipment	1,588	2.6	1,376	1.8	1,767	1.9
10	9	10	Agricultural machines	1,248	2.1	1,275	1.7	1,267	1.4
12	10	11	Office equipment	675	1.1	1,048	1.4	1,256	1.4
11	11	12	Food equipment	851	1.4	991	1.3	1,047	1.2
	12		Other machines	21,679	35.9	28,419	37.7	36,681	40.3
			Total exports of mechanical products	60,376	100.0	75,314	100.0	90,975	100.0

Source: The Machine Industry, Industrial Development Bureau, Ministry of Economic Affairs, Taiwan, February 1990.

channels, produce promotional materials). Industrial policy helped overcome these fundamental weaknesses.

In 1969, the government established Metal Industrial Research Laboratories (MIRL) to assist the sector's SMEs. For example, in 1976 MIRL founded a machine tool R&D centre, and it played an invaluable role in the design and manufacturing of Taiwan's first flexible manufacturing system (FMS) in 1982. Taiwan's machine tool sector remained weak though in terms of design capabilities.

In 1977, just twenty five college graduates were engaged in the design office of Taiwan's fifty six major machine tool companies. Companies still produced simpler tools such as light-duty and low-precision instruments like bench drill, belt drives lathes and shapers.

In 1987 R&D expenditure in the machinery sector as a whole amounted to US\$4.5 billion, of which private companies were responsible for 78 percent and the state the remainder. This represented 1.5 percent of the industry's total turnover, and was exactly double the 1983 share. Nevertheless, Taiwan is still lagging behind Japanese rivals in terms of commitment to R&D. In 1987 the Japanese machinery industry spent 2.8 percent of total revenue on R&D (McDermott, 1991a; 1991b).

Both the ROC government and manufacturers realize that in order to further improve quality and performance as well as to meet customer demand, value added components must be increased and innovative functions added to existing machines. One of the biggest problems ROC makers face in this endeavour is a reliance on imported CNC controller units. In order to remedy this situation, the ROC's Industrial Technology Research Institute (ITRI) is working hard to develop a Taiwan-made CNC controller unit. This is another good example of the partnership between industry and government.

Furthermore, the industry is making its own efforts to improve production efficiency and create new innovations. Towards these two ends, manufacturers are showing a strong trend toward developing in-house R&D programs. On average, a company will spend as much as 10 percent of sales on research while many in the industry are investing as much as 20 percent.

Investment is not limited only to research. Manufacturing improvements, namely automation, have seen strong investment efforts. A number of manufacturers are now in the process of building new automated factories that feature full FMS and CIM operations.

Those who purchase today's machinery are in fact purchasing an entire system that includes hardware, software, and customer support. In customer support services, Taiwan's machine tool manufacturers are also making great strides. For example, under China External Trade Development Council's (CETRA) assistance, the Taiwan Association of Machinery Industry (TAMI) will coordinate leading machinery builders in the establishment of a machine tool service center in Osaka, Japan in the near future.

In all, efforts by the industry and the government should lead to continued growth and innovation in the ROC's machine tool industry. The development of machine tools industry in Taiwan is shown in Table 4-13.

Based on an analysis of the critical success factors affecting the machine tool industry, we can translate them into today's strategic business terminologies, ie:

	STRUCTURE	INFRASTRUCTURE	
MACRO (Country)	Competitive Advantage of Nations	Value Added Chain	Porter (1985, 1990)
	Entrepreneurship	Innovation	Drucker (1985, 1993)
MICRO (Company)	Overall/Total Productivity	Attitude, Skills, Knowledge	Porter (1980, 1985)

4.4.4 The New Formula for Business Success

There are some fundamental changes in the determinants of economic strength. In the 19th and early 20th century, comparative advantage in land, people and natural resources plus technology, were the key factors in determining the economic power and success of nations. Mining technology was new. There was limited production of coal and steel. Those nations with the technology to extract coal and produce steel were the first to be industrialised. They had a tremendous economic advantage over other nations. The

TABLE 4-13 DEVELOPMENT OF MACHINE TOOLS

The machinery industry of Taiwan was established in 1945 after the Second World War. Since the foundation of industry was totally destroyed during the war time, the pace of progress had been very slow in the early years. After 1960, the government made efforts to promote the industrial policies, the machinery industry then started to grow. The stages are:

Stage 1 : Before 1950

After the Second World War, the Industry was mainly engaged in maintenance and repair for machinery equipment related to food processing industry, textile, industry, lumbering industry, etc.

Stage 2 : 1950 - 1960

The progress of the domestic machinery industry was initiated in the first Four-Year Economic Construction Project launched in 1953. At that time, most of the mechanical factories were small mills. Their major products were simple machines such as sewing machines, oil squeezers, rice mills, food processing and carpentry machines, etc.

Stage 3 : 1961 - 1973

The government considered upgrading the machinery industry as major task in development of national industrial muscle. Due to improvement in quality, domestic manufacturing machines gradually established reputation and won confidence of local users. Besides cheap price effect, the quality of domestic made machinery meet the requirements set by many developing countries. The manufacturers then started to explore the market in the Southeast Asia. And eventually the foundation of exporting machinery has been established. In the mean while, the textile industry, the chemical industry, the steel industry, the ship building industry and the automobile industry also started to boom.

Stage 4 : 1974 - 1981

Having experienced two oil crises, the machinery industry gradually realized that "low energy consumption" and "high added value" were two requirements for future products. Only by following those guides of economic progress, the mechanical industry could move forward. During this period, the machine tool and the sewing machine were the two items which had made breakthrough and gained international reputation. It indicated that the quality of domestically manufactured machines had been improved substantially. Targets of export was shifting gradually from countries in Southeast Asia to those in Europe and America.

Stage 5 : 1982 - 1991

The government targeted the machinery industry as one of the strategic industries with "The Policies for Upgrading the Machinery Industry" and offered low rate loans and tax exemptions to promote upgrading of the machinery industry.

Stage 6 : 1991 - future

With the vision towards the year 2000, Taiwan's machinery industry looks forward to a brand new era; with computer integrated manufacturing systems as production equipments, and with products of high precision and high added value.

Source: Churng, Sam and Chuang, Philips (1994), "Microelectronics-Based Factory Automation Technology of Metal-Engineering Industries for Human Resource Development in Taiwan", APEC-HURDIT Training Project for Industrial Technology - Innovation of Production Systems in Manufacturing Industry (2nd Phase), February 28th to March 4th, held at the ANA Hotel, Singapore, pp. 1 - 15.

poorer backward countries were easily defeated and conquered because of the technical inferiority of their armaments and economy.

Countries achieved greater economic power by conquering more territories and people to get more raw materials and larger markets. Great Britain became the most powerful country in the world. Through its technological advantage it gained control over more territories adding to resources and markets.

Today, people can gain access to most technology and resources. So the ownership of natural resources or commodities is of no great economic advantage. Nor is the possession of technology, unless it is very advanced and reverse engineering is not easy. In this age, technology is widely and rapidly available to those with the capacity to absorb the knowledge. And if they have this capacity, they can take the advances further on their own. However, not all sophisticated technology is easily and widely accessible.

The open trading system under the General Agreement of Tariffs and Trade (GATT) has provided an alternative route to wealth creation based on trade, investments and transfer of technology and know-how (*Business Week*, December 23, 1993).

Classical economic theories, originating from the West, are difficult to apply to Third World countries. The classical economists provided the intellectual tools of economic analysis through which contemporary public concerns could be explained. David Ricardo's theory of comparative advantage was in response to issues and difficulties faced in his time (taxes on imported grain, introduced during the Napoleonic Wars). Thomas Malthus worried about population growth. J S Mill addressed problems of income distribution. Because of their preoccupation with current issues, they had to concentrate on causes of current difficulties and the immediate consequences of policies they recommended. They took a short-term view of economic problems. When they took a long-term view, their analytical tools turned out to be inadequate. Because of their concern over immediate issues, they ignored changes or improvements in technology. Keynesian economics can be said to be an intellectual response to the depression of the 1930s when remedies based on classical economics proved unable to solve the severe problems of mass unemployment (Pugh and Garratt, 1993).

The classicists included the functions and earnings of entrepreneurs under capital. As

owners of capital, entrepreneurs know how to put capital to best use. It was only at the end of the 19th century that Alfred Marshall recognised that ownership of capital and management of an enterprise represented separate economic functions and earned incomes in different ways. So Marshall added a fourth factor of production to the classical three (land, labour, and capital). He called it "organization" (Warsh, 1993).

Marshall's organization did not take root in the academic literature. The classicists regarded paid managers (who did organization work) as a form of labour. It was left to Joseph Schumpeter to examine the functions of entrepreneurs (Warsh, 1993). Schumpeter assigned to the entrepreneur a crucial role - he was the driving force behind change. The entrepreneur introduced change through economic innovation and this took place in five ways:

- the introduction of a new product
- a new process of making old products
- finding new markets
- opening new sources of raw materials
- establishing new business organizations such as a cartel, an international agency, etc

Schumpeter focused on the dynamic process of economic growth and wealth-creation. Wealth could be created especially through the intelligent application of new technology, derived from technological innovation, which in turn is dependent upon knowledge and information, not on the possession of raw materials. For example, MNC staff in Singapore may be paid employees of headquarters. But clearly, they perform entrepreneur functions of economic innovation as defined by Schumpeter. They introduced a new product in Singapore or they open a new supply of components for their parent companies.

While some engineers perform routine operations of production and maintenance of equipment, in a rapidly change state of technology, many engineers have to apply their minds to new and better methods of producing the same article. Process engineering is something the Japanese excel in. In the fiercely competitive electronics industry, engineers have to do well in introducing better systems of production. This activity falls within the second definition of Schumpeter's economic innovation (Goh, 1991).

We can arrive at the conclusion that labour costs are neither the only, nor the most important, competitive consideration. With radical changes and improvements in technology in the information age, knowledge and entrepreneurship have become critical economic factors (Collins and Lazier, 1992). One branch of economics, human capital development, has treated knowledge and its acquisition as an economic variable reacting to market forces (Drucker, 1993), See Table 4-14 for details.

Today, the dynamism of the society - the energy, creativity, and drive of the people - is one major factor affecting long-term growth. Adam Smith did attribute progress and economic growth to the "animal spirits" of the entrepreneurs. We need this X-factor - that intangible human quality which drives people (Lee, 1991).

The classical formula for Business Success (in Annex 1 of Chapter 1) is:

Competitive Advantage of Nations	+ Value Added Chain	= Competitive Advantage of Individual Companies
Factor Inputs into Cost Advantage	+ Brain Power into Value Advantage	= Profit/Market Share into Business Success
Productivity	+ Intelligence	= Competitive Advantage
Economic Success	+ Marketing Success	= Business Success

The aforesaid equations are derived from classical economic theories.

The new/modern formula for *Competitive Success* (ie Competitive Advantage of Individual Business) expands the concept of economic success to incorporate new elements like:

- Entrepreneurship
- Overall productivity of the 5Ms (with growing importance of knowledge and technology)

TABLE 4-14 EVOLUTION OF BASIC FACTORS OF PRODUCTION

	Industrial Revolution 1750s - 1880s	Productivity Revolution 1880s - 1950s	Management Revolution 1950s - 1990s	Post-Capitalist Society 1990s onward
Basic factors of Production	Land, Labour and Capital	Land, Labour and Capital	Knowledge	Highly Specialised "Knowledge"
Classes	Capitalist and Worker/ Proletarian	Middle class Bourgeois	Professional Managers and Employees	Knowledge Specialists versus Service Workers
Application of Knowledge	Tools	Works-Work Studies	Knowledge	Productivity of Knowledge

Source: Compiled from Drucker, Peter F. (1993), Post-Capitalist Society. Butterworth-Heinemann, Oxford.

- Other factors (eg competitive cooperation among nations within regions, economic blocs, strategic alliances, AFTA, ASEAN)

Economists like Schumpeter assigned to entrepreneurs a crucial role in creating the wealth of nations (Drucker, 1985; Pinchot, 1985; Warsh, 1993). The best features of developed and developing countries on the world competitiveness scoreboard give a range of economic determinants of wealth (see Table 4-15). In line with fundamental economic changes, the foundation of *Economic Success* has to be re-examined and reformulated:

$$\text{Competitive Advantage of Nations} + \text{Value Added Chain} = \text{Competitive Advantage of Individual Companies} \dots\dots\dots(1)$$

$$\text{Entrepreneurship} + \text{Innovation} = \text{Competitive Advantage of Individual Companies} \dots\dots\dots(2)$$

$$\text{Productivity of 5Ms} + \text{Skills, Knowledge, Attitude} = \text{Competitive Advantage of Individual Companies} \dots\dots\dots(3)$$

In effect, the synergy in the three equations can be represented by a wholistic equation:

$$\text{Economic Success} + \text{Marketing Success} = \text{Competitive Success} \dots\dots\dots(4)$$

The logic of Abernathy et al's framework can be fitted into the above equations. To recapitulate, see Figure below:

	STRUCTURE	INFRASTRUCTURE
MACRO (Country)	Competitive Advantage of Nations	Value Added Chain
	Entrepreneurship	Innovation
MICRO (Company)	Overall/Total Productivity	Skills, Knowledge, Attitude

TABLE 4-15 WORLD COMPETITIVENESS SCOREBOARD (COMPUTED ON THE BASIS OF 326 CRITERIA)

Developed Countries	Best Features
Japan	• R&D
Switzerland	• Political stability
USA	• Market orientation
West Germany	• International orientation
Canada	• Natural resources

Developing Countries	Best Features
Singapore	• International orientation
Taiwan	• R&D
Hong Kong	• Market orientation
South Korea	• Economic growth
Malaysia	• Natural resources

Footnote:

Japan, Switzerland and America came top of a survey of international competitiveness carried out by IMD, a Swiss management school. Singapore was the favourite among developing nations. To arrive at its overall rankings, the survey combined assessments of national qualities ranging from education and research to market regulation.

Source: IMD (*Economist*, June 23, 1990, pp. 60).

A trade deficit, by itself, says nothing about a country's competitiveness (Porter and Montgomery, 1991). This requires deeper examination. America's businesses (eg cars and futuristic industries from biotechnology to virtual reality) are looking stronger than they have for a decade. Many businessmen reckoned there is more to it than just the economic cycle. The new formula for competitive success could be used to analyse the increasing competitiveness of American international businesses:

- ***Competitive Advantage of Nations*** (details given in Annex 1)

In the automobile industry, Chrysler had introduced five basic chassis designs since 1992. Ford and General Motors are trimming out new models at an unprecedented pace. European companies such as Fiat, Volvo and Volkswagen, which have been relatively shielded from Japanese competition, look even weaker. It is predicted that Detroit's share of the American market may climb back to 75 percent of 1994 against just over 70 percent in 1991.

The USA is open not only to competition but also to people from overseas. Skilled immigrants from Europe and Asia have played a big part in building many of America's high-tech industries. An estimated one third of the engineers in Silicon Valley were born in Asia. Growing numbers of these Chinese, Korean and Indian engineers are now establishing their own companies in California with the help of financial aids from family and contacts abroad. If such companies succeed, they will help keep America competitive (Forester, 1993).

- ***Value Added Chain*** (details given in Annex 1)

"Value added" is a measure of the company's output, calculated by subtracting all bought-in inputs from turnover. This can be thought of as value added for the company and the economy in general. Tully (1993) suggested that Economic Value Added (EVA) is another way of measuring an operation's real profitability. EVA takes into account a factor no conventional measure includes - the total of the operation's capital. (The capital is all the money tied up in such things as heavy equipment, real estate, computers, and other stuff that is expected to be productive for a while after it has been purchased, plus so-called working capital, mainly cash, inventories and receivables). EVA is simply after-tax operating profit, a widely used measure, minus the total annual cost of capital. The power of the EVA concept is to analyse if an operation is really creating value by applying the *true* cost of capital to *all* the capital employed. For

example, EVA will go up if the return on capital is enhanced through - earn more profit without using more capital; use less capital; invest capital in high-return projects. However, the thesis will not dwell on the methods of measuring value added but the relevance of it to reflect the performance of a company.

Davis, et al (1991) and Kay (1993) contended that the best measure of corporate quality is "added-value". According to them "added-value" is different from "value added" of value added tax, which is a measure of the company's output, calculated by subtracting all bought-in inputs from turnover. Their meaning of "added-value" is value added for the shareholders, ie the traditional version of value added for the economy generally. It measures how much more a company's output is worth than all its inputs of materials, labour and capital (*Economist*, September 7, 1991).

Japan is the supplier of substantial quantities of products that form the basic core of the US manufacturing industry, ie capital goods which are indispensable for the production of quality finished products. And unless the USA learns to manufacture such products in its own factories, Japan will continue to be locked into the current one-way flow of commerce. Included in this category of capital goods are CNC machine tools. In US-bound Japanese exports, machine tools now account for two times as much as consumables as an efficient machine tool sector is of vital strategic importance to any economy which aims to maintain a vibrant industrial base (Young, 1991). This would lead to dire consequences.

Outstanding American cars such as the Neon and Taurus, which are poised to outdo Japanese cars and even make a foray into the Japanese market, could not have been made without the use of Japan-made precision CNC machine tools for moulds and dies on which the very basic of modern car production depends. Detroit (USA) totally relies on the turnkey offer of a whole package of production know-how from Japan, including education in equipment operation (Ishihara, 1994). The present state of worldwide economic interdependence, not limited to Japan-US relations, is thus one in which Japan provides much of the technology necessary for the production of superior industrial products, while the maker of the finished product takes the value added.

The author adopts Porter's value added chain in his value added concept where all the functional activities of the company responsible for enhancing the value towards

the end-product, ie from raw materials to maintaining the loyalty of a customer resulting in repeat orders. The appropriate value chain diagram adapted from Porter (1985) is shown in Figure 4.39. It is the chain of relationships through value added manufacturing, value added marketing and sales, value added sourcing, value added logistics, value added services, etc to achieve synergies for profitability and market share (the prime objective of sustainable competitive advantage). Hence, value added chain for an individual company must be combined with the competitive advantage of nation (where the company manufactures its products) in pursuit of competitive success (the algorithm of six variables).

- ***Entrepreneurship***

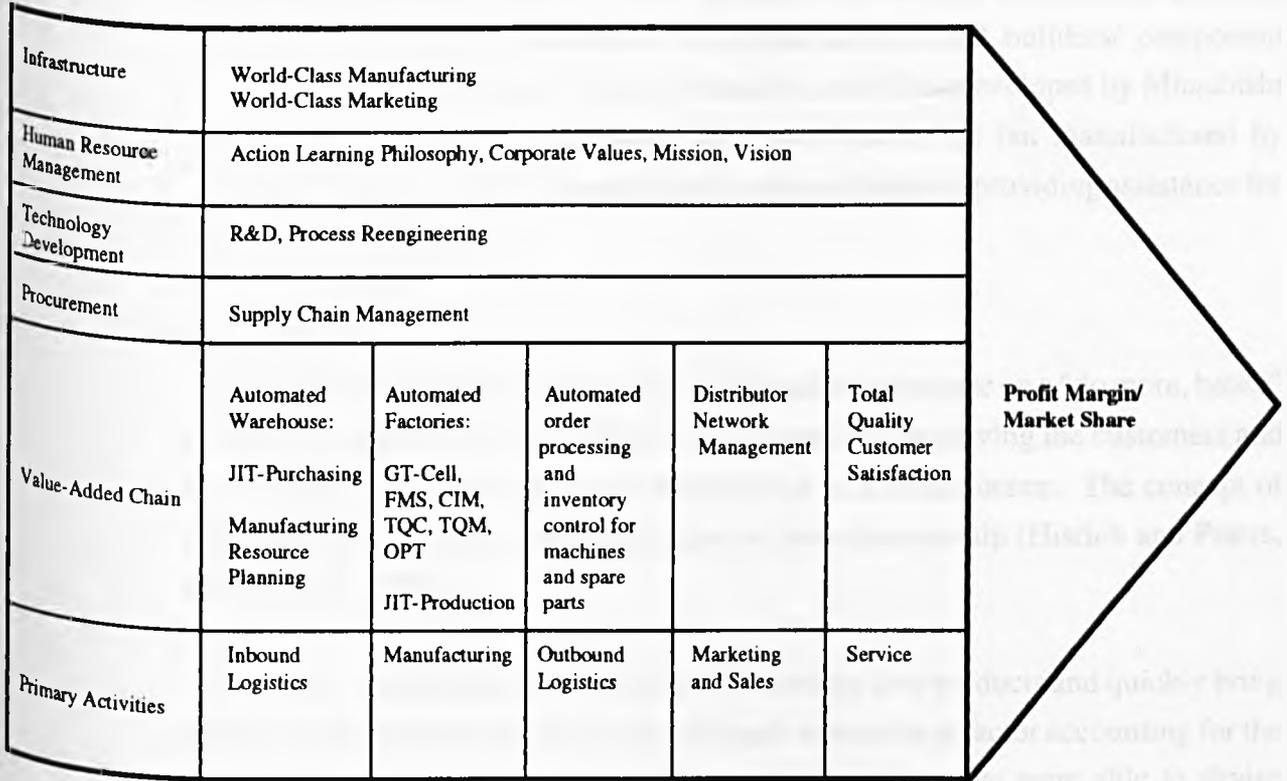
Entrepreneurship is the attempt to create value through recognition of business opportunity, the management of risk-taking appropriate to the opportunity and through the communicative and management skills necessary to mobilize human, financial and material resources to bring a project to fruition (Kao, 1991; 1993).

Many American companies had taken advantage of market opportunities and trade liberalization abroad (eg 3M, Procter and Gamble, General Electric, Coca-Cola, Pepsi Cola, McDonald's, CPC International, AT&T).

Young companies such as Federal Express (which pioneered the overnight-delivery business), Microsoft (computer software), and McCaw Cellular (wireless telephone) have created lucrative and wholesome industries. Many big companies have woken up to entrepreneurial management and set out to behave more like small companies, ie iron-out all the "red tapes" (Arkebauer, 1993). That means basing their strategies on real-time market opportunities rather than their existing resources (Perry, et al 1993). Thus, AT&T has ventured into new businesses, such as multimedia, by building alliances with tiny Californian high-tech companies. As for the machine tool industry, cooperation between manufacturers makes sense and holds promise in several ways:

- cooperation between competitors in particular fields for particular components of automation (eg Mori Seiki with OKK for machining centers because of the latter's know-how)
- cooperation between non-competitors, both horizontal cooperation and vertical

FIGURE 4.39 VALUE ADDED CHAIN OF INDIVIDUAL COMPANY



Source: Adapted from Porter, Michael E. (1985), Competitive Advantage: Creating and Sustaining Superior Performance, The Free Press, pp. 37.

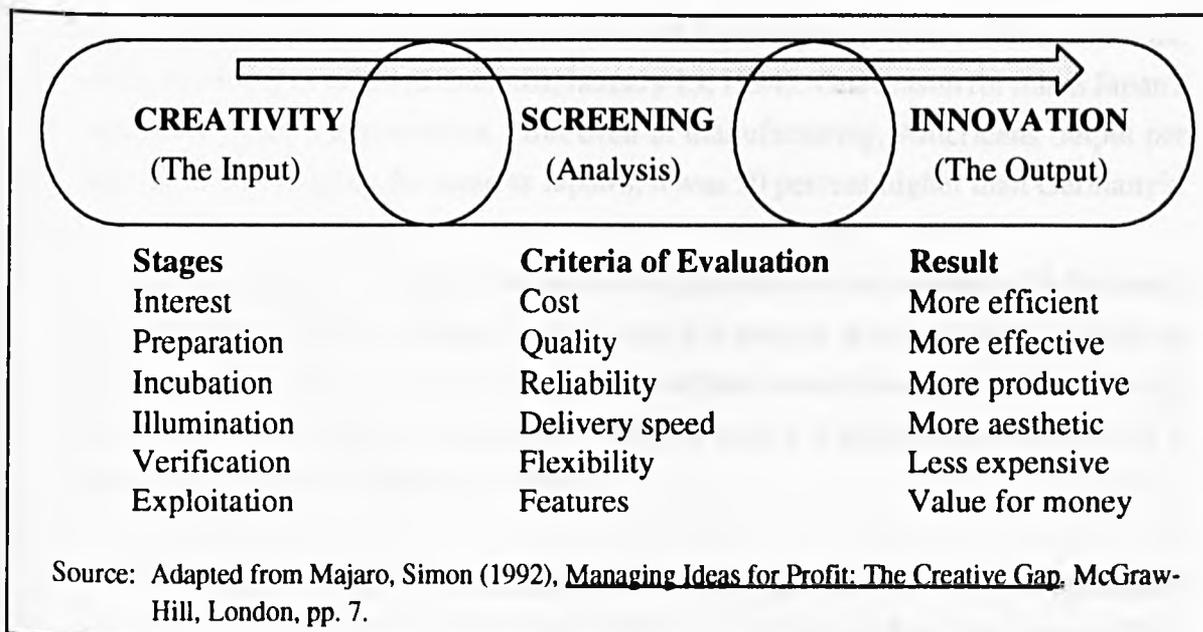
cooperation. An example of horizontal cooperation between manufacturers of different machine tool types is Okuma with Amada in the development of "Integrated Die-Manufacturing System". An example of vertical cooperation amongst computer manufacturers/software suppliers/machine tool builders/ component manufacturers is the case Yamazaki-Mazak's controllers developed by Mitsubishi solely for them; Okuma developed their own controllers but manufactured by National Panasonic with Universities of Osaka and Hokaido providing assistance for software development.

• ***Innovation***

Ohmae (1994) argues that it is no longer affordable to compete on a "do more, better" basis - innovation is the only effective way to succeed by serving the customers and the company, and knocking out the competition as a consequence. The concept of innovation and newness is an integral part of entrepreneurship (Hisrich and Peters, 1992; Farrell, 1993).

The ability to innovate and transfer new technology into products and quickly bring them onto the market place is perhaps the single most critical factor accounting for the success of high-tech companies (Ferdows, 1989). Those that were able to devise strategies to deal with shortening product life cycles, competition, difficulty in maintaining leading-edge technology and securing growth capital moved quickly from success to "super-success" (Roberts, 1993). For example, liquid crystal was originally developed by an American company but, once developed, was quickly abandoned. Japanese manufacturers of calculators and watches saw a future in the technology, which they eventually developed into an entire liquid-crystal production system (Robock, 1993). West (1992) recognised that different levels of energy and innovation in business would ultimately determine the balance of trade.

The relationship between creativity and innovation is depicted as follows:



Thousands of American companies, both big and small, remain among the most competitive and innovative in the world (Porter, 1992). American companies lead in a slew of technology-based industries such as computer software and hardware of all types, microprocessor chips, aerospace, pharmaceuticals, biotechnology, new materials energy and environmental control (eg General Electric, Microsoft, Apple, Motorola, Cypress Semiconductor, Intel, Cray Computer, Compaq, Exxon, Dow, Merck, Eli Lilly, Bristol-Myers Squibb, etc).

When the Japanese government's Economic Planning Agency surveyed 110 critical technologies in 1991, it concluded that American companies dominated 43 of them, Japanese companies 33, while European and others the remaining 34. Clearly, American companies continue to lead in innovation. However, if the company is only innovative but lack entrepreneurship or low in productivity then it will be less competitive than the one that has both advantages (Buckley and Casson, 1992). Thus, the logic of the argument is captured in equations (1) to (3) to arrive at the generic equation (4).

• **Productivity**

America is actually one of the industrial world's cheapest producers of many goods (*Economist*, January 23, 1992). This is partly due to the cheap dollar, which has fallen by half from its 1985 value against the Japanese Yen and the Deutsemark. America has the highest level of productivity amongst the big OECD economies. In the mid-

1980s America produced almost twice as much for every man-hour worked across the entire economy as Japan (*Economist*, January 15, 1994). One reason for this is Japan's notoriously inefficient services. But even in manufacturing, Americans output per man-hour was roughly the same as Japan's; it was 50 percent higher than Germany's.

American unit-labour costs in manufacturing declined by an average of 6.4 percent a year in 1985 to 1993 compared with a rise of 6.6 percent in Japan and 4.2 percent in Germany. American exports during the period shot ahead, rising, in volume, by an annual average of 8.6 percent; Japan managed only 2.3 percent and Germany 1.7 percent (*Economist*, January 15, 1994).

For example, Caterpillar remains the world's leading maker of heavy-construction equipment. It now turns out a new tractor in six days rather than twenty-five. McDonald's reduced the cost of opening a restaurant from US\$1.6 million to US\$1.0 million. Remorseless pruning at 3M had helped sales of their office-supplies group to double over 10 years while the workforce had stayed almost constant.

One worry is that businesses may be investing too little in new capital equipment. By the third quarter of 1993, American business was investing the equivalent of about 11.5 percent of its GDP; Japan managed nearly 19 percent (*Economist*, January 15, 1994). The Japanese invested heavily in labour-saving machinery (automation) because of their fear about a labour shortage, now and in the future.

Productivity is one of the key elements of competitive advantage. It must work in tandem with other vital elements like innovation, entrepreneurship, skills, knowledge, and attitude, etc to produce synergistic effect for sustainable competitive advantage.

Productivity at New United Motors Manufacturing, Inc. (NUMMI) was found to be around 40 percent higher than traditional General Motors (GM) plants in the USA. This success was possible even though the level of automation at NUMMI was considered mid-range when compared with GM's latest technology. NUMMI's success was attributed to sound management principles and to the use of the team concept (Krafcik, 1988). Thus productivity improvements can be achieved by either lean production and/or automation. Superior management of people and of technology resources was the key to manufacturing success (Forester, 1993).

• **Skills, Knowledge, Attitude**

In today's manufacturing, knowledge, skills and attitude of workers can have a critical impact on the bottom-line of business. Individual performance is a function of the three attributes, ie:

$$\begin{aligned} \text{Performance} &= f(\text{knowledge} + \text{skills} + \text{attitude}) \\ &= f(\text{ability} + \text{willingness}) \\ &= f(\text{"Can Do"} + \text{"Want To"}) \end{aligned}$$

Factories can be modernized, equipment updated and plants replaced. However, obsolete attitudes, fixed ideas and antiquated notions sap the vitality of the corporations. Workers with competitive baggages suitable for the historical environment no longer can find a fit in today's shifting milieu. Corporations could no longer plod along historical tracks. Archaic paradigm cannot offer solutions to present-day ills. The past is no longer a guide to the future. Lethargic and slothful workers make a factory fail. Positive attitude and enthusiasm make a difference. Soichiro Honda and his assistants adapted and improved even the modern machine tools he purchased from the West to make machines that would in turn make better motorcycles (Benjamin, 1993). Effective, efficient and educated workers can make a difference to the performance and the output of the factory (*Economist*, October 3, 1992). Competitiveness increasingly depends on how work is organised and on the education and skills of the workers (*Financial Times*, November 30, 1993). The skills of the workforce is going to be the key competitive advantages in the 21st century. Skilled people are the only suitable advantage (Ayres, 1991; Ali, 1992).

One big concern of the Americans is in education. Non-Americans now take 40 percent of the doctorates awarded in science and engineering each year. The teaching of basic science to American children is increasingly inadequate. Though it still has one of the best university systems in world, basic skills such as reading and writing have declined sharply among shopfloor workers. It would be difficult to tap and build the innovative potential of those nearest the work process, acknowledged as one prime mover in the competitive process.

Barro and Katz (1992) stressed the importance of improving human capital (ie a better-educated, better trained work force to lift a nation's grow rate) because human

capital can be important for R&D and for adapting technologies from other countries. They concluded that an improved work force is often accompanied by increased physical investment by business, which helps spur productivity and growth.

Economists have seen the link between knowledge and growth. Theodore Shultz won the Nobel Prize for his contribution in this field and a branch of study which can be called the *Economics of Education* grew as a sub-discipline. Knowledge clearly did play a critical role in the ascent of the four dragons' economies because in competitive exporting, success often depends on having and using the right blend/kind of knowledge (Goh, 1992).

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4.5 Competitive Strategy for Regionalization by Japanese and Taiwanese Machine Tool Manufacturers

Machine tools have always been a highly international business for world-class companies tended to export a substantial share (about 50 percent) of production. However, the bulk of this trade takes place in highly differentiated products/markets which means that most machine tool manufacturers actually operate in conditions of oligopolistic competition. In the global arena, the leading Japanese machine tool builders have a competitive edge in terms of price, shorter delivery schedule, more advanced CNC systems and updated software functions.

The competitive priorities for world-class manufacturing companies in different countries are:

Competitive Priorities (the ability to provide)			
Priority	Europe	North America	Japan/Taiwan
1.	• Consistent quality	• Consistent Quality	• Low prices
2.	• High-performance products	• High-performance products	• Rapid design changes
3.	• Dependable delivery	• Dependable delivery	• Consistent quality
4.	• Fast delivery	• Low prices	• Dependable delivery
5.	• Low prices	• Fast delivery	• Rapid volume changes
6.	• Rapid design changes	• Rapid design changes	• High-performance products
7.	• After-sales service	• After-sales service	• Fast delivery
8.	• Rapid volume changes	• Rapid volume changes	• After-sales service

Source: Corbett, Lawrence M. (1992), "Delivery Windows: A New View on Improving Manufacturing Flexibility and On-Time Delivery Performance", *Production and Inventory Management Journal*, Vol. 33, No. 22, pp. 75.

In a recent report by *American Machinist* (August 1991), there were eleven Japanese companies in the list of the top twenty producers in 1990, ranked by volume of world-wide sales of machine tools. The top five companies were all Japanese ranked in descending order:

- | | |
|---------------------|---------------------|
| • Amada Co Ltd | (US\$1,207 million) |
| • Yamazaki-Mazak | (US\$1,150 million) |
| • Fanuc Ltd | (US\$1,101 million) |
| • Okuma Corporation | (US\$ 886 million) |
| • Mori Seiki | (US\$ 810 million) |

In 1993, of the over top five hundred CNC machine tool manufacturers in the world, twenty-five Japanese machine tool producers were world-class companies (*Metalworking Engineering and Marketing*, First Quarter, 1994). Japan was both the largest producer and consumer of machine tools in 1992. Its production was US\$8.67 billion and its consumption (production plus imports less exports) was US\$5.68 billion.

Undoubtedly, Japan is a major exporter of machine tools. In terms of machine tool production, it is the number one in the world. Japan's leadership position can be traced to the oil crisis in the 1970s where circumstances forced the nation to look into productivity and flexibility. Further, the Japanese government was actively promoting these machines and allocated funds for R&D. These machines were also aggressively marketed overseas. Hence, economies of scale was achieved through sales volume. Until recently, Japanese machines could also be marketed at a competitive price (the strategy was one of cost leadership).

Japan's machine tool industry is made up of a cluster of small enterprises. According to JMTBA (1993), eighty two of its one hundred and fourteen member companies had less than 300 workers involved exclusively in machine tool manufacturing. The seven most outstanding public listed CNC machine tool builders from Japan are Okuma, Mori Seiki, Hitachi-Seiki, Toyota, Makino, Toshiba and OKK (see Figure 4.40). Yamazaki-Mazak is a private company.

Japanese technological standards have improved rapidly in the last decade or so. Though the Americans invented the microchip, they are falling behind the Japanese in electronics in particular, and research in general (*Financial Times*, March 2, 1994). Japan is the leader in electronics products and it has many subsidiaries operating in the ASEAN region. Many of their CNC machines and technological know-how have been transferred to their factories in

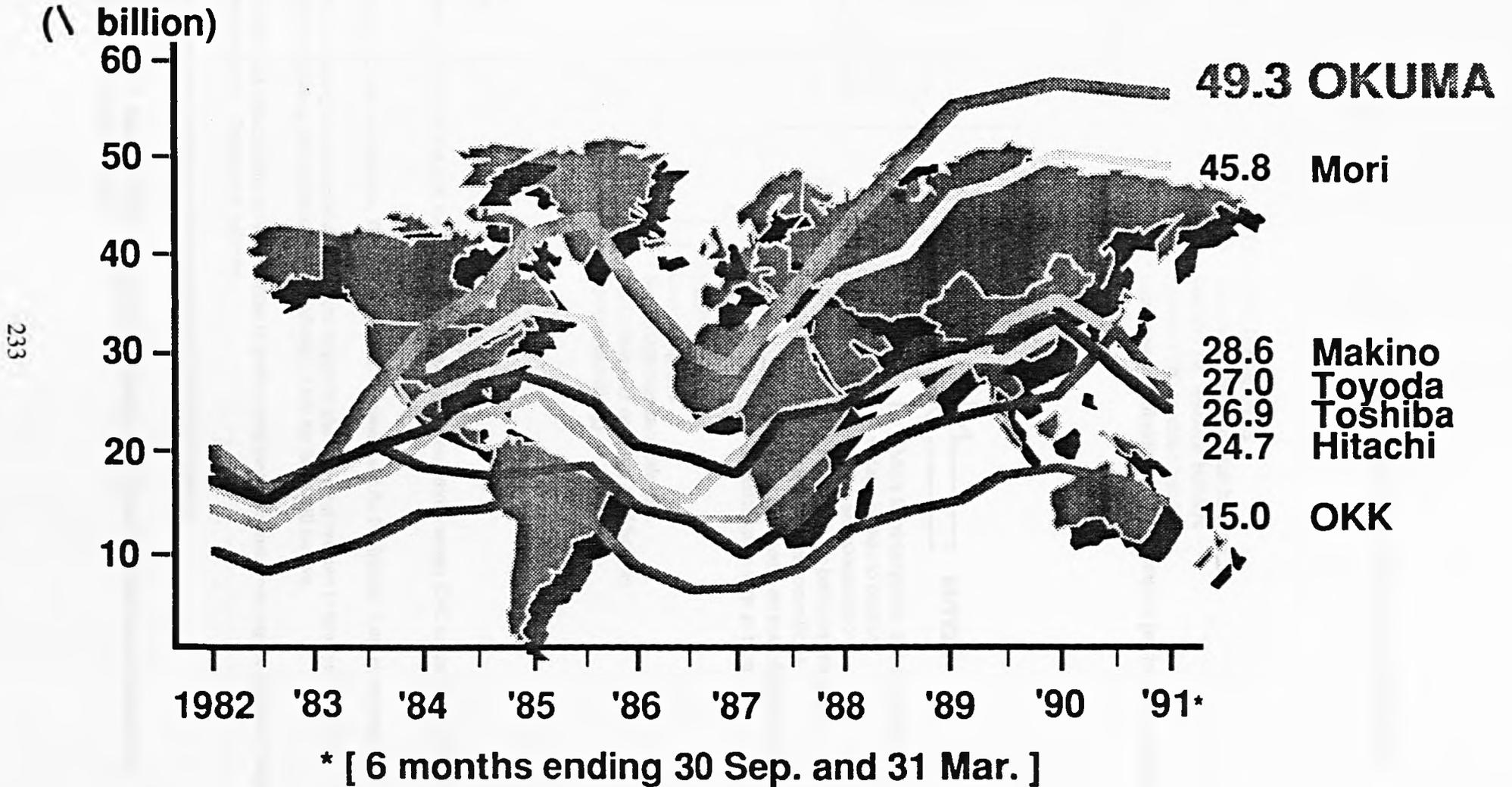
the region. Therefore, most companies prefer Japanese CNC machines because of the availability of technology to meet their product specifications. Japanese machine tool builders upgrade their CNC controllers every year and have been proven to be technologically more advanced than those from the West. This explains why there are fewer leaders of CNC machine tool builders from the USA, UK, Switzerland and West Germany because of their uncompetitiveness. It is also noted that 80 percent of their controllers are supplied by Japanese computer manufacturers and/or through some sort of a collaboration (*Financial Times*, May 6, 1992). For example, Okuma's controllers in the USA market are manufactured by Allen Bradley and Fanuc's controllers are manufactured by General Electric.

The Japanese, already dominating the US and European markets for high value added machines, have sequentially targeted the ASEAN market. This strategy is based on the insight that the rate of adoption of technological innovation for such high-tech/high-investment products in ASEAN countries is slow as compared to the industrialised countries of the West. Having produced in volumes, thereby reaping the economies of scale, the Japanese are then able to penetrate the ASEAN market by a low pricing strategy (cost leadership). Further, they are also able to cross-subsidise their market penetration. They are focusing increasingly on the lucrative high end of the market and are confidently erecting barriers to their competitors.

Particulars of every end-user and their products must be declared to the Ministry of International Trade and Industry (MITI) in Japan. The Japanese government will then permit the export of CNC machines. Japan is governed by the COCOM (The Co-ordinating Committee for Export to Communist Area) regulations and cannot freely export high technology products (eg CNC machines, sophisticated high-powered computer systems, etc) to communist countries to pre-empt the use in building ordnance/munitions products. After World War II, Japan barred the export of any military equipment or technology, but made an exception for technology transfers to the USA under a 1983 accord. Competitive forces driving industry competition in the ASEAN region is shown in Figure 4.41.

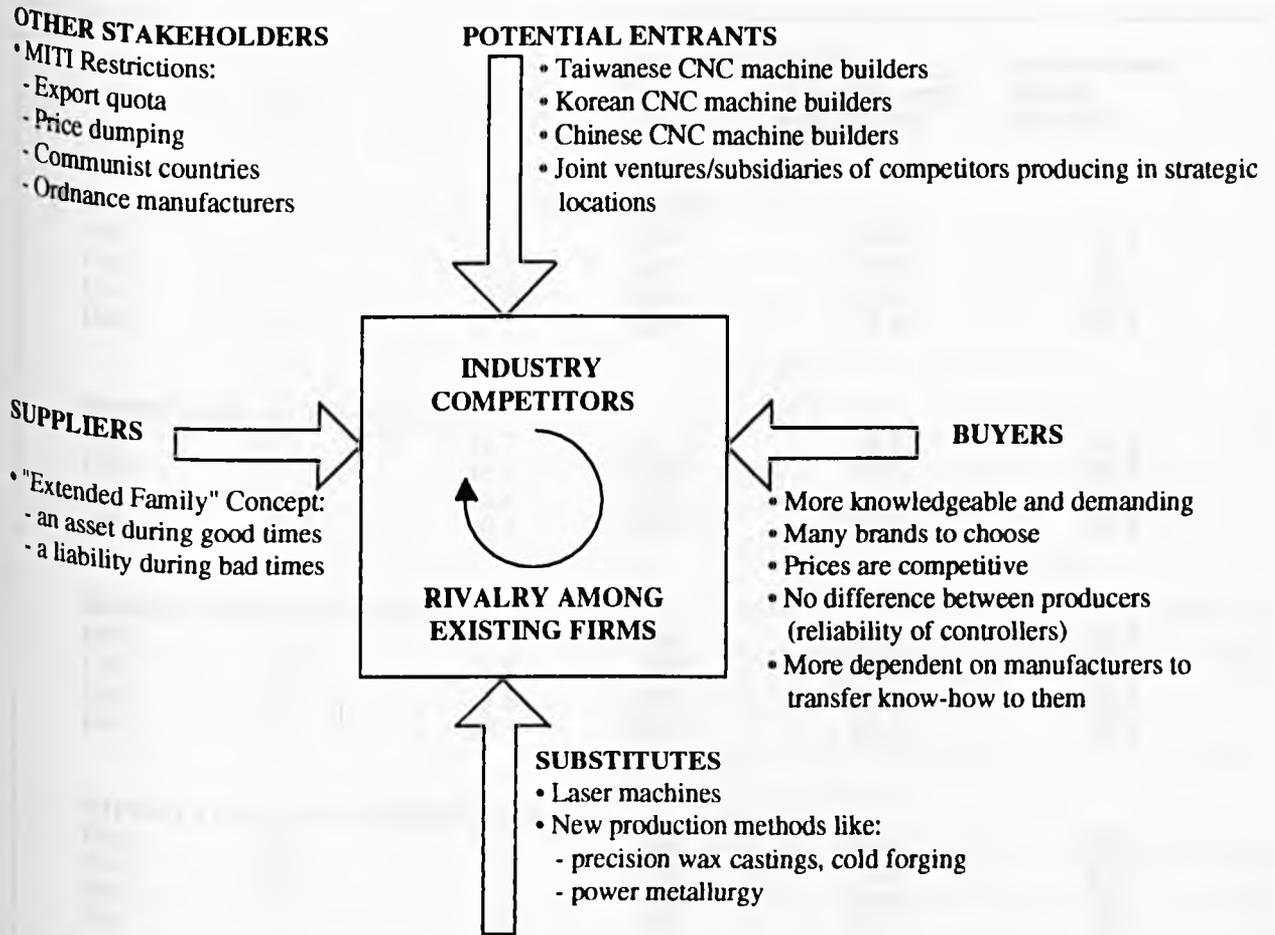
After World War II, some 40,000 used machine tools were shipped to China and Southeast Asia to assist their industrial revival (Vogel, 1985). Particularly in the last decade, economic growth in the ASEAN region had been significant. Along with the driving pace of economic development, there had been increasing demands for machine tools. Manufacturers want machine tools quickly when an economy is on the upswing (see Table 4-16).

FIGURE 4.40 ORDERS FOR SEVEN MAJOR JAPAN MACHINE TOOL BUILDERS



Source: Nikkei Shimbun (1982 to 1992)

FIGURE 4.41 FORCES DRIVING INDUSTRY COMPETITION IN ASEAN REGION



Footnote:

Industrial Competitors

- Industrial growth rates have slowed down for the USA, Europe, and Japan. Competition among CNC machine tool producers is more intense.
- Attractive industrial growth rates for Malaysia, Thailand, Singapore, Indonesia, and the Philippines. Lure more competitors.
- Competitors are reducing selling price and providing financial incentives plan (payment over two to three years). CNC machine tool business is becoming less lucrative (low profitability). Only the fittest will survive.
- Yamazaki-Mazak, Mori Seiki, Hitachi-Seiki have capabilities to produce own controllers and promoting the slogan of "single source for machine and control". Others have followed.
- Major competitors already set-up technical centres/manufacturing facilities in Singapore.

Source: Adapted from Porter, Michael (1980), Competitive Strategy: Techniques for Analysing Industries and Competitors, The Free Press, pp. 4.

TABLE 4-16 CONTINUED GROWTH OF MANUFACTURED IMPORTS FROM ASEAN COUNTRIES TO JAPAN

	Total imports		Manufactured imports		Manufactured
	Value (US\$mil)	% increase over previous year	Value (US\$mil)	% increase over previous year	imports ratio (%)
IMPORTS FROM THE FIVE ASEAN COUNTRIES					
1988	21,342	16.0	4,592	48.9	21.5
1989	24,722	15.8	6,648	44.8	26.9
1990	27,998	13.3	7,648	15.0	27.3
1991	30,279	8.1	9,604	25.6	31.7
IMPORTS FROM INDONESIA					
1988	9,497	12.7	1,357	38.3	14.3
1989	11,021	16.1	2,168	59.7	19.7
1990	12,721	15.4	1,984	-8.5	15.6
1991	12,770	0.4	2,150	8.4	16.8
IMPORTS FROM MALAYSIA					
1988	4,710	-1.3	604	40.3	12.8
1989	5,107	8.4	768	27.2	15.0
1990	5,402	5.8	1,090	41.9	20.2
1991	6,471	19.8	1,823	67.3	39.5
IMPORTS FROM THE PHILIPPINES					
1988	2,044	51.1	547	95.4	26.7
1989	2,059	0.7	560	2.4	27.2
1990	2,157	4.7	765	36.6	35.5
1991	2,351	9.0	930	21.6	39.5
IMPORTS FROM SINGAPORE					
1988	2,339	14.2	1,187	37.6	50.8
1989	2,952	26.2	1,648	38.8	55.8
1990	3,571	21.0	1,816	10.2	50.9
1991	3,414	-4.4	1,980	9.0	58.0
IMPORTS FROM THAILAND					
1988	2,751	53.2	897	69.7	32.6
1989	3,583	30.2	1,504	67.6	42.0
1990	4,147	15.8	1,993	32.6	48.1
1991	5,252	26.6	2,721	36.5	51.8

Source: Asia Pacific Metalworking Equipment News, July 1992, pp. 19.

The increasingly acute labour shortage situation in the ASEAN countries led to a loss of flexibility in production resulting in lowered ability to respond to continuously changing market requirements. With the rapid spiral increase in labour and employment related costs experienced by the NIEs, the benefits of higher productivity and the achievement of quality output have outweighed the higher capital and financing costs of using CNC machines. It created the demand for CNC machines because of its cost effectiveness and flexibility. CNC machines produce high value added parts and the return-on-investment can be recovered within two to three years which makes it an attractive financial proposition because customers can maintain high quality while increasing their return on investment. There was a surge in demand for machine tools in the 1980s as MNCs began to shift their operations to ASEAN, bringing with them the purchasing power to buy the state-of-the-art technology. MNCs had adapted to the CNC machine tool applications in a large way. As the life cycle of high technology products was relatively short a wider variety of types of products is required. The manufacturing process had to be flexible as customers must be able to quickly respond to market requirements and CNC machine tools met this criterion. These ASEAN countries adopted the strategy of attracting MNCs from the developed countries by providing ideal investment conditions. These were the countries with the most vibrant manufacturing activities. They were in the process of improving their industrial infrastructure with the transition into technology and capital-intensive production. They became export oriented.

In the 1980s, when Makino developed its first CNC machining centre for application in the ASEAN region, it targeted at users who were mainly using conventional machines. The advantage of CNC machines at that time was to increase the scope of manufacturing complex jobs, improve quality repeatability and shorten the batch production delivery time. Besides supplying the equipment, Makino also provided application support and advised customers' on the application of cutting method and programming. In the early days, the performance of the machining centre was not critical in terms of speed and features. But when the product turn-around became more frequent and volume increased, Makino had to adjust their design criteria to match the changed market demand. Makino went into the development of high performance machining centre. It offers high speed quick acceleration and fast processing CNC control.

In ASEAN, there are no trade barriers. Hence, Japanese machine tool producers have captured more than 65 percent of the CNC machine tool market due to their price competitiveness and reliability (*Asia Pacific Metalworking Equipment News*, July, 1993). Imported CNC machines are taxable (about 45 percent of the total sales value) in ASEAN

countries, except for Singapore and Malaysia. Nevertheless, the local distributors could under-value the purchase to reduce the extra cost to be incurred by the end-users due to the import duty.

Among the ASEAN countries, Singapore and Malaysia require an import licence for CNC machines for fear that they will be re-exported to communist countries. The marketing and sales of CNC machines in the region was marked by intense price wars, shakeouts, restructuring of the economy in the respective ASEAN countries (in particular, during the 1985/86 recession), and the consolidation of position among the survivors. During this period, every competitor was at risk, even large established competitors. Low cost players like the Taiwanese CNC machine tool builders shattered profitability at the expense of market share, even though they might have captured 10 to 15 percent of the initial market. A most attractive business became very unattractive because competition became irrational (eg to allow users to utilise machine(s) with only 10 percent down payment and to stretch the credit on payment). Competitors flocked to the same markets and cross-subsidies unwound. Most machine tool builders narrowed their product range to produce standard CNC machines to obtain economies of scale to achieve cost leadership while maintaining quality. Flexibility in the business strategy and in pricing was the key to survival.

After years of intense competition in ASEAN, the situation changed dramatically in 1986 (due to the world recession). Weaker players, like the less established Taiwanese, Korean and even Japanese CNC machine tool builders, were liquidated. Large and established competitors had cut costs and developed new products and improved services. Competition shifted away from purely price-based behaviour. With the increase of Japanese FDI in ASEAN, business opportunities arose for leading Japanese machine tool companies to make it big and better once again in the region. (For example, with the return of Yamazaki-Mazak in early 1989 after their distributor for ASEAN market went into liquidation in 1986 with a debt of S\$7 million.)

4.5.1 The Three World-Class Japanese Machine Tool Producers in the ASEAN Market

With the increasing but selective demand for CNC machine tools in ASEAN, more and more major machine tool builders are setting up high quality marketing and service centres in the region. The preferred choice for centralised management operations is Singapore because of its infrastructure and relatively low-risk rating (*Business Times*, March 13, 1993). Due to the highly technical nature and peculiar nuances of marketing CNC machine tools and the exacting demand for after-sales service, these centres are

being established with emphasis on technical support and training. This is a reflection of the fact that the industrial marketing of CNC machine tools is not exactly comparable to marketing consumer products. CNC users need access to expertise in training, back-up service, machining application know-how and the like. In the CNC machine tool business, it is a question of what is the most appropriate technology and degree of flexibility required by customers which characterise organization buying behaviour. It is a race towards establishing and expanding corporate technology with the goal of carving a market share. It evolves on two bases:

- whether the machine tool producer has the conviction to physically establish a technical presence in the region
- whether the machine tool producer has the world-class technology the customer requires

In Singapore, Yamazaki-Mazak initially operated an office which was its regional marketing and technical support centre. In September 1989, Yamazaki expanded its Singapore activities to include plans to manufacture parts locally and to set up an R&D Centre. It puts in an investment of S\$36.5 million in a fully automated factory, its first Asian plant outside of Japan. The 15,000 square metres CIM factory started operations on 9 May 1992 and its R&D Centre is linked via satellite to Yamazaki's five other R&D Centres around the world (ie in Japan, UK, USA, Germany and China).

Mori Seiki has established a training and after-sales service centre in Singapore. It is promoting Mori Seiki products more directly throughout in ASEAN region. It is a leader in factory automation and computer integrated manufacturing technology. Officially opened on 8 March 1990, the new office occupies a land area of 10,000 square metres. Headed by a Japanese General Manager, the staff comprise of four Japanese and four locals.

For Okuma, market analysis in 1987 had indicated that exports to the USA and Europe would decline due to the voluntary restriction agreement (VRA) export scheme. Okuma thus focused on the Asia Pacific market, with particular emphasis on the fast growing ASEAN economies. The opening of the Okuma-Singapore Technical Centre on 9 July 1990 reflects a serious presence to do business in the region. It is an investment of S\$5.5

million on a 2,500 square metres of private property, housing management, marketing and engineering personnel. (It has a staff of seven locals and five Japanese). It has showrooms which display the latest in CNC technology and engineering applications. It has training facilities and a temperature controlled spare parts service depot.

Comparatively, of the 3 major Japanese machine tool builders with a significant presence in Singapore, Okuma is still relatively conservative in style. Ultimately, it is the company's philosophy towards business which dictates the choice of strategy. The degree of change and the measure of success hinges on the vital human element of leadership. Leaders in the 1990s must encourage innovation and risk taking to meet the dynamic and ever changing challenges facing the organisation. Corporate leaders must possess that entrepreneurial spirit for survival and sustainable success. The promise of entrepreneurship is that it will create new products and markets for corporations. Entrepreneurship is a synonym for achievement and action, a touchstone for creativity, and the remedy for lack of competitiveness in any corporations.

In the global environment, Yamazaki-Mazak, Okuma, and Mori Seiki (in descending order) are the top three Japanese CNC machine tool builders recognised as world-class leaders (*Metalworking Engineering and Marketing*, January, 1994). They can compete in the key areas of operations, management, quality, technology, organization, clarity of corporate mission (the why), and corporate vision (the where). In spite of different strategic focus, (Mazak is in R&D; Okuma is in application know-how; Mori is in fast delivery), all three started off with vertical-backward integration and then selected concentric diversification as their commonsense grand strategy to capitalise on their manufacturing, marketing and technology expertise and experience. Rendeiro (1985, 1988) postulates that the main reason behind Japanese dominance in the machine tool business is because their corporate strategies de-emphasize manufacturing in favour of marketing factors. A close look at manufacturing costs, notably through vertical disintegration (sub-contracting) and design rationalisation, is likely to pay off. The emphasis on marketing and service as sources of product differentiation is now more relevant than the past. And, the strategic importance of leading users providing the "problem impetus" for innovation is greatly emphasized. Corporations should recognise this crucial feature of the innovation process in their R&D strategies. According to Professor Hideki Yoshihara (1986) successful Japanese companies pursue growth by diversification. Successful diversification is related diversification especially in

technology, ie concentric diversification. Companies entering into related businesses can rely on existing corporate resources. This multiple usage of corporate resources produces a synergistic effect (Rendeiro, 1985; 1988). Japanese competitiveness is also based on excellent Japanese production management and strong leadership of top management. Further, combining low-cost operations with high productivity, Japanese CNC machine tool builders have kept their competitive edge. Japanese companies have a definite competitive edge in the global market for CNC machine tools because of four main factors:

- The ability in industrial engineering and manufacturing, with heavy investment in modernised plant and equipment
- The ability to produce new research and development in industrial applications
- Strength in marketing and technological information network
- The ability to control the supply of capital around the world

All these depend to a great extent on human skills and organization. Japanese CNC machine tool producers are peculiarly well positioned to grow in strength because of these levers of power.

4.5.2 The Three World-Class Taiwanese Machine Tool Producers in the ASEAN Market

According to the data from the Department of Statistics, Ministry of Economic Affairs of Taiwan, there were 1,180 machine tool builders in Taiwan, consisting of 779 metalcutting machine builders and 401 metalforming machine builders in 1993, with the total employees of approximately 18,000. Among them, only three builders (ie Taichung, Leadwell and Yeong Chin) had more than 300 employees, 0.3 percent of the total; 18 builders (1.6 percent) had 100 to 299 employees; and 108 builders (9.4 percent) with 30 to 100 employees. Therefore, the number of employees working for most of Taiwan machine tool makers (1,061 companies or 88.8 percent) was less than 30.

Taiwanese machine tool industry is clearly a very fragmented industry. Nevertheless, the industry has attained surprisingly high levels of productivity. In 1988 annual output per employee amounted to US\$50,000. Its productivity compared favourably with

levels recorded in South Korea, and even the USA (albeit the figure for the former is based on 1987 data, and for the latter on 1986 data). Strategic analysis of Taiwan's machining industry is in Table 4-17 and its production of CNC machines in Figure 4.42.

Machine tool is the foundation of all machinery industry. Hence, the users of CNC machine tools are widely distributed into different areas as shown in the table below. Among them, the machinery components constitute the highest percentage, about 33 percent, other industry areas with high usage are automobile, motorcycle, mould and die, etc.

<u>User area</u>	<u>Machinery Component</u>	<u>Automobile and Motorcycle</u>	<u>Mould Die</u>	<u>Electric Machinery</u>	<u>Aero Space</u>	<u>Pneumatic Tools</u>	<u>Training Education</u>	<u>Bicycle</u>	<u>Others</u>
Percentage (%)	33	22.2	21.8	5.9	4.3	3.2	2.9	0.8	5.9

Source: Industrial Products Statistics Monthly. Taiwan Area, October 1993, MOEA.

The Taiwanese government upgraded the machinery industry in the process of developing its national industrial muscle. Due to improvement in quality, domestic manufacturing machines gradually established its reputation and won the confidence of local users. The strategy was to produce practical and economical CNC machine tools with user-centered manufacturing technologies. Besides cheap pricing, the quality of domestic made machinery meet the requirements set by many developing countries. The manufacturers then started to explore the market in the ASEAN region and eventually laid the foundation for exporting machinery to the region. The machine tool items made a breakthrough and gained international reputation. Machine tools are now the machinery industry's main export item and in the period 1981 to 1988 replaced sewing machines (domestic and industrial) as the machinery industry's main export item.

Taiwan is now among the world's ninth largest machine tool manufacturers with annual output of US\$980 million (*AsiaMac Journal*, June, 1992). But despite its success, Taiwan still lags behind industry leaders like Japan and West Germany which dominate the mid-range and premium sectors of the machine tool market respectively.

TABLE 4-17 STRATEGIC ANALYSIS OF TAIWAN'S MACHINERY INDUSTRY

Strengths	Weaknesses
<ul style="list-style-type: none"> • Low cost, quality labour • Good infrastructure (eg electricity supply, transportation, etc) • Availability of government incentives • Research institutions 	<ul style="list-style-type: none"> • Dependence on imported parts and technology • Shortage of technicians • Land shortage • Dependence on exports • Dependence on US market, albeit on the decline • Dependence on low value added products
Opportunities	Threats
<ul style="list-style-type: none"> • Diverse product range, moving to moderate and high value added products (eg automated machines) • Expansion of domestic market • Diversify export markets • Switch from low cost leadership strategy to product differentiation (ie emphasise quality and improve marketing/promotion) 	<ul style="list-style-type: none"> • Further appreciation of the NT\$ • Further wage increase • Liberalisation of domestic market • Increasing protectionism in export markets • New competition (eg China, South Korea, Spain)

Source: McDermott, Michael C. (1991), Taiwan's Industry in World Markets: Target Europe. Special Report No. 2111, pp. 70.

FIGURE 4.42(a)

PRODUCTION EXPORT AND IMPORT VALUE OF MACHINE TOOLS IN TAIWAN

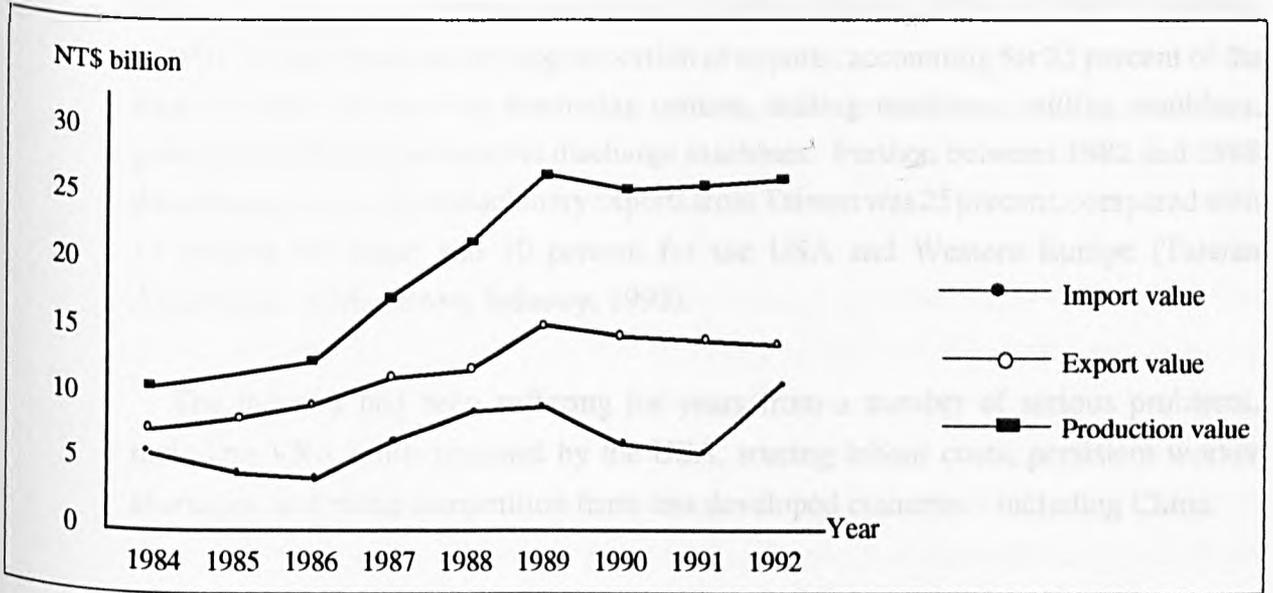
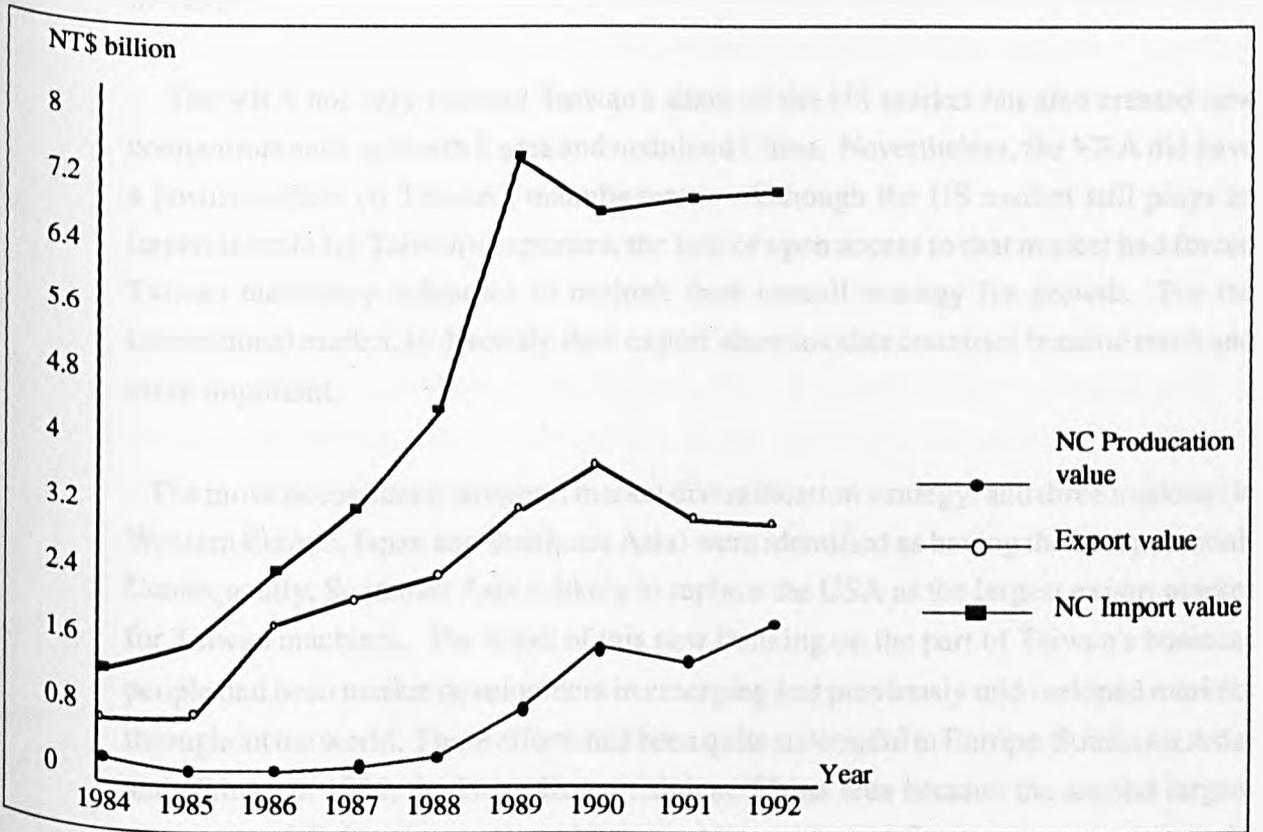


FIGURE 4.42(b)

PRODUCTION EXPORT AND IMPORT VALUE OF CNC MACHINE TOOLS IN TAIWAN



Source: Mechanical Industry Research Laboratories (1993), Factory Automation, ITRI, Taiwan.

Productivity improvements partly explain the success of Taiwan's machinery which had seen the value of its exports rise from US\$198 million in 1979 to US\$657.5 million in 1991. Lathes made up the largest portion of exports, accounting for 25 percent of the total in 1991, followed by machining centres, drilling machines, milling machines, grinding machines, and electric discharge machines. Further, between 1982 and 1988 the annual growth rate of machinery exports from Taiwan was 25 percent, compared with 15 percent for Japan and 10 percent for the USA and Western Europe (Taiwan Association of Machinery Industry, 1993).

The industry had been suffering for years from a number of serious problems, including VRA limits imposed by the USA, soaring labour costs, persistent worker shortages, and rising competition from less developed countries - including China.

Despite the VRA, which was imposed in 1986, the USA remained the biggest overseas market for Taiwan made machine tools. Its percentage of overall shipments had dropped, however, from 28.9 percent in 1989 to 18.8 percent in 1990 and 16.8 percent in 1991.

The VRA not only reduced Taiwan's share of the US market but also created new competitors such as South Korea and mainland China. Nevertheless, the VRA did have a positive effect on Taiwan's manufacturers. Although the US market still plays an important role for Taiwan's exporters, the loss of open access to that market had forced Taiwan machinery industries to re-think their overall strategy for growth. For the international market, to diversify their export share to other countries became more and more important.

The move necessitated an export market diversification strategy, and three markets (ie Western Europe, Japan and Southeast Asia) were identified as having the best potential. Consequently, Southeast Asia is likely to replace the USA as the largest export market for Taiwan machines. The result of this new thinking on the part of Taiwan's business people had been market development in emerging and previously undeveloped markets throughout the world. These efforts had been quite successful in Europe, Southeast Asia, and China. In 1991, the Hong Kong/mainland China area became the second largest consumer of Taiwan's metal-working machine exports. Exporters are particularly excited about the possibilities for future growth in this area (Vincent Siew, 1993).

Due to the strong market demand in the mainland China, Hong Kong - the major bridge for indirect trade across the Taiwan Strait - replaced the USA as the largest outlet for Taiwan-made machine tools in 1992. The British colony absorbed 24 percent of the island's machine tool exports last year, compared with the corresponding figure of 16.3 percent for the US market (*Metalworking Engineering and Marketing*, March, 1993).

Most of the machine tools shipped to the territory, however, were destined to be transshipped to China (Taiwan's government does not yet allow direct shipments). The third largest market was Germany, followed by Malaysia and Thailand (both of which have large numbers of Taiwanese investment in factories that source machine tools from the home county), Japan, Korea, Indonesia, France, and Italy. In view of the risks that too much dependence upon the Chinese market might lead to difficulty in coping with the rapid changes in the market environments, Taiwan manufacturers have also been expanding their shares in the ASEAN market.

In the ASEAN region, out of the top five world-class Taiwanese machine tool producers (Taichung, Yeong Chin, Leadwell, Yang Iron and Fair Friend), only Leadwell has set-up a joint-venture manufacturing facilities with Fong Lee in Singapore. The plant produces machining centres, the others depend on their distributors in the respective ASEAN countries for sales and after-sale services.

One concern of Taiwan's machine tool makers was Japan's decline in machine tool production value in 1992. With sluggish home demand, Japanese manufacturers were expected to mount a strong sales drive, including the dumping of machine tool products overseas. Such a development would have serious implications for Taiwan, in terms of both exports and the domestic market. The island's exports would inevitably be affected and, since local demand for machine tools remains strong and Taiwan manufacturers frequently favour Japanese products, the island's own relatively small machine tool makers would have great difficulty in fencing off Japanese inroads into their territory.

Taiwan's demand for machine tools increased drastically in 1992, fuelled by the continued implementation of the US\$300 billion "Six-Year National Development Plan" for reconstruction of domestic industries and by a strong willingness among local manufacturers to invest in manufacturing equipment in order to increase production to meet the brisk market demand in Asia.

While machine tool production and exports of most countries of the world were undermined by downturn in the world defence industries and global economic recession in 1993 (*Business Week*, August 2, 1993), the machine tool industry in Taiwan maintained its production value at almost the same level of US\$1.3 billion as 1992, and the industry's exports continued to enjoy annual growth of 6.53 percent to reach US\$660 million. Such production and export performances were quite remarkable, as compared with foreign competitors. Japan, for instance, suffered a drastic decline of 40 percent in machine tool production in 1992. South Korea witnessed a 20 percent shrinkage, and the USA and European countries also failed to perform well.

With the Clinton Administration taking measures to revitalize the US economy, US demand for machine tools is expected to rebound significantly. This, coupled with continued market demand in mainland China and Southeast Asia as well as an expected gradual economic turn-around in Europe, promises Taiwanese (and Japanese) manufacturers much brighter export prospects. Besides market development, machine tool manufacturers are also deeply involved in product upgrading and service support.

Taiwan-made machine tools previously had a niche in the markets for low-end and low-price items. Now that such a market has become saturated, local makers have upgraded their production to stay competitive. In this regard, Taiwanese machine tool producers have stepped up research and development of new models and key parts and components, and upgrade the precision, durability, and versatility of their products. The quality of Taiwanese production facilities has impressed leading Japanese machine tool producers such as Fanuc, Okuma, Takisawa which have established joint ventures with Taiwanese counterparts to manufacture components for them.

Taiwan's machinery industry has now developed to a point where fundamental changes are necessary if it were to remain competitive and its new direction will be reflected in its products, marketing and competitive strategies. Product strategy will involve a switch from companies having a single, low-added-value product, to a range of high value added products. In marketing, the traditional emphasis has been on international markets, especially the USA. But in the 1990s the domestic market will receive more attention and resources, while abroad, continued efforts will be made to diversify the industry's base away from the USA to the Asia Pacific.

Similarly, in terms of competitive advantage there will be a radical departure from traditional practice; instead of competing on price and concentrating on cost reduction, other elements of the marketing mix will be emphasised (eg characteristics of the product, namely its quality, promotion, and distribution). Taiwan's success to date in the machine tool industry has been based largely on its cost advantages.

In comparison with foreign rivals, Taiwan continues to benefit from the availability of low-cost, quality labour. On top of this, the machinery industry has received strong government support in the form of incentives and assistance from research institutions. Improvements in the country's infrastructure (eg electricity supply, industrial parks, roads and port facilities) have also impacted favourably on the industry's cost structure. Nevertheless, serious problems must be overcome if growth targets were to be met. The industry will have to reduce its dependence on imports for vital components and foreign technology. It has been reasonably successful in reducing its dependence on export and in diversifying its export base away from the US market.

Protectionism in key exports (eg the EU) may demand a switch to local production, but in addition to this "pull" factor, foreign production may prove essential because of "push" factors. Taiwan, after Bangladesh and the city states of Hong Kong and Singapore, is the world's most densely populated country. High density has resulted in a scarcity of suitable sites for further industrial development and soaring land prices. Other countries may offer a more attractive location for future investments. Further appreciation of the New Taiwan dollar and rising labour costs would also encourage the transferring of production overseas. These factors plus the emergence of new competitors (eg from China, South Korea and Spain) are encouraging Taiwan's machine tool manufacturers to switch from a low-cost leadership strategy to one of product differentiation and higher value added CNC machines.

The increasing share of CNC machines among the Taiwan machine tools is partly because of the growing domestic demands for automatization. Machine tool users in Taiwan are now urged to automatize their production equipment to wipe out the image of "dirty, dangerous, and hard-work" job environments, as well as to cope with the increasing labour expenses coupled with the serious labour shortage. As the traditional protectionism has been shifted into the free trade policy, Taiwanese manufacturers have been forced to compete with overseas competitors by improving production efficiency,

which leads to the increasing demand for system-oriented machine tools. Other than Far East Machinery, Tong-Tai Machine Tool has also developed automated industry and exports them to Thailand and the Philippines.

A promising trend for production is the development of more CNC models and the move towards whole systems instead of single machines. In 1991, CNC models accounted for 28.6 percent of the total value of machine tool production. This is still low compared with the world average, and an official of the government-backed Mechanical Industry Research Laboratory (MIRL) has called on research institutions and the industry to work together to boost the share to 50 percent (MIRL, June 1993).

As for R&D activities, out of the total 1,180 machine tool makers, only 80 companies (7.0 percent) are doing research and development by themselves, with the total R&D staff members of 800. Also, their average investment in R&D is said to account for 1.1 percent of their sales income. In comparison with the Japanese (average about 8 percent) and Western counterparts (average about 5 percent), those figures seem not to be satisfactory for Taiwanese builders to make further inroad into the world market with advanced machine tools or systems (eg FMS, CIM) (Thomas, 1994).

The development of flexible manufacturing cells and systems is still relatively young in Taiwan but is attracting increased attention, especially with the drive toward greater factory automation. The government has commissioned MIRL to carry out a two-year FMC technology development program starting in 1992, and three machine tool makers have signed contracts with the laboratory to cooperate in the effort: **Yang Iron Works**, **Yeong Chin Machinery Industries**, and **Fair Friend Enterprise**. Some companies, including **Yeong Chin**, **Far East Machinery**, and **Fu Sheng Machinery**, have installed FMCs in their own production lines. The production and use of such automated equipment is expected to strengthen financial performance that has suffered weak profits in recent years because of rising costs, lagging sales and intense competition.

The use of flexible manufacturing systems (FMS) is still in its infancy in Taiwan, but these systems are rapidly gaining favour because of the island's chronic worker shortage and the need to economise on labour costs. Eighteen FMSs are now in use, seven of them by the machinery industry itself. While some local machinery manufacturers are capable of turning out these systems, most Taiwan users still prefer to procure the machinery and

equipment involved in them from Japan, such as machine tools, automated warehousing equipment, automated feeding systems, and others.

To summarise, five of the seven local machinery using FMSs are suppliers of machine tools; Taichung Machinery Works Co, Yeong Chin Machinery Ind Co., Wintec Machinery Co, Leadwell CNC Machinery Mfg Co, and Far East Machinery Co. The FMS now in use by Taichung Machinery (currently the biggest local user) cost the company NT\$70 million (US\$2.6 million at NT\$27 = US\$1), and a further investment of NT\$120 million (US\$4.4 million) is planned for the installation of another FMS in a new plant now under construction.

Fifty-nine percent of all automated equipment installed in Taiwan in 1992 was imported. Japan was the preferred source of supply not only for FMSs, but for other automated production equipment as well. It provided 56.6 percent of all automated machinery imported into the island last year; the USA and Germany followed with 13.3 percent and 13.1 percent respectively. The volumes involved are considerable. According to a report by the government-backed MIRL, the island's manufacturers and research institutions are expected to purchase a total of NT\$105.6 billion (US\$3.9 billion) worth of automated production equipment by 1994.

As discussed in the aforementioned, medium and large size builders as Taichung Machinery Works, Leadwell CNC Machines Mfg., Far East Machinery, Yeong Chin Machinery Industries, and Wintec Machinery have installed FMSs one after another or are making plans for installation. Among them, only Far East Machinery has installed its own FMSs, while the others have introduced mainly Japanese-made FMSs. The main reason seems to lie in the fact that the know-how to respond to orders for FMSs has not sufficiently been accumulated on the side of machine tool builders in Taiwan. Most of the FMSs that are presently installed or to be installed in Taiwan are mainly in the trial phase. Regardless of the present level of technology, FMSs or FMCs are the issues to be tackled by Taiwan machine tool builders for their further development of higher value added products.

In the future, the development and progress of CNC machine tool industry in Taiwan would hinge on the following:

- ***To improve the quality and added value of products/services.***

With fast development in the electronic and automation industry, major developments for domestic machinery industry should following these directions:

- combine control hardware to improve value added of products
- promote production automation
- improve production flow
- upgrade the quality of goods

- ***To broaden the international market channel.***

Currently, the mechanical products are produced and exported through the original equipment manufacturing channel. However, to establish the long-term product sale market and to gain higher benefit, it is important to create locals' own brands, build up the ISO 9000 quality insurance system and broaden the marketing network.

- ***To develop senior professional personnel to build distinctive products.***

It is necessary to develop senior professional personnel in Taiwan to improve and upgrade the local products in order to compete in the world-wide market. In the mean time, more research and development activities should be emphasized such that national science technology projects will create links between other countries and local industrial firms.

4.6 Summary

The direct numerical control (DNC) systems that were marketed in the late 1960s and early 1970s were relatively expensive by today's standard. Their high cost, with an unfavourable economic climate at that time, caused businessmen to resist the temptation to plunge into the new DNC technology. Also, the DNC systems available then were somewhat rigid in terms of management reporting formats and hardware requirements (Bolk, et al 1989). The more recent advent of CNC systems, together with lower-cost computers and improvements in software, have resulted in the development of hierarchical computer systems in manufacturing. In these hierarchical systems, CNC computers have direct control over the production machines and report to satellite computers, which in turn report to other computers, and so on. There are advantages to this hierarchical approach over the DNC packages that were offered around 1970. The common theme in these advantages is *flexibility* (Bedworth, et al 1991; Ross, 1992). The information system can be tailored to the specific needs and desires of the company. This contrasts with many of the early DNC systems in which the reporting

formats were fixed, in some cases providing more data than management wanted and in other cases omitting details that management needed. Another advantage of the hierarchical approach is the ability to gradually build the system instead of implementing the entire DNC configuration all at once. This piece-by-piece installation of the computer integrated manufacturing systems is a more versatile and economical approach. It permits changes and corrections to be made more easily as the system is being built. It also allows the company to spread the cost of the system over a longer time period and to obtain benefits from each subsystem as it is installed. The hierarchical computer arrangement embraces the DNC philosophy, which is to provide useful reports on production operations to management in real time. One might say that DNC has not really been replaced by this new approach; it has simply altered its physical form.

The evolution of the hierarchical control configuration, in which the machine tool controllers are connected to a central plant computer and the controllers are themselves CNC units, has an architecture very similar to DNC. To distinguish this configuration from DNC, the term *distributed numerical control* is used. The difference is simply in the presence of the CNC controllers in the hierarchy to replace the hard-wired controllers (Pimentel, 1990). Today, distributed numerical control represents the generally accepted approach for central computer control of CNC machine tools. In present usage, the initial DNC refers to this modern control configuration (Kusiak, 1990). Improvements in CNC machine tool technology have enhanced the concept of machining center to include the use of large capacity part storage systems connected to the machine tool. The storage system may contain a dozen or more part positions together with a transfer mechanism for loading and unloading the parts at the machine spindle. This permits the storage system to be loaded with raw parts at the beginning of a work shift and for these parts to be machined in sequence during the shift with no human operators in attendance. After each part is completed it is placed back in the storage system. The name given to this type of operation is *untended machining*. The Japanese have exploited the use of *untended machining* to allow production to be accomplished overnight with no operators present ("ghost shift"). The term "unmanned machining" is also used sometimes in reference to this mode of operation.

Another development in DNC and CNC is the FMS. An FMS is a group of CNC machine tools or other automated workstations connected together by a materials handling and storage system and controlled by a computer. It represents an attempt to combine the flexibility of CNC with the efficiency of automated flow lines of manufacturing automation. Advantages

of CNC, FMS and CIM are given in Tables 4-17 and 4-18, respectively. While CIM has largely grown out of making the production of a particular product at one production facility more efficiently, CIM seen in its widest sense also facilitates the globalisation of manufacture. It is with the advent of CIM that the real opportunity lies in redesign and reorganisation of the whole manufacturing chain to realise the full advantages to be gained.

Finally, a technology related to numerical control is robotics. Industrial robotics borrows much of the control technology of NC but assumes an entirely different anatomical form to accomplish work that is traditionally performed by human beings. Their usage has gained popularity since the early 1980s in industrialised countries and NICs.

Figure 4.43 summarises the growth of computer applications in manufacturing whilst Figure 4.44 provides an overview of the role of computers in factory automation.

Theoretically, automated manufacturing systems (CNC, FMC, FMS, CIM, IMS), whether located in the East or in the West, are the same capital inputs in the business process and therefore we can expect almost similar productivity index. In reality, there is a marked difference in performance even for multinational corporations using the same automated manufacturing system but in different countries (eg Okuma in USA and Japan experience a gap of about 30 percent in the overall productivity performance). The critical difference lies in the human factor, ie the knowledge, skills and attitude of workers manning the system. People are more important than technology in producing results. Hence, human resource management must be linked to the corporate strategy (Plevel, et al 1994).

Voss and Hanson (1993) contended that world-class manufacturers must consider focused strategy to gain synergy of:

- Low Cost
- Speed of Delivery
- High Quality
- High Flexibility

But no manufacturer can really be simultaneous price, quality and flexibility leader in its industry. Though many companies give good value on all these dimensions, trade-offs may still have to be made (Skinner, 1978, 1985; Jaikumar, 1986; Harmon, 1992; Sweeney, 1991; New, 1992). Therefore for FMSs, CIMs and IMSs we often use the term "optimization"

TABLE 4-18 STAGES OF MANUFACTURING AUTOMATION

<u>Stage</u>	<u>Features</u>	<u>Examples</u>	<u>Date</u>
Mechanization	Replacement of human labour by machine	Lathe Power Conveyors	1775
Point automation	Replacement of human control of machine by automatic control	NC/MRP	1960
Islands of automation	Integration of point automation within its local environment to manage part of the manufacturing process	CNC/MRPII FMS CAD/CAM	1970 1980
Computer integrated manufacturing	The integrated application of computer based automation and decision support systems to manage the total operation of the manufacturing system	The automated and the automatic factory	1990

Footnote:
 "Culture may have played a significant part in the evolution of manufacturing automation by constraining the approach of engineers and managers to various problems and process developments. This is certainly an important consideration in the implementation of just-in-time as a production management approach. It is also a consideration when discussing approaches to the automation of manufacturing. For this reason, it is useful to ponder on some of the differences between Eastern and Western thinking.

Western society has tended to adopt the world view of scientific method, which is reductionist, quantitative and analytic in nature. The major tenet of this approach is that the whole can be reduced to its constituent parts and each examined on its own. In this manner, it is assumed that the system itself is also understood. Such thinking is evident in the work of Adam Smith, who laid the basis for the division of labour at the beginning of the industrial revolution, and more particularly so in the case of F.W. Taylor and his approach to management at the beginning of this century. If one accepts this argument, then the approach of Western manufacturing systems experts can be seen as the focused examination of well defined areas, without giving due consideration to the overall system. For example, many of the efforts of quantitative Operations Research (OR) have not had significant impact on the practice of production scheduling (King, 1976), despite the fact that great energy has been expended over the last 20 years, since those initial influential formulations of scheduling problems in the 1960s by researchers such as Conway et al. (1967). Moreover, writers such as Burbidge (1986) have reiterated this theme by taking issue with the overspecialised nature of manufacturing personnel.

In contrast, Eastern society seems more often to adopt a systems perspective of the world. This world view holds that the whole is greater than the sum of its parts and so recognizes the importance of interaction between the constituent sub-systems. In such a holistic approach, each sub-system is seen as having a certain autonomy, while still operating within the overall goals of the system. The most important aspect is that no sub-system proceeds with an action which is detrimental to other sub-systems. This style of thinking is exhibited frequently in the Just-In-Time (JIT) approach to production management in Japan. For example, Shingo (1981) writing on Kanban at Toyota, declared, "the following is considered quite important: (to) acknowledge the concept of Toyota production system, its techniques and besides the systematic relationship between each technique".

The Western approach is perhaps best exemplified by so-called mechanistic work organization and work structures, where individual operators tend to be assigned to a few very specialized repetitive tasks in a hierarchical supervisory environment. The alternative approach, the so-called organic work organization, is characterized by multiskilled operators working in relatively autonomous work groups and under a less rigid control and supervisory organization. The latter approach seems more appropriate, particularly in modern manufacturing systems. Since the CIM problem is primarily about integration, it follows that a holistic approach using organic work structures may well be necessary to attain an effective solution".

Source: Browne, J., Harhen, J and Shivnan, J. (1988), Production Management Systems: A CIM Perspective. Addison-Wesley, Wokingham, England, pp. 16 - 17.

TABLE 4-19 ADVANTAGES OF DIFFERENT TYPES OF COMPUTERISED MANUFACTURING SYSTEMS

CNC	FMC	FMS	GT
<ul style="list-style-type: none"> • Reduced dependability on operator's skill • Improved accuracy and reduced human errors • Increased productivity • Reduced inventory • Reduced manufacturing leadtime • Greater manufacturing flexibility • Reduced fixturing • Reduced nonproductive time • Process management and manufacturing information system is centralised and simplified • Greater economies of scope 	<ul style="list-style-type: none"> • Technological <ul style="list-style-type: none"> - larger system expansibility - built-in flexibility - greater machine tool utilization rates - greater productivity - better part quality • Economic <ul style="list-style-type: none"> - faster return on investment - less in-process inventory - increase economies of scale - less and more efficiently utilized floor space • Social <ul style="list-style-type: none"> - reduction in workforce requirements over stand-alone approaches - replace boring and difficult to handle work 	<ul style="list-style-type: none"> • Machine flexibility • Process flexibility • Product flexibility • Routing flexibility • Volume flexibility • Expansion flexibility • Operation flexibility • Production flexibility 	<ul style="list-style-type: none"> • Increased <ul style="list-style-type: none"> - component standardisation and rationalisation - reliability of estimates - effective machine operation - productivity - costing accuracy - customer service - order potential • Reduced <ul style="list-style-type: none"> - planning effort - paper work - setting time - down time - work-in progress - work movement - overall production times - finished parts stock - overall cost

Source: Author

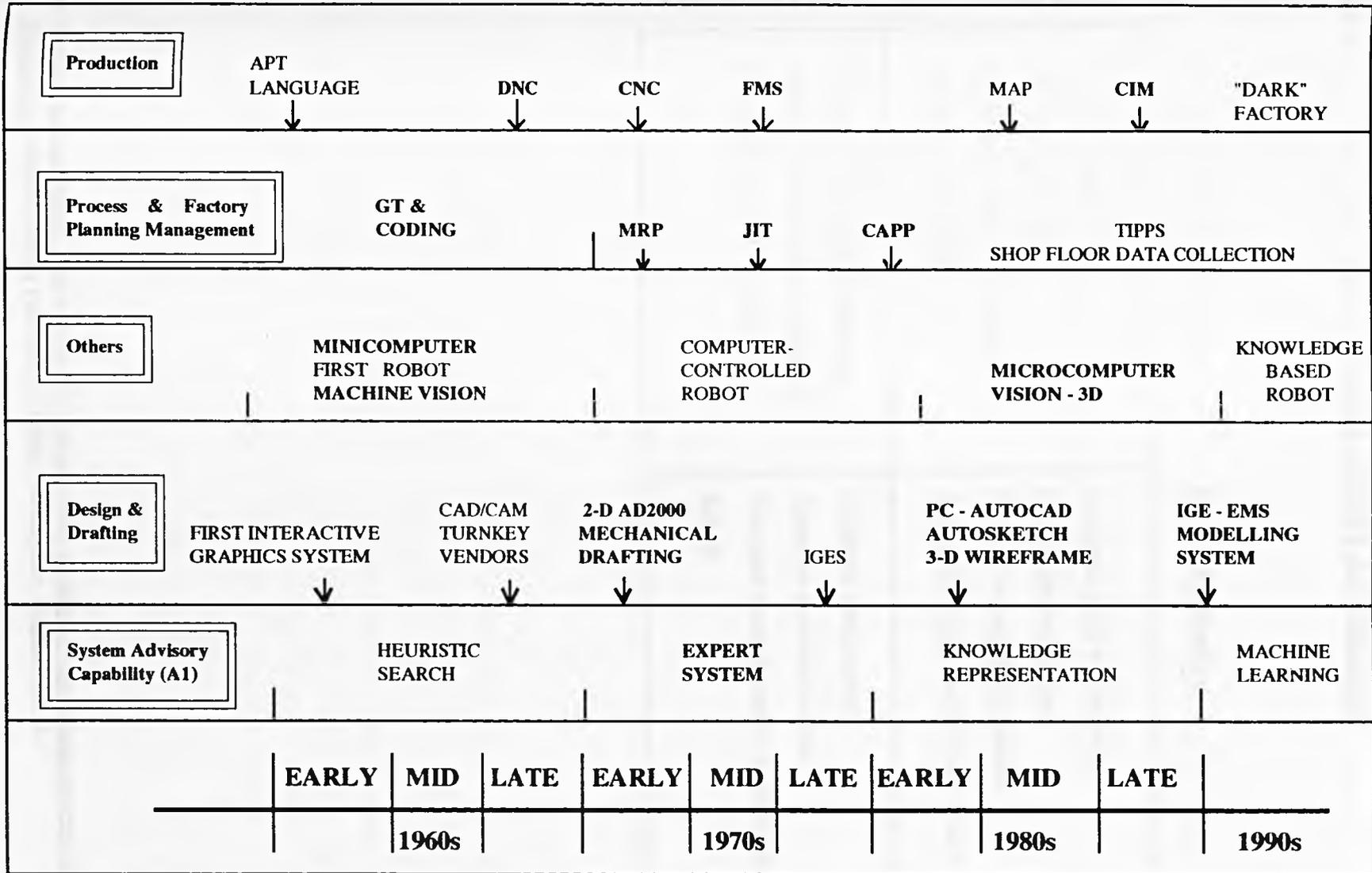
Footnote: The table below give an example of the application of various manufacturing techniques in the car industry.

	English Post-Industrial Revolution (early 1900s)	USA Mass Production (1920s)	Scientific Mass Production (1950s)	Japanese Lean Production (1980s)	CNC Machine Tool Era (1990s)	Flexible Manufacturing System (2000 onwards)
No. of machines in typical factory	3	50	150	150	50	30
No. of different models made	infinite	3	10	15	100	infinite

Source: Harvard University, General Motors (*Economist*, October 17, 1992, pp. 10)

FIGURE 4.43 THE GROWTH OF COMPUTER APPLICATIONS IN MANUFACTURING

256



Source: Authur Anderson Seminar on "Manufacturing Capabilities of Computer Integrated Manufacturing", organised by the Economic Development Board of Singapore (1993).

FIGURE 4.44 ROLE OF COMPUTERS IN FACTORY AUTOMATION

	Indirect Application	Direct Application
Plant Level	Macro planning models Accounting systems Production management systems Computer aided design	Computer aided warehousing Direct numerical control Flexible manufacturing systems Automatic storage and retrieval system
Operations Level	Computer aided process planning Computer aided work measurement Computer aided NC programming	Computer aided testing Computer numerical control Computer based automatic assembly machines Robots

Source: Browne, Jimmie, Harhen, John and Shivnan, Hames (1988), Production Management Systems: A CIM Perspective, Addison-Wesley Publishing Company, Wokingham, England, pp. 20.

instead of "maximisation" (Suzuki, 1993). However, the author would concur with Hayes and Pisano (1994) that there are pay-offs (the "Abundance Mentality") rather than trade-offs (the "Scarcity Mentality") because the reality is that it is possible to have high quality and high flexibility at low cost (learning from experiences of 3M, AT&T, Motorola, Allegheny Ludlum, Intel, Xerox, Hitachi Seiki). Figure 4-45 gives the strategy development template and Table 4-19 shows the difference in order of importance of strategic options facing businesses.

The debate on how best to devise the ultimate corporate strategy examine the following issues:

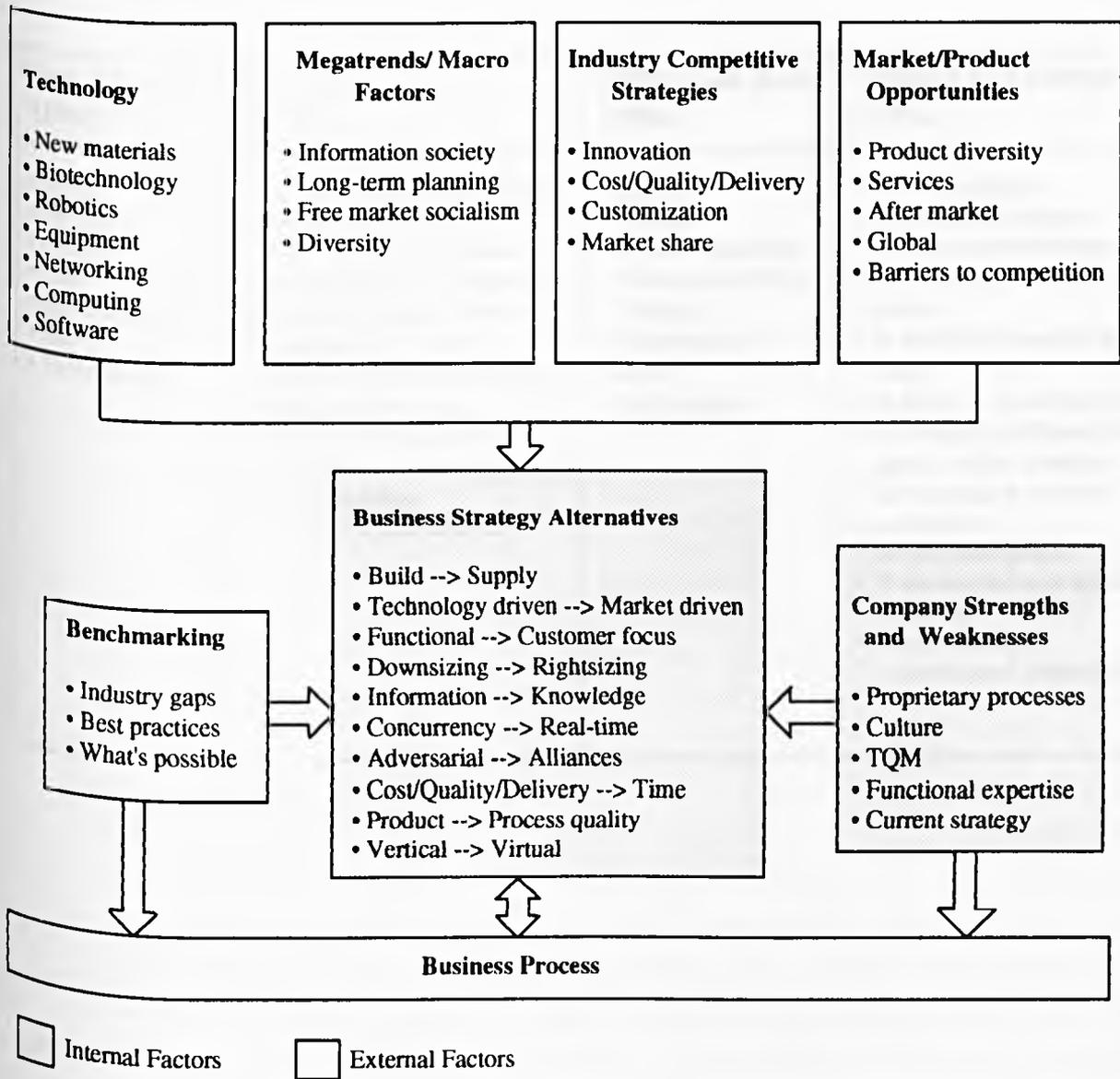
- Do factories have to be focused?
- Is strategic fit enough?
- Are trade-offs really necessary?
- Vertical integration versus global sourcing?

Corporate strategy must provide a framework for guiding the selection, development, and exploitation of these core competencies and capabilities by looking into the strategic mix, ie strategic options, strategic flexibility, strategic fit and strategic timing, to achieve sustainable competitive success through combinations of quality, cost, flexibility and dependability (relationships of the value-chain).

4.7 Conclusion

Manufacturing matters no more than services, but no less than them either; they are interdependent (*Economist*, February 20, 1993). The distinction between industry and services is now largely meaningless because over half the workers in a typical manufacturing company do service-related type jobs, eg design, distribution, financial planning; only a minority make things on the factory floor, especially true for the factory of the future facilitated by the advent of low-cost computers towards unmanned operation. Therefore, the distinction between purely manufacturing and servicing activities becomes blurred just like in the marketing of consumer and industrial products (eg selling a "Lexus" to an individual or an organization); to stay competitive, most businesses have to arm themselves with manufacturing advantage as well as service advantage because if everything else remains equal (quality product and low-cost), service is the ultimate value added leverage for competitiveness. Thus, manufacturing and service are indispensable just like marketing and manufacturing are inseparable for world-class manufacturing companies.

FIGURE 4.45 STRATEGY DEVELOPMENT TEMPLATE



Source: Adapted from Flaig, L. Scott (1993), Integrative Manufacturing: Transforming the Organization through People, Process, and Technology. Business One Irwin, Homewood, Illinois, pp. 151.

TABLE 4-20 LIST OF STRATEGIC OPTIONS FOR WORLD-CLASS MANUFACTURING COMPANIES ADOCATED BY DIFFERENT SCHOLARS

Yeoh, Michael (1993)	Lamming (1993)	Jeffrey and Roth (1988)	Steudel and Desruelle (1992)
<ul style="list-style-type: none"> • Speed • Service • Quality • Cost • Knowledge • Skills • Technology 	<ul style="list-style-type: none"> • Servicing the customer better • Inventory Reduction • Total quality management • Reduced delivery leadtime • Increased competitiveness • Elimination of waste • Creation of thinking people • Reduced cycle time • Improved productivity • JIT deliveries from suppliers • Pull scheduling • Preventive maintenance 	<ul style="list-style-type: none"> • Speed • Service • Product flexibility • Volume flexibility • Delivery • Conformance • Price • Performance 	<ul style="list-style-type: none"> • To be world-class • To be leader in quality • To maximise market share • To be leader in customer service • To minimise manufacturing costs • To invest in the employees • To change significantly the mission of the company • To be leader in product innovation • To maximise profits • To survive through the next 12 months • To make money • To understand product costs

Source: Compiled by Author

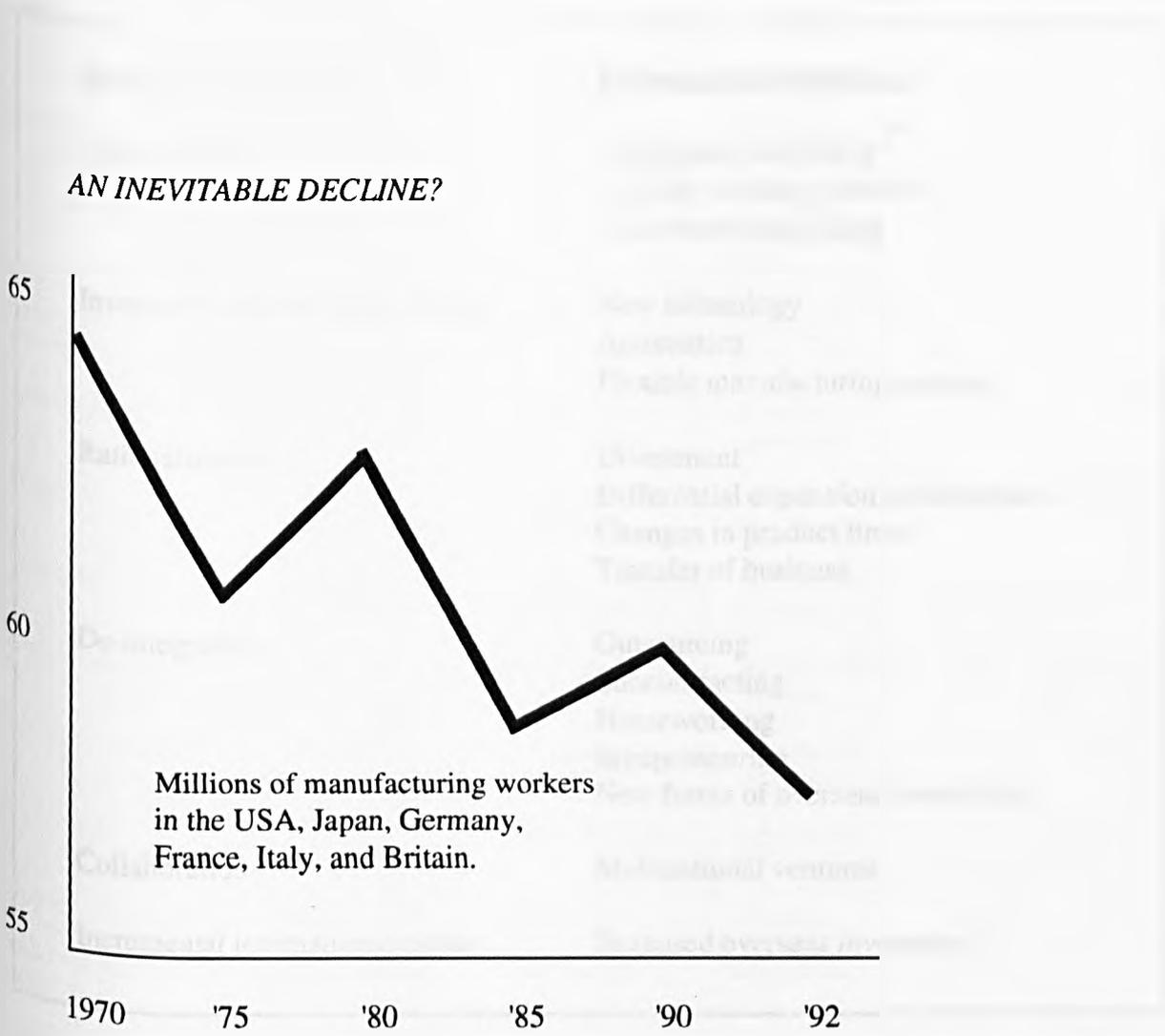
On the other hand, it would be fruitless for governments of major industrial countries to try to save disappearing factory jobs in sunset manufacturing industry. Low cost mass manufacturing will inevitably shift to increasingly efficient low-cost developing nations that offer competitive advantage. As a result, price of goods will decline, further pushing down the factory wages in the USA, Europe and Japan. It is estimated that manufacturing in the major industrialised countries will sink below 10 percent of total employment within a generation from the current 23 percent. See Figure 4.46 (Brown and Julius, 1993; Spiers, 1993).

Nevertheless, deindustrialization does not necessarily spell economic decline. Developed countries should specialise in manufacturing high value added products to attain competitive success (Landvater, 1993). As these more advanced industries grow, they will create new, high-income service jobs to support the engineering aspects of business (Nilson, 1992). Lancaster's (1993) and Kotler's (1994) concept of marketing engineering identify precisely this spin-off in value added service activities in view of the advent of technology, IT, and computer and communications affecting international business and international marketing.

The burst of Japan's "bubble economy" demonstrated that during the boom years of the late 1980s when stock prices were soaring and bank loans flowing freely, many companies built extra manufacturing capacity that they are now having trouble casting off as they try to transfer production abroad (Wood, 1992). The inflation of asset values during the bubble artificially strengthen traditional Japanese industries, leading to complacency, while making it harder for new innovative business to emerge. Whittaker (1990), Kogut (1993) accorded that the success of Japanese CNC machine tool industry is due to its core competence in managing innovation through relationship management. Japanese companies need to adopt an optimal mix of available strategies, including greater procurement of parts and semi-finished products from abroad and increased reverse-imports from overseas production bases (Mowery, et al., 1993). In tandem with these efforts to directly counter the adverse impact of the yen's appreciation, corporations should move decisively to adapt to the rapidly changing market environment through corporate restructuring (see Table 4-20). But, as the *Business Success/Competitive Success* equation has shown, to sustain competitive advantage and ensure corporate longevity every company must subscribe to *FIRMS* (see Chapter 6).

Attempts to analyse the post-1945 environment suggest that the concept of economic cycles provide a framework for understanding the present and forecasting the future (Rothwell, 1981; Batra, 1993). Table 4-21 relates the stages of post-1945 economic development to implications

FIGURE 4.46 DECLINE OF MANUFACTURING INDUSTRY



Source: Spiers, Joseph (1993), "The Future of the Factory", *Fortune*, Vol. 128, No. 16, December 27, pp. 20.

TABLE 4-21 MAJOR FORMS OF CORPORATE RESTRUCTURING

<u>Restructuring mode</u>	<u>Forms of restructuring</u>
Intensification	Contractual flexibility Flexible working practices Concession bargaining
Investment and technical change	New technology Automation Flexible manufacturing systems
Rationalization	Divestment Differential expansion (contraction) Changes in product lines Transfer of business
De-integration	Outsourcing Subcontracting Homeworking Intrapreneuring New forms of overseas investment
Collaboration	Multinational ventures
Incremental internationalization	Increased overseas investment

Source: Enderwick, P. (1989), "Multinational Corporate Restructuring and International Competitiveness, California Management Review. Vol. 32, pp. 44 - 58.

TABLE 4-22 THE STAGES OF POST-1945 ECONOMIC DEVELOPMENT AND IMPLICATIONS FOR MANUFACTURING

Factor	Stage 1 1945 - 55 Early stages	Stage 2 1956 - 1969 Growth	Stage 3 1970 - 80s Maturity	Stage 4 1990 onwards Decline
Research emphasis	Basic patents	Expansion of patent concepts	Emphasis on manufacturing efficiency	Reduction in new product
Return on R&D expenditure	Low	High	Declining	Low
Growth method	New products	Modifications to new products	Company acquisitions	
Design	New use of materials/concepts	Increasing duplication	Emphasis on cost contribution	Minor cosmetic changes
Production	Craft emphasis Few economies	Economies of scale more important	Economies of scale vital	Over-capacity Industrial re-structuring
Capital requirements	Low	Growing	Extremely capital intensive	Limited new investment Old industries breaking up
Competitive structure	Small local	National consolidation	International companies	Global agreements Cartels
Labour skills	Limited	Trained personnel	Emphasis on skills	Many jobs replaced by automation
Growth	Slow	Rapid	Slowing	Declining
Manufacturing emphasis	Mechanisation	Automation	Integration	Flexibility
Manufacturing objectives	<ul style="list-style-type: none"> • Standardisation • Optimization 	<ul style="list-style-type: none"> • Factory throughput • Labour costs 	<ul style="list-style-type: none"> • Speed-to-market • Quality control • Customer/supplier coordination • Global efficiency 	<ul style="list-style-type: none"> • Adapt to changing markets • Adapt to changing organization • Accommodate new products • Adapt to changing business relationships
Principle/Results	<ul style="list-style-type: none"> • Group technology layout 	<ul style="list-style-type: none"> • Island of automation 	<ul style="list-style-type: none"> • Integration 	<ul style="list-style-type: none"> • Intelligent integration

Source: Adapted from Rothwell, R. (1981), Futures, Vol. 13, pp. 19; Flaig, L. Scott (1993), Integrative Manufacturing: Transforming the Organization through People, Process, and Technology, Business One Irwin, Homewood, Illinois, pp. 277.

for manufacturing. There has been a steady increase in the number of mature industries (one of them is the machine tool industry). These will become more and more competitive as manufacturers with high levels of existing automation seek marginal improvements in profitability and product performance. This situation is especially applicable to the machine tool industry. The key realities are:

- Growth rates are declining
- Overall industrial profitability is decreasing (eg most of the Japanese CNC machine tool manufacturers are in the red for the financial year ending March 1994; Metalworking and Marketing, 1994)
- Industrial overcapacity is growing
- Employment in manufacturing is decreasing
- Job replacement by automation is increasing
- Returns on R&D are declining (eg the Stockholm International Peace Research Institute estimated that the arms industry will shrink by about 25 percent worldwide during the next five years; normally R&D involves the purchase of highly precise CNC machine tools for the production of proto-type weaponry)
- Companies are growing by acquisition rather than organic growth (eg German machine tool builders - Decker, Gildermister, Maho and Traub are acquired by the banks in order to remain in business)
- Global agreements on export restrictions are increasing (eg USA five-year Export Restrictions with Japan for keeping the maximum export figure at below 30 percent of total production output; Europe's Voluntary Restrain Agreement with Japan; COCOM's Agreement on restricting the sales of advanced machine tools to communist countries, etc)

Since 1992, the Japanese machine tool manufacturers have experienced dramatic decline in both domestic and international demand (due to economic cycles) and the resultant over capacity in production. Relative to the peak period of 1980s, Japanese machine tool

production has dropped by 40 percent. Worldwide machine tool manufacturers must increasingly appreciate the relevance of the concept of a *Virtual Factory*. This is a factory which gets its task of transforming materials and components into value for the customer by using resources outside the manufacturing function proper. Relationships and resources with the suppliers, marketing and sales, engineering, even the customer, have to be mobilised and leveraged in order to carry out the manufacturing task (De Meyer, 1992a). The concept of a virtual factory requires that tasks get carried out by networks of resources inside and outside manufacturing. These networks will emerge by establishing relations with peers and partners and to the management of interfaces. De Meyer (1992b) concluded that human resources are more important than technology in the virtual factory. This conclusion precisely supports the author's belief in *FIRMS*, which integrates manufacturers, marketers, human resources, suppliers, distributors, and even competitors through core competencies of *intelligence, flexibility* and *relationship management*.

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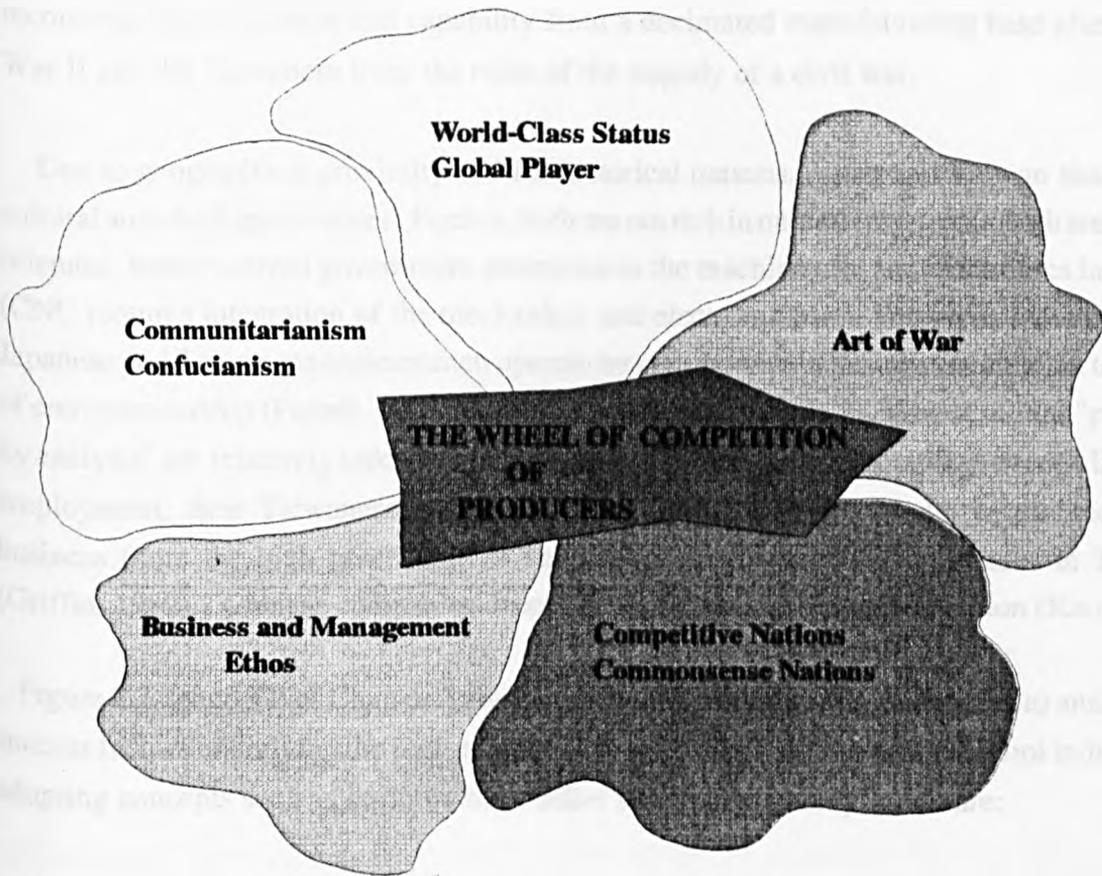
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CHAPTER FIVE

**THE WHEEL OF COMPETITION OF PRODUCERS
IN THE ASIAN MACHINE TOOL INDUSTRY IN ASEAN REGION**



CHAPTER 5

THE WHEEL OF COMPETITION OF PRODUCERS IN THE ASIAN MACHINE TOOL INDUSTRY IN ASEAN REGION

5.1 Introduction

There is no one single casual factor for the tremendous success of Japan's and Taiwan's CNC machine tool industry. Since 1983, Japanese CNC machine tool manufacturers have dominated the global market. By 1990, than Taiwanese counterparts had improved Taiwan's position as it edged from tenth in the world (in 1988) to the ninth (McDermott, 1991). This is an incredible achievement considering the fact that in the 1940s the Japanese needed to reconstruct their machine tool capability from a decimated manufacturing base after World War II and the Taiwanese from the ruins of the tragedy of a civil war.

Due to geographical proximity and for historical reasons, Japan and Taiwan share some cultural and ideological values. Further, both are not rich in natural resources. Both are export-oriented. Both received government assistance in the machine tool and electronics industries (CNC requires integration of the mechanical and electronic parts, known as mechatronics). Japanese and Taiwanese businessmen operate by commonsense business strategy in the spirit of entrepreneurship (Farrell, 1993). Western management tools with the resultant "paralysis by analysis" are relatively unknown (Chan, 1993). Whilst Japanese employees seek life-time employment, their Taiwanese counterparts work to accumulate wealth to run their own business (note the high percentage of small businesses or family businesses in Taiwan) (Griffin, 1989). Chinese companies depend less on data and more on intuition (Kao, 1993).

Figure 2.2 (page 32) of Chapter 2 gives the conceptual structure and attempts to analyse the success factors underlying the performance of Japan's and Taiwan's machine tool industry by adopting concepts such as socio-cultural belief systems; the components are:

- *Communitarianism*
- *Confucianism*
- *Business and Management Ethos*
- *Art of War Strategy*

The peculiar manufacturing strategy and marketing strategy are forged within the Asian socio-cultural milieu. It delves beyond the absence or presence of economic incentives (the noncultural factors) to explain the outstanding performance of their machine tool producers.

Undoubtedly, comparative study involves identification of similarities and differences and establishment of causal relationships. The basis for analysis lies in the belief that Japan and Taiwan share common attributes, viz:

- they are *Competitive Nations* enjoying competitive advantages (ie Porter's Competitive Advantage of Nations)
- they are *Commonsense Nations*
- they are *Global Players*
- they have attained *World Class Status*

Each dimension will be examined.

The propositions are:

- Japanese and Taiwanese share some common cultural belief systems embedded in Confucianism
- Japanese and Taiwanese prescribe to communitarianism
- Japanese and Taiwanese use Sun Tzu's Art of War Strategy in business
- Japanese and Taiwanese business and management ethos are derived from their socio-cultural belief systems
- Though the Japanese and Taiwanese CNC machine tool builders have attained world-class status, they apply different international marketing strategy
- Japanese and Taiwanese machine tool builders are more competitive than their European and American counterparts because of proximity, quality, flexibility, after-sales service, aggressive sales promotion, pricing, delivery schedule, product reliability
- Japanese and Taiwanese are able to exploit and manage technology for innovation and product development on a Just-In-Time response to market needs

The Wheel of Competition provides a frame of reference within which can be seen broadly

shared regional values and attitudes that have influenced the development of capitalist institutions in Asia. This does not mean that some of the elements in the Wheel (eg values in Confucianism) may not occur outside the Asian region, but it does suggest that their occurrence in Asia fits a pattern and has a historical basis.

The values of thrift, hard work, honour, filial piety and respect for law are not and cannot be culturally or linguistically or racially or nationally exclusive. Values come alive only in real contexts and situations (Lee, 1994). There is no easy compartmentalisation of Asian and Western values. Some values are simply good and common to everyone. Hard work is one such value (Wilkinson, 1990).

The values of hard work and thrift are by no means exclusive to Asians. Weber (1905) pointed out that it was Calvinism and the Protestant ethic of hard work, thrift and deferred gratification that paved the way for capitalism in Europe. The Protestant ethic legitimised the pursuit of profit and thus enabled the tremendous industrial expansion that took place in the USA after the Civil War (Withane, 1991).

Tawney (1926) argued that individualism, with its ethic of self-help and frugality, was more significant than Calvinist teachings in the development of capitalism. The well spring of American value of system, the Protestant ethic, is strikingly similar to the values in Confucian philosophy. Hence, the claim that the Confucian ethic has been instrumental in developing the functional equivalent of the Protestant ethic in East Asia. Confucius shared with Christianity a belief in the moral force of ideals, the Golden Rule of doing to others what you want others to do to you, honouring one's parents, and a high moral standard in human affairs. Crawford (1988) realised that the universal search for wisdom, benevolence, and courage, the virtues taught by Confucius, were in actuality the characteristics that were sought by the Scarecrow, the Tin Woodman and the Lion in the Wizard of Oz (Baum, 1990).

There is no easy contrast between Western individualism and Asian communitarianism. Group cohesion is a trait associated closely with Asian societies; excessive individualism is an attitude reviled in Asian traditions. However, the need for excellence, thrift and perseverance are highly individual qualities. Extreme individualism increasingly is being questioned in the West, whose economic and social structures are beginning to show signs of strain. At the same time, individual excellence and self-reliance arguably are more apparent in communitarian Asia than in the individualistic West, where state welfarism has stunted individual initiative

and enterprise. These complexities and ironies prove that values do not and cannot exist in water-tight geographical compartments (*Straits Times*, June 18, 1992).

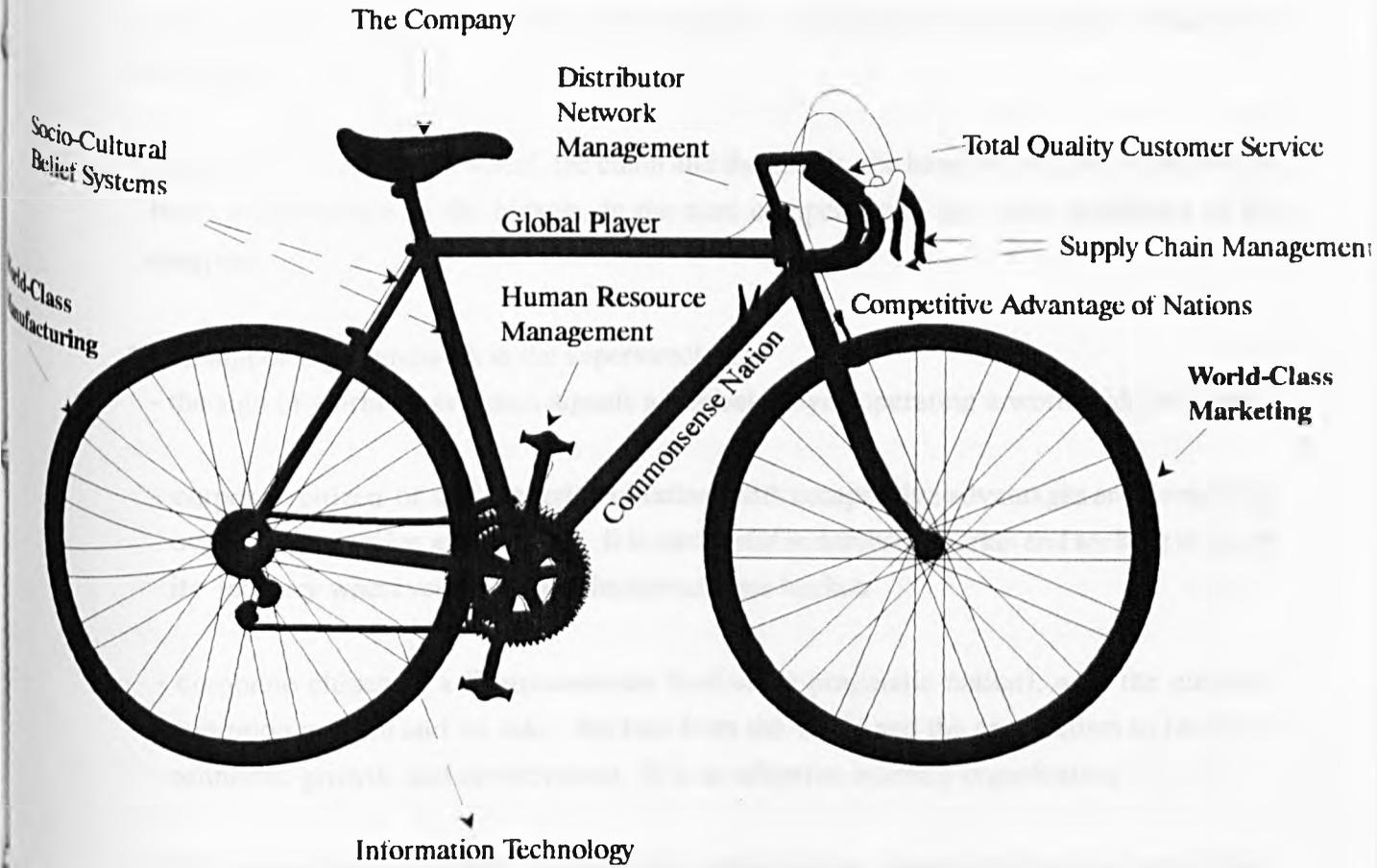
This chapter discusses the *soft* issues of culture and values in the context of performance and achievement of Asian machine tool producers.

5.2 Total Quality Business Paradigm : The Imagery of a Bicycle

The elements of the Wheel of Competition are integrated with those of FIRMS to give the Total Quality Business Paradigm. These are (see Figure 5.1):

- The Company is the main actor (takes the **Seat**) as it drives the organization towards its strategic intent (the **Destination**) with a focused vision (the **Lights**)
- The **Rear wheel** is the driving force, ie back wheel drive. The rear wheel gives the technological push in a manufacturing company seeking to achieve world-class manufacturing through the 5Ms - men, machines, materials, money, methods
- The Rear wheel is connected to the **Chain through the Pedals**, the sources of energy. Human Resource Management (HRM) either provides the power and impetus to propel the organization forward or retards the growth and development of the company. Progress or stagnation of the company is determined by the drive and quality of HRM, ie the value added
- The **Front wheel** works in tandem with the rear wheel. Products must be sold in international markets. World-class marketing must work in tandem with world-class manufacturing to offer products at lower prices, better quality, more flexibility and with shorter delivery lead time for that market niche. Hence, the need to integrate the 7Ps of marketing (ie product, price, promotion, place, physical evidence, process and people) with the 5Ps of manufacturing (ie parts, plant, processes, people, planning and control systems)
- The front wheel is controlled by the **Handles** (gives the direction) **with Brakes**. Total Quality Customer Service (TQCS) and Distributor Network Management (DNM) are the handles because they determine the success of marketing in reaching out to the customers in terms of empathy, relationship marketing, networking for an integrated marketing system. With higher value added service content, ceteris paribus, Supply Chain Management (SCM) would act as the adaptive control where brakes are used at the appropriate time to ensure a safe ride

FIGURE 5.1 TOTAL QUALITY BUSINESS PARADIGM: IMAGERY OF A BICYCLE



Source: Author

Source: Author

with optimum performance. SCM becomes a resistance if suppliers are not reliable in delivery, quality, service and costs (if brakes are applied unnecessarily). However, if the company progresses ahead of its suppliers, then the suppliers will impede the progress of the company because of a lack of parallel development. Whether the journey is smooth or rough would be determined by the coordination between the handles and the brakes by adapting to the road conditions, ie the international business environment. TQCS, DNM and SCM would ensure that the company is flexible and responsive to the dynamic and stringent demands of customers

- The rear wheel, the front wheel, the chain and the pedals, the handles and the brakes are the basic infrastructure in the bicycle, ie the core competencies and key capabilities of the company
- The supporting framework is the superstructure:
 - the sign of world-class brand, signals a **Global Player** operating a worldwide business
 - corporate citizen of a **Competitive Nation** with competitive advantages and competing over quality, service and delivery. It is successful in domestic market and seeking to move its industry wherever opportunities/advantages beckon
 - corporate citizen of a **Commonsense Nation** (ie pragmatic nation), with the guts and gumption to learn and to take the best from the world and the pragmatism to focus on economic growth and development. It is an adaptive learning organization
 - the **Socio-Cultural Belief Systems** (ie Confucianism, communitarianism, art of war, business and management ethos), responsible for high group performance arising from consensus and commitment of the corporate citizenry
- The chain is **Information Technology** (IT) which connects every component in the business, the multi-media for communication (transfer of information) to complete the feedback loop. The three key elements (world-class manufacturing, world-class marketing, and IT) influencing the performance of the company are the milestones in the latest concept of "Marketing Engineering", ie market-pull (need for increased variability, reduced leadtime/product life cycles, improved quality/services, lower unit cost, comprehensive performance measures) in sync with technological-push (need for reorganization/use of better models and

understanding, computerization/use of IT and integration, automation/use of mechatronics and FMS) make possible with the continuous improvement and adoption of IT (Kotler, 1994).

5.3 Total Quality Business Paradigm: Combination of Parameters of the Wheel of Competition and FIRMS

The Fish Bone Diagram in Figure 5.2 integrates the generic elements of the Wheel of Competition of producers in the Asian machine tool industry in ASEAN region with the Flexible Intelligent Relationship Management Strategy (FIRMS) which defines *The Total Quality Business Paradigm*. This chapter highlights the parameters of the Wheel of Competition whilst Chapter 6 deals with the parameters of FIRMS. The originators of the respective concepts are listed in Table 5-1.

5.4 Socio-Cultural Belief Systems

The success of East Asian economies has drawn attention to the positive ways in which culture may play a role in the economic behaviour of individuals and even nations. To some observers, the Confucian tradition common to the high-performance Asian economies (HPAEs) contributed to their economic development. This has raised intriguing questions about the complex connections between culture and economic development, and are receiving more systematic attention from social scientists in the East and West.

Any meaningful discussion of growth must now address the role played by factors rather than the classical ones of land, labour, capital, and raw materials. Since the turn of the century, when Max Weber proposed the idea of Protestant work ethic as a major driving force for the success of capitalism, a key component of the softer side of growth has been a nation's value system. He tried to point out relations between religions and value systems on the one hand and economic ethics and economic behaviour on the other. Since then, economists, political scientists, philosophers, sociologists, and even Western businessmen begin to inquire into the relationship between culture and economic development. The study by Hofstede (1992) linked culture and economy, suggesting that values fostered in a nation's families, organizations, and political life are reflected in its economic performance.

Countries with access to roughly the same technology and resources and operate essentially free market system should have the same level of success. There is, however, the intangible cultural factor that seem to make some more successful than others. The stronger a sense of

FISH BONE DIAGRAM OF THE WHEEL OF COMPETITION FOR PRODUCERS AND FIRMS - THE TOTAL QUALITY BUSINESS PARADIGM

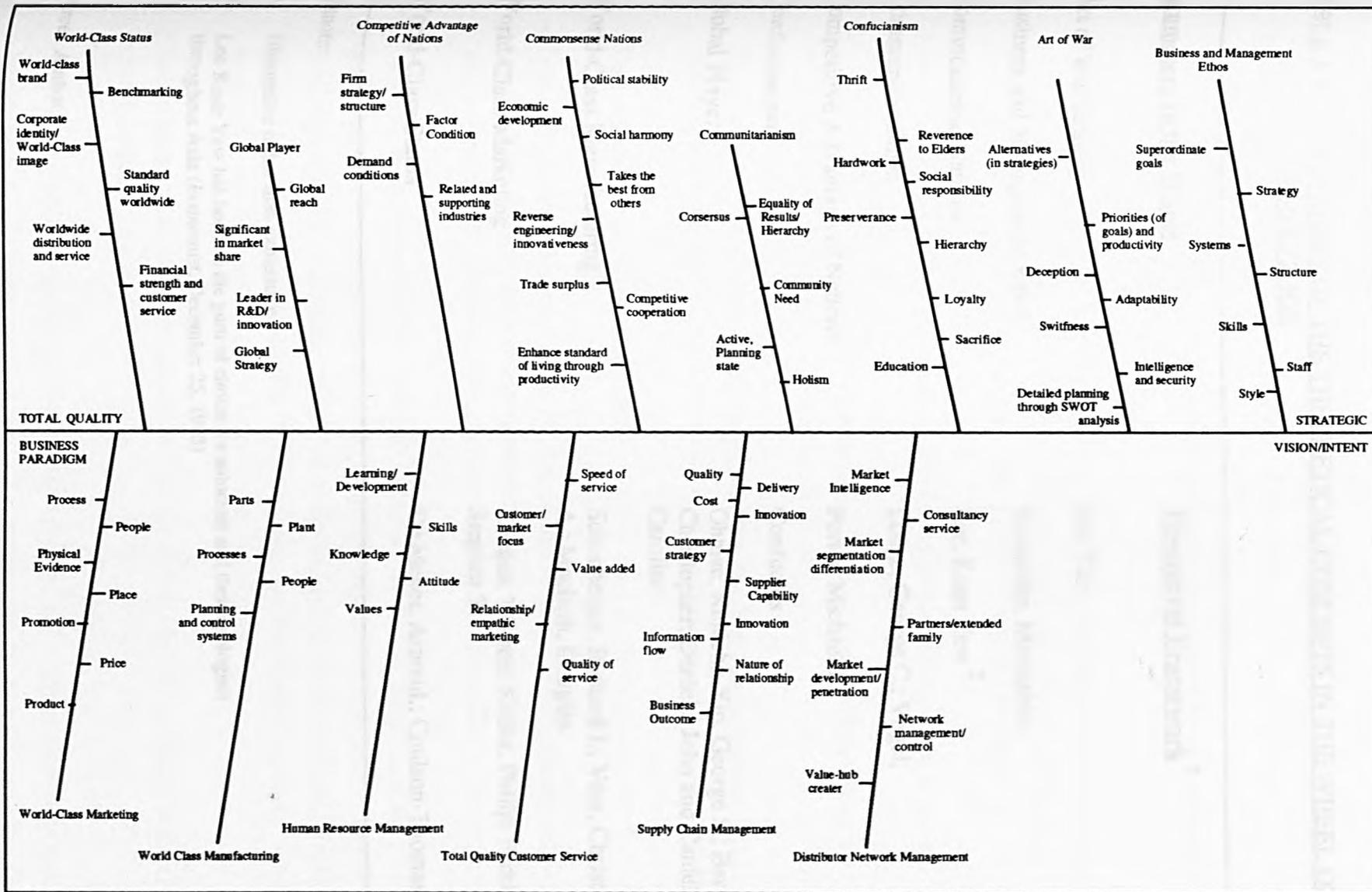


TABLE 5-1 PIONEERS OF THE THEORETICAL CONCEPTS IN THE WHEEL OF COMPETITION

<u>Parameters in the Wheel</u>	<u>Theoretical Framework</u> ¹
• Art of War strategy	Sun Tzu
• Business and Management Ethos	Konosuke, Matsushita
• Commonsense Nations	Lee, Kuan Yew ²
• Communitarianism	Lodge, George C.; Vogel,
• Competitive Advantage of Nations	Porter, Michael E.
• Confucianism	Confucius
• Global Player	Ohmae, Kenichi; Yip, George S.; Bartlett, Christopher; Daniels, John and Caniels, Caroline
• World-Class Manufacturing	Schonberger, Richard J.; Voss, Christopher A.; Macbeth, Douglas
• World-Class Marketing	Keegan, Warren; Kotler, Philip; Parkinson; Stephen T.
• World-Class Status	De Meyer, Arnoud,; Coulson-Thomas, Colin

Footnote:

1 Illustrative rather than exhaustive

2 Lee Kuan Yew has become the guru of choice for autocrats and their apologists throughout Asia (*Economist*, December 25, 1993)

Source: Author

identity in a people, the stronger the commitment to common ideals, goals, and values. These intangibles make for superior performance (Lee, 1992).

Koh listed ten values that help East Asia's economic progress and prosperity (*Straits Times*, December 14, 1993). They are:

- East Asians do not believe in the extreme form of individualism practised in the West. Unlike Western society, where an individual puts his interests above all others, in Asian society the individual tries to balance his interests with those of family and society
- East Asians believe in strong families. The family is the building block of society
- East Asians revere education. Unlike the West, this is a value held not only by the elite but by all strata of society
- East Asians believe in the virtues of saving and frugality. East Asians believe, as individuals, families and governments, that they should lead frugal lives and live within their means
- East Asians consider hard work a virtue
- East Asians practise national teamwork. Unions and employers view each other as partners, not enemies. Together, government, business and employees work cooperatively for the good of the nation; there is the ability to forge national consensus
- There is an Asian version of the social contract between the people and the state. The government will maintain law and order, provide citizens with their basic needs for jobs, housing, education and health care, and an obligation to treat their people with fairness and humanity. Citizens are expected to be law-abiding, respect those in authority, work hard, save and motivate their children to learn and be self-reliant
- Governments have sought to make every citizen a stakeholder in the country, trying to build communitarian societies
- East Asians want their governments to maintain a morally wholesome environment in which to bring up their children

- Good governments in East Asia want a free press but, unlike the West, they do not believe that such freedom is an absolute right

Taken together, these ten values form a framework that has enabled societies in East Asia to achieve economic prosperity, progress, harmonious relations between citizens, and law and order.

It is important to distinguish between the culture inside the organization and the broader culture of the nation, economic group, or geographical region. The first is called "corporate cultures" and the second "macrocultures" by Hampden-Turner (1992). The investigation of corporate cultures involves looking at how people in an organization behave, what assumptions govern their behaviour, and what bonds hold the corporation together. But the macroculture cannot be ignored because corporate cultures act out themes and patterns of the wider culture. He reasoned that many Japanese corporations are formidable competitors because of their Asian cultural heritage.

Nationality is an important factor in shaping the culture of a country, but even within that country, organizations develop cultures of their own, with far-reaching consequences for their members and for the achievement of their aims (Hofstede, 1991). Hofstede (1991) defined culture as the collective programming of the mind which distinguishes the members of one group or category of people from another. National culture is the collective programming of the mind acquired by growing up in a particular country. Organizational culture is the collective programming of the mind which distinguishes the members of one organization from another. Mental programs are patterns of thinking, feeling and acting, ie software of the mind. Culture (at the macro or micro level) is thought to bestow unique competitive advantages and/or dire limitations (Lodge and Vogel, 1987; Sinha and Kao, 1988; Hampden-Tuner, 1990, 1992; Hofstede, 1991; Kotter and Heskett, 1992; Hampden-Turner and Trompenaars, 1993; Pheysey, 1993).

5.5 Sun Tzu's Art of War Strategy

It is a known fact that Japanese military thought and strategies have tremendous influence on Japanese management practices. In the heydays of the craze to learn Japanese management during the 1970s and early 1980s, the "*Book of Five Rings*" written by a Japanese samurai named Miyamoto Musahi in 1645 A.D., was hailed as the book that influenced much of Japanese strategic thinking and practice. It was reputedly a "must" for Japanese CEOs. Its

english translation even made it to the American bestseller list. Interestingly, if one were to compare the *Book of Five Rings*, with *Sun Tzu's Art of War*, one will be surprised by the many parallels between them. But since the former is a 17th century document, and the latter a 4th century B.C. production, it is quite obvious who the actual guru was.

The analogy between the world of business and war in the battlefield is not a novel one. Kotler et al (1985) likened the Japanese economic conquest of the world to a military campaign. Ries and Trout (1986), "Marketing Warfare", relied on the thoughts of the German General Karl Von Clausewitz (1832); Hendon (1986) recommended the use of guerrilla warfare for products and services in "low attraction, low strength" battleground (guerrilla campaign is a low-resource tactic most suitable to financially weak challengers); Levinson (1989) also recommended the use of guerrilla strategies, tactics and weapons for survival in small or medium-sized business; Duro and Sandstrom (1987) and Michaelson (1987) also used military terminologies and strategies in their works for marketing practitioners and business leaders. Kotler (1994) envisages today's companies working in a war zone of rapidly changing competitors, technological advances, new laws, managed trade policies, and diminishing customer loyalty. These writings are worthwhile studies because they provide valuable insights and lessons for business people in today's highly combative environment.

Perhaps, one of the greatest military geniuses is Sun Tzu, a military adviser during China's Spring and Autumn Period (770-476BC). China's oldest and most outstanding book on military science is Sun Tzu's *Art of War* (varying translations of Sun Tzu's Chapter titles is in Table 5-2). It was written during a turbulent time in China where many warring states were trying to gain control of the country. Sun Tzu's ideas and strategies were based on logic, experience and proven success. His successes testified to his extraordinary ability in the art of war. His treatise clearly testified to his systematic thinking, intuitive foresight, organizational ability, quality in leadership, sense of commitment, concepts of the proper deployment of manpower. His central premise is that true victory can only be won by strategy.

The qualities required of, and the methods employed by, the leaders of an army going to war are especially relevant and applicable to businessmen who often have to decide on an offensive or defensive stance in conquest of markets and customers. Obviously, business strategy is predicated upon a fundamental vision of where the company would like to be in the future. Once this vision is defined, you have to understand the market, the businesses and the resources available to develop a robust strategy. The works of Khoo (1990, 1992) and Wee, et al (1991),

TABLE 5-2 VARYING TRANSLATIONS OF SUN TZU'S CHAPTER TITLES

	GILES (1910)	CLAVELL (1910)	GRIFFITH (1963)	CHENG LIN (1969)	CHEN (1982)	WING (1989)	CLEARY (1991)	WEE (1991)	TAO AND YUAN (1991)	TSAI AND LEONG (1991)	LOW (1992)	AMES (1993)	HUANG (1993)
1	Laying Plans	Laying Plans	Estimates	Deliberation	Planning	The Calculations (Analyzing the Conflict)	Strategic Assessments	Situation Appraisal	Estimates	Calculations	Laying Plans	On Assessments	Surveying
2	Waging War	Waging War	Waging War	Planning	Preparations	The Challenge (Estimating the Costs)	Doing Battle	Waging War	Waging War	Planning	Waging War	On Waging Battle	Mobilising for Armed Conflict
3	Attack by Strategem	Attack by Strategem	Offensive Strategy	Strategy	Strategy	The Plan of Attack (Developing an error-free strategy)	Planning a siege	Strategic Attacks	Offensive Strategy	Strategy	Offensive Strategy	Planning the Attack	Planning an Offense
4	Tactical Dispositions	Tactical Dispositions	Dispositions	Tactics	Tactics	Positioning (Positioning Yourself for Triumph)	Formulation	Dispositions of the Army	Dispositions	The Power of Defence	Tactical Dispositions	Strategic Dispositions	Control
5	Energy	Energy	Energy	Formation	Organization	Directing Positioning Your Opponent for Defeat)	Forces	Forces	Posture of Army	Formation	Potential	Strategic Advantage	Combat Power
6	Weak Points and Strong	Weak Points and Strong	Weaknesses and Strengths	Opportunism	Seizing Opportunities	Illusion and Reality (Using Camouflage)	Emptiness and Fullness	Opportunism	Void and Actuality	Strengths and Weaknesses	Weaknesses and Strengths	Weak Points and Strong Points	Superiority and Inferiority
7	Maneuvering	Manoeuvring	Manoeuvre	Manoeuvres	Manoeuvres	Engaging the Forces (Manoeuvring for Advantage)	Armed struggle	Manoeuvres	Manoeuvring	Manoeuvring	Manoeuvre	Armed contest	Armed contention
8	Variations of Tactics	Variation of Tactics	The Nine Variables	Variations	Variation in Tactics	The 9 Variations (Spontaneity in the Field)	Adaptations	The 9 Variations	The 9 Variables	The 9 Variations	The 9 Variables	Adapting to the 9 Contingencies	The Nine Adaptions
9	The Army on the March	The Army on the March	Marches	Mobilization	Sites and Observations	Moving the Force (Confrontation in the Field)	Manoeuvring Armies	Marches	On the March	Mobilisation	Marches	Deploying the Army	Troop Manoeuvres
10	Terrain	Terrain	Terrain	Terrain	Terrain	Situational Positioning (Positioning during Confrontation)	Terrain	Terrain	Terrain	Terrain	Terrain	The Terrain	Terrain
11	The 9 Situations	The 9 Situations	The 9 Varieties of Ground	Situations	Positions	The 9 Situations (Mobilizing During Confrontation)	9 Grounds	The 9 Types of Battle- Grounds	The 9 Varieties of Ground	The 9 Classic Situations	The 9 Varieties of Ground	The 9 Kinds of Terrain	The Nine Zones
12	The Attack by Fire	The Attack by Fire	Attack by Fire	Incendiarism	Fire	The Fiery Attack (The Decisive Thrust)	Fire Attack	Attacking with Fire	Attack with Fire	Attack by Fire	Fire Attack	The Incendiary Attack	Attacks Using Fire
13	The Use of Spies	The Use of Spies	Employment of Secret Agents	Espionage	Spies	The Use of Intelligence (The Information Advantage)	On the Use of Spies	Espionage	Espionage	Intelligence	Employment of Secret Agents	Using Spies	Espionage

Lip (1990), Wee (1990), specifically applied the military thoughts of Sun Tzu to modern management and business (see Booklet I). As the work of Wee, et al (1991) is more thorough, rigorous and systematic in approach (see Table 5-3 and Figures 5.3 and 5.4), the work is adapted (for simplicity) for this thesis in the following sections.

5.5.1 Sun Tzu's Art of War and its Implications for Strategic Management and Thinking in Business

• ***Situation Appraisal : Principle of Detailed Planning through SWOT Analysis***

To Sun Tzu, "War is a matter of vital importance to the State. It concerns the lives and deaths of people; and affects the survival or demise of the state. It must be thoroughly studied." Situation appraisal requires the seven dimensions (see Table 5-4)

The difference between winning or losing lies in how detailed or thorough the plan is formulated through situation appraisal in war or SWOT analysis in business because it is comprehensive in scope and coverage:

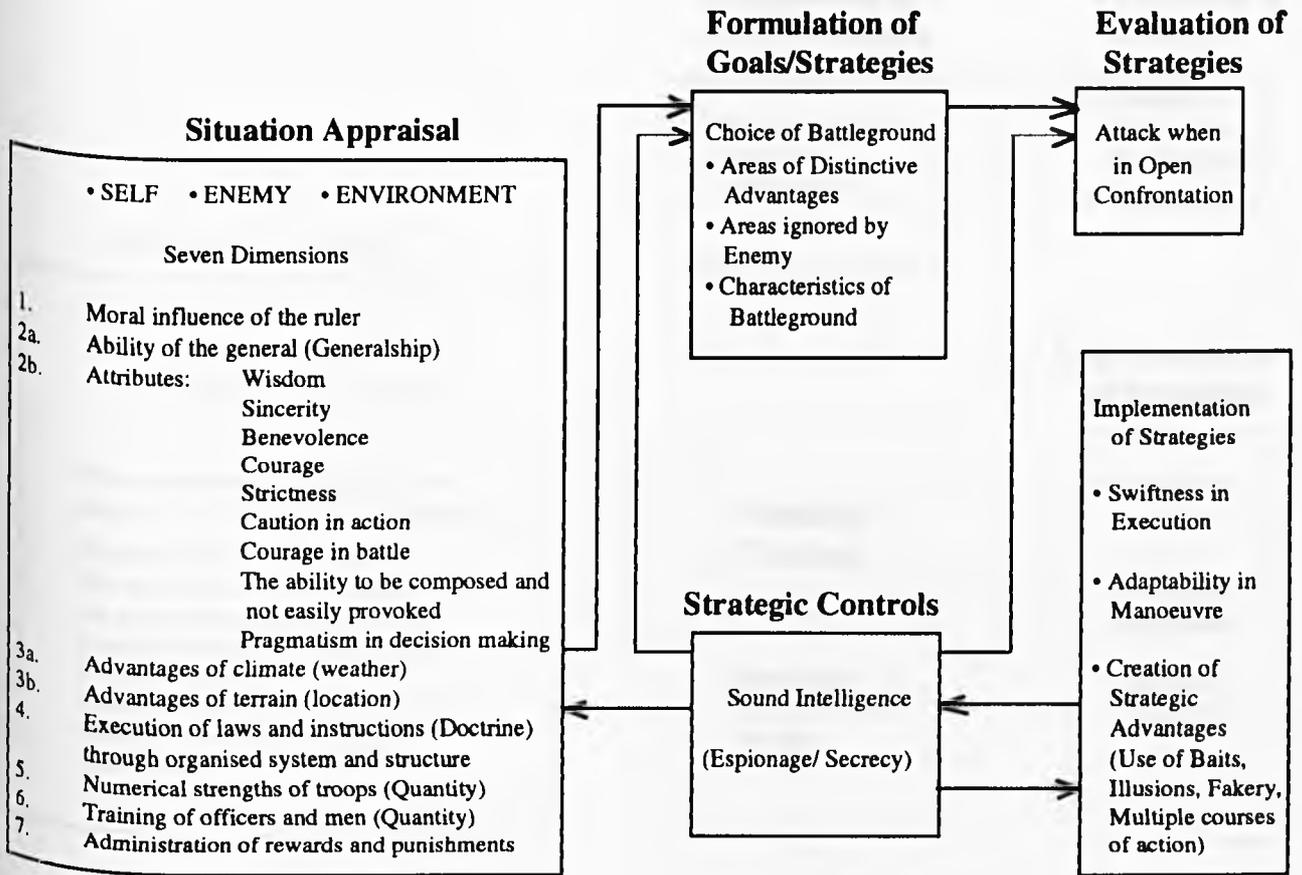
<p><u>Micro</u></p> <ul style="list-style-type: none"> - Human resource development, corporate leadership, motivation (the individual) - Corporate structure and organization, competitive edges (the company) 	<p><u>Macro</u></p> <ul style="list-style-type: none"> - Political leadership (the nation) - External and infrastructural factors (the environment)
<p><u>Controllables</u></p> <ul style="list-style-type: none"> - Human resource development - Motivation - Competitive edges 	<p><u>Uncontrollables</u></p> <ul style="list-style-type: none"> - External and infrastructural factors (climate and terrain) - Political leadership
<p><u>Human</u></p> <ul style="list-style-type: none"> - Political leadership (moral influence) - Corporate leadership - Human resource development (training) - Motivation (discipline) 	<p><u>Non-human</u></p> <ul style="list-style-type: none"> - External factor (climate) - Infrastructural factor (terrain) - Structure and organization (doctrine)
<p><u>Static</u></p> <ul style="list-style-type: none"> - Infrastructural factor (terrain) - Political leadership 	<p><u>Dynamic</u></p> <ul style="list-style-type: none"> - External factors (climate) - Competitive edges (strengths) - Human resource development (training) - Motivation (discipline)
<p><u>Tangibles</u></p> <ul style="list-style-type: none"> - Competitive edges (strengths) - Corporate structure and organization (doctrine) 	<p><u>Intangibles</u></p> <ul style="list-style-type: none"> - Leadership (command) - Motivation (discipline)

TABLE 5.3 SUMMARY OF SUN TZU'S ART OF WAR STRATEGY

<u>SUN TZU'S SEVEN PRINCIPLES IN THE ART OF STRATEGIC WARFARE</u>	<u>STRATEGIC MANAGEMENT AND THINKING BUSINESS</u>
• Situation Appraisal	• Principle of Detailed Planning through SWOT Analysis
• Sound Intelligence	• Principle of Intelligence and Security
• Swiftness in Execution of Plans	• Principle of Swiftness
• Adaptability in Manoeuvres	• Principle of Adaptability
• Creation of Strategic Advantages	• Principle of Deception
• Choice of Battleground	• Principle of Priority (of Goals) and Proactivity
• Attack when in Open Confrontation	• Principle of Alternatives (in Strategies)

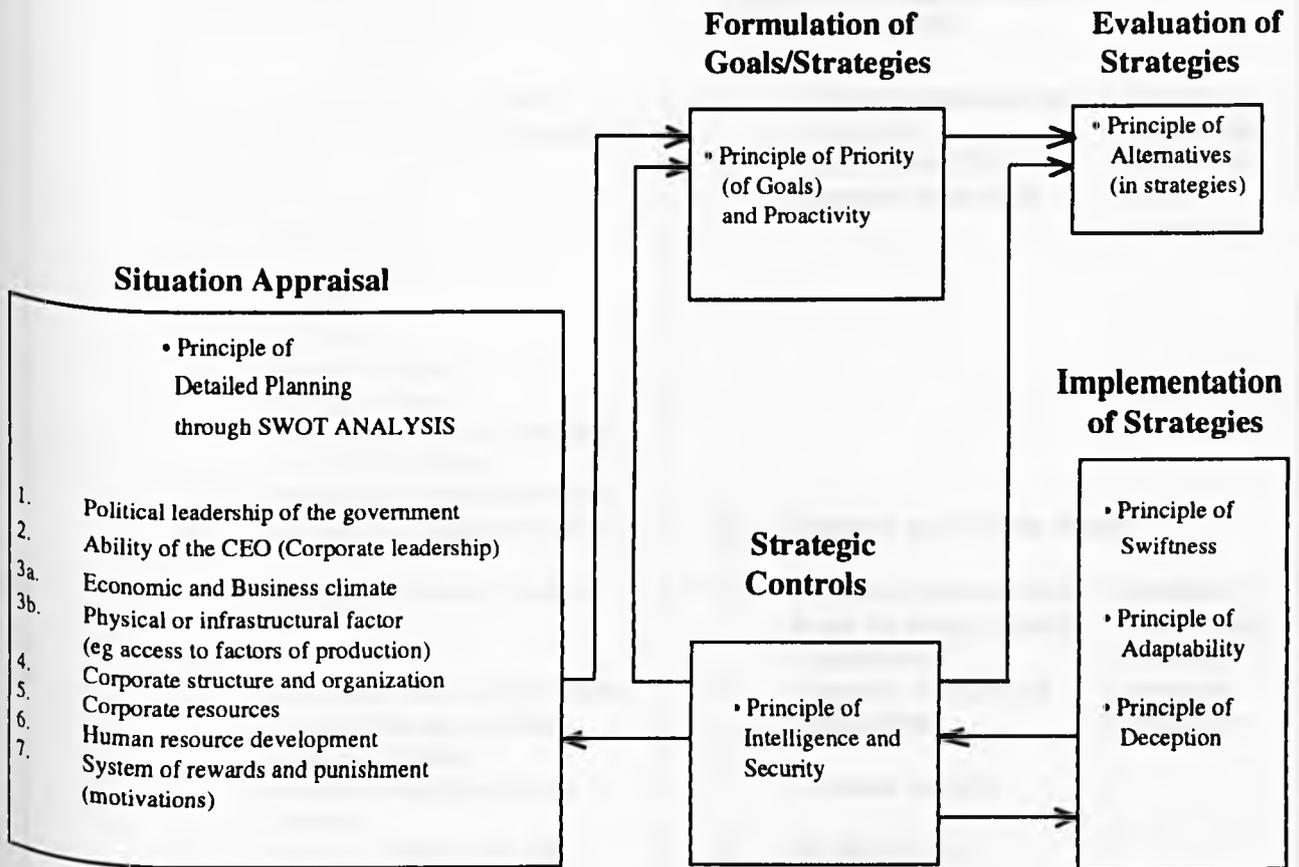
Source: Adapted from Wee, Chow Hou (1990), Sun Tzu's Art of War : Application to Business. PHP International, Singapore; Wee , Chow Hou; Lee, Khai Sheang and Bambang, Walujo Hidajat (1991), Sun Tzu - War and Management: Application to Strategic Management and Thinking. Addison-Wesley, Singapore.

FIGURE 5-3 GENERAL FRAMEWORK IN SUN TZU'S ART OF WAR



Source: Compiled by the author

FIGURE 5.4 GENERAL FRAMEWORK IN STRATEGIC THINKING FOR BUSINESS



Source: Author

TABLE 5-4 SWOT ANALYSIS

<u>7 Dimensions in War</u> (Situation Appraisal)		<u>7 Dimensions in Business</u> (SWOT Analysis)	
1.	Moral influence of the ruler }	1.	Political leadership of the government }
2a.	Ability of the General (Generalship) }		Identifying Opportunities and Threats in the environment }
2b.	Attributes: }	2.	Ability of the CEO (Corporate leadership) }
	- Wisdom }		
	- Sincerity }		
	- Benevolence }		
	- Courage }		
	- Strictness }		
	- Caution in action }		
	- Courage in battle }		
	- The ability to be composed and not easily provoked }		
	- Pragmatism in decision making }		
3a.	Advantages of climate (weather) }	3a.	Economy and business climate }
3b.	Advantages of terrain (location) }	3b.	Physical or infrastructural factor (eg access to factors of production) }
			Strengths/Weaknesses of oneself versus the competitor }
4.	Execution of laws and instructions (Doctrine) through organised system and structure }	4.	Corporate structure and organization }
5.	Numerical strengths of troops (Quantity) }	5.	Corporate resource }
6.	Training of officers and men (Quality) }	6.	Human resource development }
7.	Administration of rewards and punishments }	7.	System of rewards and punishment (motivations) }

Source: Author

• ***Sound Intelligence : Principle of Intelligence and Security***

Military strategies must be developed from sound intelligence. To quote Sun Tzu, "know your enemy, know yourself, and your victory will not be threatened. Know the terrain, know the weather, and your victory will be complete". Controls are essential to any strategy. To effect controls, there is a need to collect, collate, analyse, interpret information on the enemy and the environment. The Principle of Intelligence addresses the need for information acquisition, the offensive dimension of strategic controls as information must be acquired so that effective strategies can be developed. Equally important is the need to prevent leakage of information to the enemy. The Principle of Security represents the defensive dimension, there is a need to protect information.

Strategic controls are feedback and feedforward mechanisms in the strategic planning process.

• ***Swiftiness in Execution of Plan : Principle of Swiftiness***

Speed in execution will deny the enemy the time to prepare defences against the attacking force and gives the element of surprise as it catches the enemy unprepared.

There are three dimensions to the Principle of Swiftiness:

- | | | |
|-----------------------------------|---|--|
| Timing | : | to attack at the most appropriate and suitable moment to exploit advantages of the situation |
| Momentum | : | to achieve synergy of actions, to overwhelm the enemy, deny him the chance to develop effective defences and counter measures |
| Avoidance of Protracted Campaigns | : | to conserve and consolidate resources, deny the enemy the opportunity to retaliate and third parties from interfering or taking advantage of the situation |

The importance of timing in business is strongly advocated by Porter (1985) as the costs of a company's market entry can easily be affected by the timing of its entry. A CEO's sense of timing may be greatly improved if he has a better understanding of the following:

- the environment in which he operates
- the nature of competition
- the characteristics of the target customer and market segments
- the strengths and weaknesses of the company
- corporate history of the company

When a company has struck on a winning formula, it should never cease pursuing further successes to maintain the momentum. A company should not be engaged in protracted campaigns against the competitors. A lengthy price war will tend to erode profits, thus affecting the bottomline.

• ***Adaptability in Manoeuvres : Principle of Adaptability***

There must be a consciousness of the need to be adaptive as conditions change.

There are three aspects to the Principle of Adaptability:

Shaping and Flexibility : There are no fixed rules and regulations in war, but react and flow according to the situation

Innovativeness : Proactive in its attempt to dictate the situation through changing methods and schemes

Initiative : Resourcesfulness at the point of decision-making

In business, the CEO need not comply with conventional ways of doing business, and could resort to whatever actions he deems fit, so long as he gains the advantage. Kotler, et al (1985) commented that flexibility and innovativeness have been the visible hallmark of the Japanese to win and penetrate markets. Wee, et al (1991) noted that the Japanese demonstrated initiative to control the time and place of action, and to dominate business situation and the competitors in the early 1980s when the Japanese yen was appreciating remarkably against the US dollar and other European currencies so as not to undermine the competitiveness of the Japanese manufacturing sector.

• ***Creation of Strategic Advantages : Principle of Deception***

Deception is designed to gain strategic advantages in war by distracting the enemy and dispersing his combat power as the enemy does not know where you are attacking or defencing.

Ways of deception are:

Baits : - to lure the enemy out of their position
- to generate complacency in the enemy

Illusions and Fakery : - to conceal your real intention
- to make you more unpredictable
- to use false pretence of vulnerability, humility, weakness, inferiority

Unpredictable or Multiple Courses of Action : - to generate surprise through direct and indirect approach strategies

Baits are abundance in business, eg free gifts, lucky draws, sales, discounts, pioneer status, preferential treatment, liberal foreign exchange controls. Further, many businesses have to be highly regulated to prevent deceptive practices, eg counterfeit products have become big industries in some countries. When Japanese companies first made their moves on the world markets, they were like young maidens with very low profiles and little fanfare about their silent conquests.

The use of varied and unpredictable course of actions is very similar to contingency planning in business, taking into account the alternative use of corporate resources and strategies that could be equally effective.

• ***Choice of Battleground : Principle of Priority (of Goals) and Proactivity***

The General has to choose the right battleground because the whole conduct of battle will depend greatly on it.

Terrain refers to the physical characteristics of the ground, a fixed factor.

Battlegrounds are not necessarily fixed. The General can decide on the type of battleground he wishes to engage his enemy in. The battleground is a variable factor which is to a large extent, controllable.

To consider the following three factors in the choice of battleground:

- areas you have distinctive advantages; areas where you can maximise your strengths
- areas ignored by the enemy : ample time to build up your strengths
- characteristics of the battleground : key to devising the appropriate strategy

A car manufacturer may decide whether to compete in the passenger, commercial or industrial sector (choice of battleground). However, once it makes a choice, its "terrain" is fixed as the forces of competition will be driven by that particular market. Ohmae (1983) noted the tendency of the Japanese to look for different battlegrounds on which to compete with the Western giants so that they would not have to fight head-on.

• ***Attack when in Open Confrontation : Principle of Alternative (In Strategies)***

Open combat is the last resort. The best way is to use a preemptive strategy to counter the enemy. To Sun Tzu, "To win a hundred victories in a hundred battles is not the hallmark of skill. The acme of skill is to subdue the enemy without even fighting." Kotler (1994) put it as "win the war before the war".

Open combat or an all-out war should be avoided. War should only be waged when all other non-war alternatives have been exhausted, and when there are definite advantages to be gained.

When open combat is inevitable, the only way to win is through attacking, and not defence. An invincible defence can only ensure non-loss, but cannot assure victory because it cannot cause the enemy to be vulnerable.

The Principle of Attack must be applied with the intention of achieving relative superiority at the point of contact. In open combat, what matters most is who has relative advantage at the point of contact. Thus a smaller force can easily concentrate his entire force against the scattered few of a larger army. This is the principle of niching in business.

The concept of product life cycle planning dictates one must actively seek for new products, or extend the existing product in order to survive the market forces. The need to be in the offensive to gain market share is recognised by successful companies as they attempt to modify and improve their products, eg Colgate toothpaste, Gillette's razor blades, Wrigley chewing gum, Pampers, Coca-Cola, Shell, Esso, Caltex, Mobil).

Over the last two decades, the success of countries like Japan, South Korea, Hong Kong, Taiwan and Singapore have been attributed mainly to their attacking strategies in international trade. These countries opted for an export-oriented strategy as the engine of economic growth rather than relying on domestic factors. Furthermore, the Four Tigers are now reinforcing their competitive advantage through regionalization, with the support of government incentives, by developing domestic MNEs to achieve world-class status. To overcome the possibility of hollowing out, (ie becoming merely a distributor of its suppliers' products), only high value added/complex products are manufactured and/or assembled locally - simple and relatively standard parts are outsourced or manufactured in countries offering comparative advantages (Meredith, 1992).

5.6 Confucianism

Confucius (551 - 479 BC) was a great philosopher and educator. He organized 2,000 years of Chinese culture into a system of values. His teachings laid the foundations of the orthodox Chinese moral outlook that lasted through 2,000 years of feudal society until the Communist takeover in 1949 when it was declared the Number 1 ideological public enemy. His teachings were blamed for China's backwardness. Blind obedience, rote learning, text memorization, intolerance of dissent and subjugation of the individual are classic examples of facile generalisations and negative impressions of Confucianism, off quoted as stifling China's progress and contributing to its decline.

On the other hand, Confucianism has been popularly touted as the key to the dragons' economic miracle. To Vogel (1992), this is overstating the case. The heartland of Confucianism, mainland China, has not yet achieved an industrial transformation. If Confucianism alone explains why countries modernise, why then should the Confucian motherland lag behind?

China is now seeing a quiet revival of interest in Confucianism as the many years of Marxism did not leave behind a moral structure. Confucius was reviled by the hard line Communists but since the 1980s Beijing has referred to his ideology of self-discipline and social responsibility in their drive to modernise China.

Confucius' influence has spread beyond China to Japan, Korea and several countries in Southeast Asia. "Confucian Culture Sphere" covers all of East Asia and parts of Southeast Asia. Also Confucian ideas have found wide acceptance among scholars and theologians in the West. In 1988, seventy-five Nobel Laureates met in Paris and passed the resolution that if mankind were to survive in the 21st century, it has to go back 2,500 years in time to tap the wisdom of Confucius. Dresdner Bank celebrates the success of the Confucian philosophy in the computer age. It sees Confucianism as a school of thought which laid the groundwork for an unusually favourable economic environment. The foundation for success has been built on an uncompromising recognition of competence, the importance of getting a good education, and especially the individual's profound feeling of being at one with both society and his employer. It also involves duties. For in order to sustain the climate of harmony, each individual is expected to comply with various rules of behaviour. Striving for harmony is a formula for competitive success (*Financial Times*, November 24, 1993).

Confucian virtues are seen as a driving force for economic growth. In August 1991, a 3-day World Chinese Entrepreneurs Convention was held in Singapore. It was unanimous among the 800 guests from over 30 countries that the performance of the "Four Dragons of Asia" (Taiwan, Hong Kong, Korea and Singapore) has confirmed that Chinese culture is the main driving force in Asian economic development. It was agreed at this convention that the formation of a world Chinese entrepreneurs' communications network is expected to generate immense influence on the international economy.

East Asians excel in capital formation, industrial management, commercial, transaction and innovative technology. They share a number of remarkably pervasive tendencies. These include the idea of the self as a center of relationships, a sense of the community of trust modelled on the family, the importance of an established ritual in governing ordinary daily behaviour, the primacy of education as character building, the importance of exemplary leadership in politics, the aversion for civil litigation, the belief in consensus formation and the practice of self-cultivation. The value system that seems to be most compatible with these features is commonly labelled "Confucian ethics" (Tu, 1991).

Confucian dynamism refers to those core values which do not retard innovation and have propelled it to economic recovery, eg the values of thrift, perseverance, system of hierarchical relationships and group cohesion. Even Japan's business sector has acknowledged that Japan's economic success can be attributed to the spirit of Confucianism (Hofstede, 1984).

Confucianism is perhaps the greatest philosophical tradition of China. It is a practical, rational set of principles for order and progress in this life. Confucianism represents everything which is controlled. The way of Confucianism is primarily a system of government and moral code, mastered by study, thought and discipline. The values of the individual who is good and cultivated, nurturing of the family, faithfulness to friends and, loyalty to the State are primary tenets in Confucian philosophy.

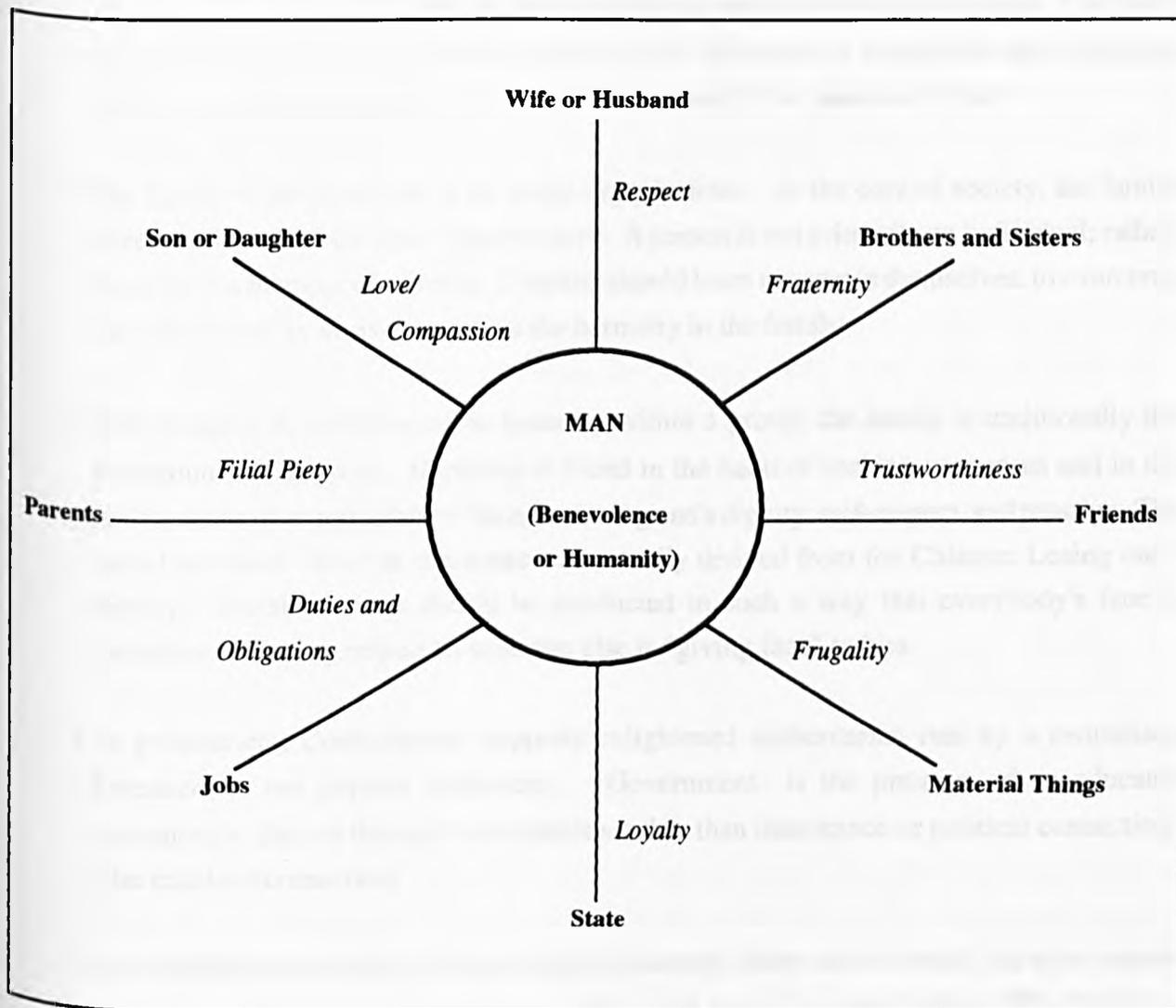
Confucius believed that harmony in the family is the basis for social and political stability, and so the family metaphor is often applied to both the community and the state. Within the community, the "brothers" metaphor is applied to friends. Indeed there is a saying which goes: "All men within the four seas are brothers." The traditional Chinese sense of social cohesion and mutual help, therefore, was extended to an "in-group" - however large this group may have been. Thus, Chinese rely heavily on "Guanxi", mutual support networks, usually consisting of friends, relatives and business associates who provide capital and other assistance for launching their entrepreneurial ventures. "Guanxi" (personal connections) does help to grease the wheels of business. The Confucian tradition of respect for one's social network may be the right twist for today's businesses/markets. The worldwide web of Chinese business make up the world's fourth economic power, after North America, Europe and Japan. The Confucian tradition is remarkably persistent in this web (Kao, 1993).

Confucius' teachings are lessons in practical ethics without any religious contents; Confucianism is not a religion but a set of pragmatic rules for daily life. Confucianism is "this worldly". Man is the center of all relationships; the essence of his human nature is benevolence or humanity ("Do not impose on others what you yourself do not desire"). Different virtues are the moral standards of actions in different relationships. To surmarise, Confucianism is about Commonsense (Franke et al., 1991). See Figure 5.5

The following are the key principles of Confucian teaching:

- The stability of society is based on unequal relationships between people. The five basic

FIGURE 5.5 DIFFERENT VIRTUES ARE THE MORAL STANDARDS OF ACTIONS IN DIFFERENT RELATIONSHIPS



Source: Lau, Kwok-Keung (1991), "An Interpretation of Confucian Virtues and their Relevance to China's Modernisation" in Confucianism and the Modernisation of China. Silke Krieger, Rolf Trauzettel (Eds.), Hase and Koehler Verlag Mainz, Germany, pp. 213

relationships, are ruler/subject, father/son, older brother/younger brother, husband/wife, and older friend/younger friend. These relationships are based on mutual, complementary obligations. The ruler must be righteous to enable the subject to become obedient. The father must be loving to encourage filial piety in the son. The husband should take care of matters outside the family, while the wife should be responsible for domestic affairs

- The family is the prototype of all social organizations. At the core of society, the family becomes the model for other organizations. A person is not primarily an individual; rather, he or she is a member of a family. Children should learn to restrain themselves, to overcome their individuality so as to maintain the harmony in the family
- Individualism is subordinated to harmony within a group; the family is traditionally the paramount social group. Harmony is found in the habit of seeking consensus and in the maintenance of an individual's "face," meaning one's dignity, self-respect, and prestige. The use of the word "face" in this sense was actually derived from the Chinese: Losing one's dignity. Social relations should be conducted in such a way that everybody's face is maintained. Paying respect to someone else is "giving face" to him
- In government, Confucianism supports enlightened authoritarian rule by a centralised bureaucracy, not popular democracy. Government is the preserve of an educated bureaucracy, chosen through examinations rather than inheritance or political connections (the scholar-bureaucrats)
- Virtuous behaviour toward others consists of treating others as one would like to be treated oneself: a basic human benevolence. Virtue with regard to one's tasks in life consists of working hard, not spending more than necessary, being patient, and persevering. Conspicuous consumption is taboo, as is losing one's temper. Moderation is enjoined in all things
- Education is vitally important to ensure the well-being of the individual and safety of the state. Knowledge increases wisdom, and is the result of study and learning. The wise are therefore students not for a few years at school, but for life. Study and learning is an arduous process which is never accomplished. Education inspires the most highly trained to serve their community and country, while preparing the bulk to view learning as the path to improving their lot in life. Education should be made available to all. For a long time, education had

been a ladder of upward mobility for the ordinary Chinese that led to government office - and with its power, fame and wealth

- The emphasis on education rests on the Confucian belief in the perfectibility of man. Confucius, who saw virtue as the basis for individual dignity, social order and political stability, also thought that virtue could be cultivated through education and self-discipline. He believed that there is an intrinsic value in education for it is not merely to satisfy the intellect; it is also for the cultivating and changing of the whole person, for his moral good
- Knowledge and practice cannot be separated. This is the principle of "unity of knowledge and action". Knowledge is the direction for action and action the effort of knowledge. Knowledge is the beginning of action and action is the completion of knowledge. Learning involves both theory and practice. The more clearly one knows, the more earnestly one practices. The more earnestly one practises, the more clearly one knows. There are five major phases in the Confucian learning process:
 - extensive study
 - intelligent questioning
 - careful thinking
 - clear discrimination
 - earnest practice

Knowledge is related to truth, sincerity and honesty. The search for knowledge aims to discover the truth about people and things in the scientific spirit of honest questioning, sincere investigating and open-mindedness.

5.7 The Notion of Competitive Nations and Communitarian Ideology

According to Lodge (1991), there is such a thing as a competitive nation; an ideology is perhaps a nation's most competitive advantage. A country with a communitarian ideology like Japan, Taiwan and Singapore will be more competitive than an individualistic one like the USA if that ideology gives high priority to competitiveness and if institutions such as government and business are efficiently aligned with it and share the will, the purpose. Nations may have strategies, and some like Singapore, Japan, South Korea, and Taiwan all have strategies that help them compete (Goldstein, 1991). These strategies are characterised by high savings and high investment with low capital costs in selected industries, which are chosen by government and business as targets for national endeavour. These strategies are

backed by a strong consensus among the people and between the manager and the managed. They are complemented by trade policies which encourage designated winners, but do not protect uncompetitive losers. They are accepted as a necessity. With them comes an emphasis on education and skills developments (Goh, 1993).

Reich (1991) estimated that four to five out of ten Japanese have "symbolic analytical capability", compared to only two out of ten Americans. He expounded the view that economic competition depends on which country has workers of better education and skills. The role of government is to ensure that the people's skills and insights are as developed as possible, from investing in pre-natal education right up to providing money for research and development and infrastructure. In the future, people will not be talking about the competitiveness of a nation's economy but rather the competitiveness of its populations. The only difference between the Japanese and the American economies will be in the percentage of the population equipped with symbolic analytic capabilities (Ishihara, 1994).

Culture and education have been the key factors behind the rapid growth of Japan and the NIEs. During the last 40 years, the group-oriented values of the East, combined with a free enterprise system, have resulted in high economic performance. Some Western scientists had called such East Asian countries "communitarian" societies - in which individuals were prepared to make sacrifices for the good of the country and its progress. The Japanese have the right attributes for high group performance. They are hardworking, business oriented, highly competitive and pragmatic. But the other East Asians, Koreans, Chinese, Vietnamese, are not inferior in these qualities, as their histories bear out. They share many characteristics derived from a common cultural base which is Chinese in origin. The history of these countries has also resulted in strong social cohesion within their societies. They have learnt the valuable lesson that to make the greatest progress in the shortest possible time, it is necessary for a people to move in unison. And this implies the need for individuals to make sacrifices for the good of the country and its progress. The concepts of group cohesion, community trust and mutual help, hardwork and thrift are rooted in Confucian teachings.

Communitarianism takes a more organic view, regarding the society as more than the sum of the individuals and requiring explicit definitions of its needs and priorities. Competition in world trade is among nations as well as companies, and governments compete to make their jurisdictions the most hospitable locations for global production systems. The edge is created through collective action following the dictates of a national strategy laid down by government

in collaboration with business. The Asian countries have clearly defined their community need as maintaining competitiveness in the world economy. This has been and is top priority. Singapore has certainly embraced competitiveness as a national goal. Singapore is an island of 626.4 sq km, with no natural resources and a population of 3.1 million. Unable to fall back on natural resources, it has directed its energies into making the most of its human resource. The American risk consultancy - *Business Environment Risk Information* - has rated the Singapore Worker as number one in the world in the past ten annual surveys.

Japanese workers have also made the nation's competitiveness their top priority. Initially, few Japanese companies possessed the resource base, manufacturing volume, or technical prowess of the US and European industry leaders. Today, Japan is now the second largest economy in the world.

The traditional ideology of the US and some Western industrialised countries (eg EU) exemplifies human rights/individualism. Individualism suggests an atomistic view of society. The individual is the ultimate source of value and meaning. The interests of the community are defined and achieved by self-interested competition. Individualism assumes a world economy in which numerous private companies compete with one another, producing in one country and exporting to the open markets of another. The role of government is to keep the market place free and open. Lodge (*Straits Times*, January 8, 1991) identified the dogmatic adherence to an outmoded individualistic ideology - where the individual is the ultimate source of value and meaning - as the cause of the US economic decline in the 20th century. The principle of individualism, which forms the foundation of the American value system, has led to an economically uncompetitive America. Lodge noted that this difference in ideology had led to the different rates of economic progress in the USA and countries like Japan and Singapore. The challenge for the USA is to move in a communitarian direction to compete effectively once more.

The characteristics of communitarianism are:

- *Equity of Result or Hierarchy* : In the West, there has been a shift away from the old notion of equality before the law. It used to be equality of opportunity, an individualistic conception under which blacks, whites, men, and women presumably had an equal place.

In both the USA and Europe there has been increasing concern in recent years that the old

idea was not insuring adequate or acceptable results. Too many were being left behind. Thus, in a variety of ways, governments have intervened to impose guarantees and safeguards. Under this idea, the good corporation or community is one that adapts itself to inequalities in the surrounding environment so as to produce equality of result.

In modern Japan, this slot in communitarian ideology has generally been filled not at all by equality but by the notion of hierarchy, ie individual fulfilment and self-respect result from knowing and accepting one place in a social structure.

- *Rights and Duties of Membership* : Duties are just as integral a part of communitarian ideology as rights. If the community assures rights, it must - and eventually will - require duties. In Japan, duties are regarded as equally if not more important than rights.
- *Community Need*: The needs of the community for clean air and water , safety, energy, jobs, competitive exports are becoming increasingly distinct from, and more important than, what individual consumers may desire. As a consequence, the means of determining community need requires explicit attention, especially when it is impossible for the community to meet all its needs at once.

Business purpose is fixed by community need as defined by the community, generally through government or with its participation. Once community need has been determined, business activity can be harmonized with it in four ways: prescribed or ordered marketplace competition; regulation of business by government; partnership between government and business; and the corporate charter through which government gives business its license to exist. A wise choice among the four requires a clear definition of community need in the first place, a reliable delineation of the relevant community, and an understanding of what makes a business function efficiently and effectively in different social settings.

It is important to note that although communitarians are not prepared to leave the definition of community need to the vagaries of the marketplace, they may well allow the use of competition in the marketplace as a means of controlling and directing the activities of business toward the implementation of that need. The Asian communitarians seem to be substantially more probusiness than the more individualistic West. Their conception of the purpose of business is closely tied to community need.

- *The Active, Planning State* : The role of the state is to define community needs and to insure that they are implemented. Inevitably, the state takes on important tasks of coordination, priority setting, and planning. It needs to be efficient and authoritative, capable of making the difficult and subtle trade-offs among, for example, environmental purity, energy supply, economic stability and growth, rights of membership, and global competition.
- *Holism - Interdependence* : The idea of scientific specialization is replaced by a consciousness of the interrelatedness of all things.

To understand any particular aspect of a community, for example, its economic performance, it is necessary to view the community as a system, perceiving the critical roles and relationships of institutions, such as government, business, labour union, and school. There is no separation between what the economists refer to as "macro" and "micro". The motivation of workers on the shop floor is inseparably tied to overall policies and incentives having to do with savings, investment, and work.

- *Consensus* : The relationship between individuals are governed not so much by *contract* as by *consensus*, which may be imposed autocratically by fiat or arrived at through democratic and participative means. The right to manage is coming from the managed in democratic systems or from government in autocratic ones.

In South Korea and Japan, consensus in the community as a whole is usually imposed by a ruling elite, with government playing a leading role in its design and enforcement. Where dissidents are not suppressed, they are co-opted by a process that Asian communities condone through the religious conviction that consensus is a moral virtue.

Many American intellectuals look to countries such as Japan and Korea for lessons about social solidarity - communitarians are particularly sensitive to social context as they recognise that different communities have different problems. In some communities, an increase in social responsibilities would have the most beneficial impact on human well-being, whereas in others there might be a more pressing need for freedom of expression and democratic rights. The evaluation of what is a proper moral stance will vary according to the circumstances of time and place. For example, the Americans place great emphasis on China about human rights but, on the other hand, believe in pursuing individualism, democracies, and social responsibilities.

Within communitarianism there is little conceptual space for individual rights. Constrained within the conceptual space of collective interests, no individual or group can assert its own right as a basic condition of existence, lest the assertion be read as unacceptable self-interest, potentially detrimental to the whole. However, as consensus is required, legitimate interest groups have the right to be consulted in consensus formation. This right differs from liberal concepts of individual rights, which are conceived as "transcendental" and "natural" rights to be protected against state infringement. In contrast, it is constituted pragmatically, on grounds that consensus can emerge only when all identifiable interests parties are consulted and differences accommodated where possible.

Central to communitarianism is the idea that collective interests be placed above individual ones. Logically, the substance of collective interests should be based on the consensus of the collective itself. However, within a modern state, rationalised on the technical difficulty of soliciting opinions from all interested and affected parties, the elected political leadership readily assumes for itself the position of defining the national interests for the governed. There is thus a conflation of government and society.

This conflation of government/society enables the elected to slip into authoritarianism, either in a genuine belief of acting in the collective welfare or merely using it in a self-serving fashion. The result is an interventionist state which justifies the interventions as pre-emptive good measures to ensure collective welfare. Thus, while logically communitarianism does not favour any form of government, in practice it often spawns authoritarianism. The government plays a more extensive role of vision setter, planner and consensus maker.

Fukuyama (*Business Times*, February 18, 1992) saw a potential competitor to western liberal democracy in the soft authoritarianism in Japan, South Korea and Singapore. While Japan and South Korea may formally share the West's system of constitutional democracy, their societies are ordered according to inegalitarian group hierarchies that emphasize conformity to group interests over individual rights.

In Asia, it is argued, capitalism has become far more universal than democracy, and countries there have found a way to reconcile market economics with a kind of paternalistic authoritarianism that persuades rather than coerces. This alternative, in the view of Singapore's Senior Minister Mr Lee Kuan Yew, comes more naturally to Asian societies than Western liberal democracy, since it builds on Asia's shared Confucian traditions.

It is clear that Asia's post-war economic success is the chief factor legitimising the region's soft authoritarianism. This alternative can be the underpinning of the thoroughly modern, technologically based society by promoting a highly disciplined and educated work force. But the advantages of such a society lie as much in the moral realm as in the economic, because if there is any broadly felt sense of social malaise in the US and other Western societies today, it has to do with the loss of community, the absence of any meaningful sense of local attachment and the fragmentation of national purpose.

With their stress on group identity, Asian societies have in a sense already realised the communitarian ideal praised by Western politicians. On the other hand, there are some problems with Asia's soft communitarianism. In the first place, it is a tremendous oversimplification to speak of a single Asian alternative or a uniform Confucian inheritance affecting all states in the region. While Japan is a far more conformist society than the USA, it is far more individualistic than it was 45 years ago, or than Singapore is today.

As countries mature economically, they tend to produce increasingly well-educated middle classes that are connected to the world's marketplace of ideas. It is no accident that Asia's three most economically developed societies - Japan, Taiwan and South Korea - are also the most Westernised in terms of political institutions because citizens of prosperous middle-class societies begin to demand a variety of other goals beyond economic growth, such as recognition of their status and political participation.

The second problem with Asia's group-oriented alternative is that it is ultimately based on irrational distinctions between human communities, and leads to conflict, among them. All strong communities must be based on some form of exclusivity. Indeed, the stronger the community, the more pronounced its exclusiveness. Ultimately, the result is intolerance of outsiders in domestic politics, and frequently nationalism of an aggressive sort in international relations.

Japan's well known lack of intolerance for things non-Japanese could some day become a serious economic and political liability because, like any advanced economy, Japan cannot export all low-wage jobs and faces a critical labour shortage in the next generation.

Moreover, the fact that many Asian societies share a common Confucian inheritance does not mean that they believe they share a common destiny. In societies built on communitarian

principles, the largest meaningful group is the nation, which ultimately cannot share common purposes with other nations. Thus, while Asia as a whole may out-compete America economically, who in the end will save Asians from each other and from the nationalism implicit in their social structure? The final question raised by the Asian alternative is whether, in the long run, human beings are really made happy by the sacrifice of their individuality to larger communities.

The coercive apparatus of the state is a notoriously ineffective and unreliable instrument to sustain and promote communitarian relationships. Communitarian thinkers of the past such as Hegel and De Tocqueville argued that it is through non-governmental intermediate organizations that a broader notion of public-spiritedness is possible. As part of a trade union, mosque, church, professional association, women's group, or environmental organization, individuals acquire the power to exert an effective influence on broader public issues and this, more than anything, allows for the exercise of civic virtues (Bell, *Trends, Business Times*, March 27 - 28, 1993).

5.8 Business and Management Ethos

The term "ethos" (in the Oxford Advanced Learner's Dictionary, Fourth Edition, 1989) refers to the characteristic spirit, moral values, ideas or beliefs of a group, community or culture. Hence, business and management ethos refers to management philosophy and corporate culture, (ie basic attitudes towards business, enterprise, people and certain ways of conduct).

The management of the company believes, as illustrated by what it says and what it does, that certain policies, philosophies and attitudes should pervade the entire organization. It is clear statements of belief (creed) relating to people and management practices. These beliefs take precedence over and serve as screens for all strategic plans, actions, and decisions.

In the company, the pervasive understanding of the philosophy and its implications leads to reinforcing behaviour at all levels and makes the likelihood of consistency and prioritised efforts much greater. Allegiance to the company is strong. Employees use common terms and have a set of common examples (eg "forklore") and way of doing things. There is a sense of tradition and continuity within the company. There is a sense of pride and a common bond. Such an overriding philosophy specifies the kind of company it is, how it is viewed by competitors, stockholders, employees and the public.

Understanding an organization's corporate culture is vital for management if it is to encourage high performance and maintain shareholder value. Strategies will not work effectively without some prior understanding of the organization's culture (Hampden-Turner, 1992).

One useful description of corporate culture is by Ed Schein of MIT (1990):

"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 to be taught to new members as the correct way to perceive, think, and feel in relation to these problems."

Schein sees cultures as operating at three levels of more or less visibility, and this model is useful in considering how corporate identity can be used in programs to change corporate culture (see Figure 5.6).

According to Hofstede (1991), the core of culture is formed by values. Values are broad tendencies to prefer certain states of affairs over others (see Figure 5.7).

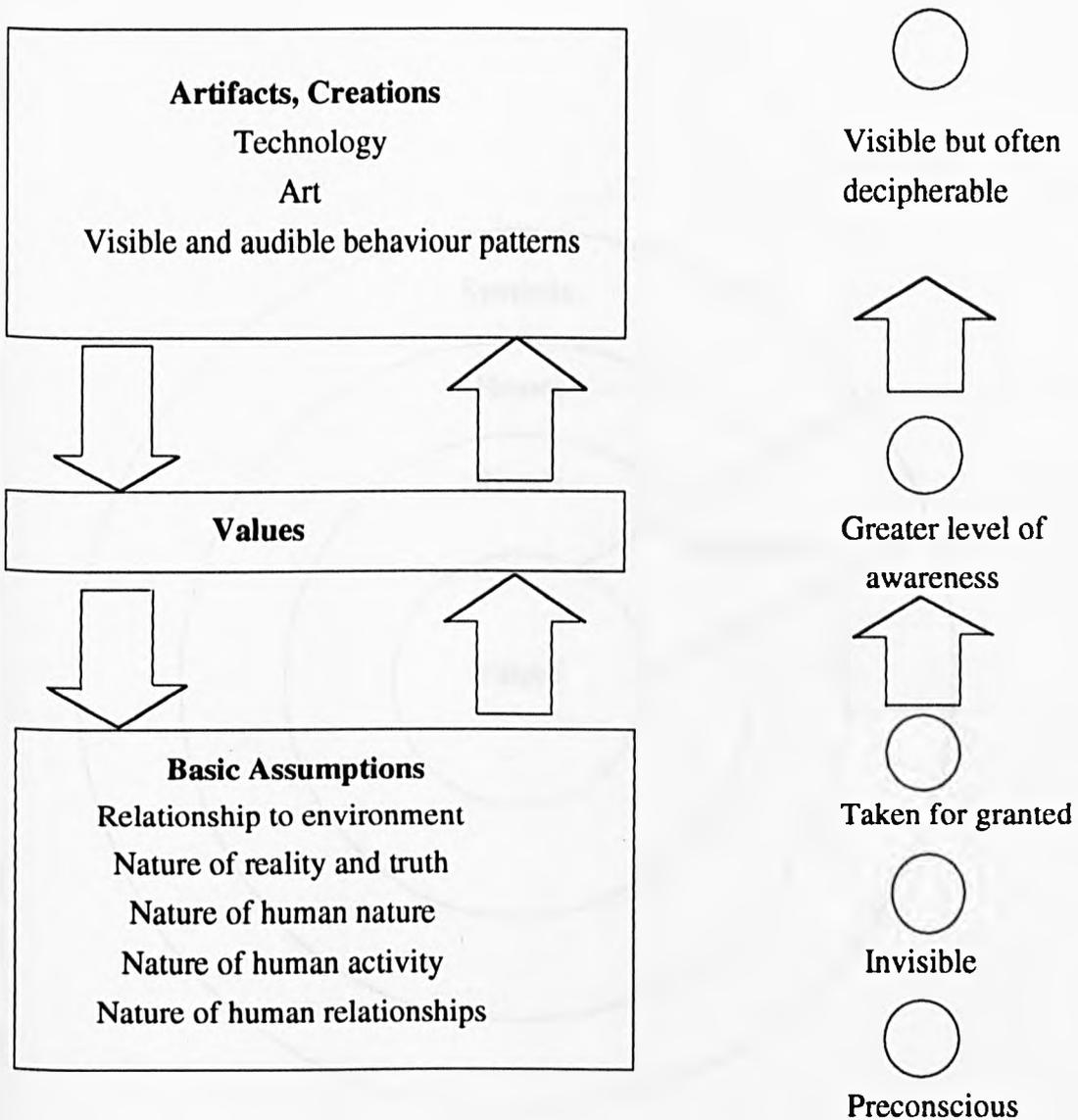
The McKinsey model (Athos and Pascale, 1981), is another approach to understand corporate culture (see Figure 5.8). Meanings can only be generated if we create harmony and coherence among all seven "S"s. The strategy has to be one for which the systems are in place and which the organization's structure is capable of delivering. Staff must be capable of working the strategy through and must have the skills to learn through it and from it. This, in turn, will require the appropriate management style. The whole is orchestrated by superordinate goals to which all employees commit themselves, often using spontaneously improvised means of realizing these. This totality constitutes the organization's culture, a pattern which is more or less harmonious.

Some examples of business and management ethos are in Annex 6.

5.9 World-Class Status

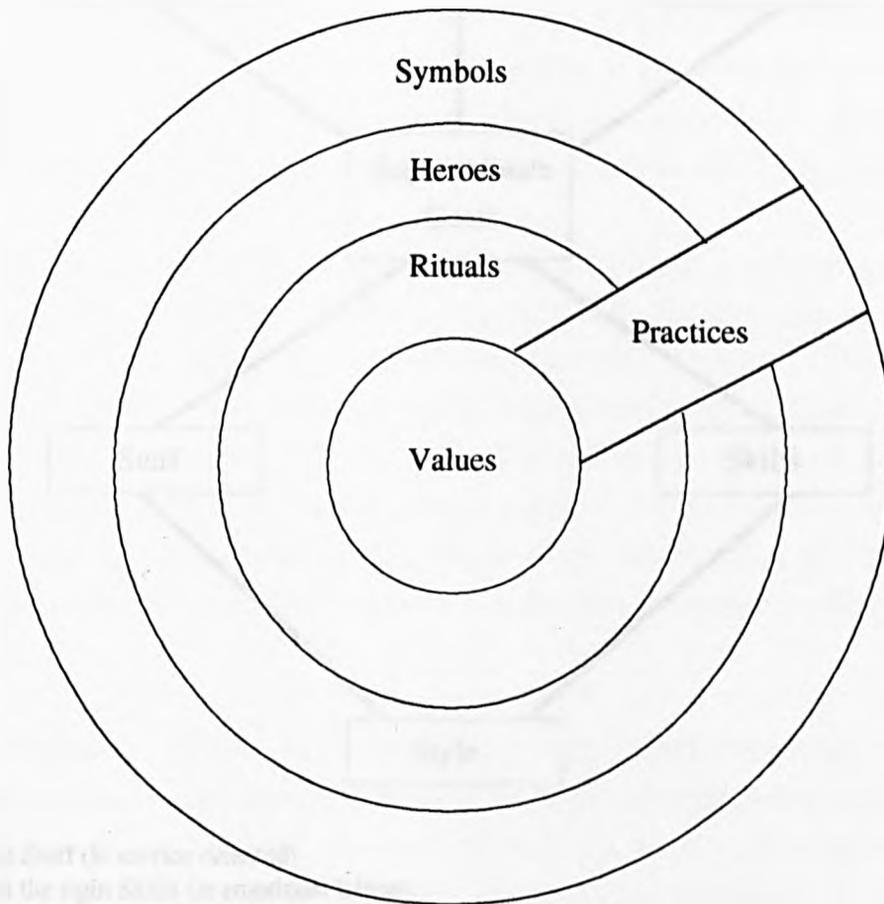
Among the most popular terms in the business lexicon is "world-class". This interest in being "world-class" is due to a single factor - increased international competitiveness. With the new technologies for acquiring information about specific markets, and with the ability to

FIGURE 5.6 SCHEIN'S THREE LEVELS OF CULTURE



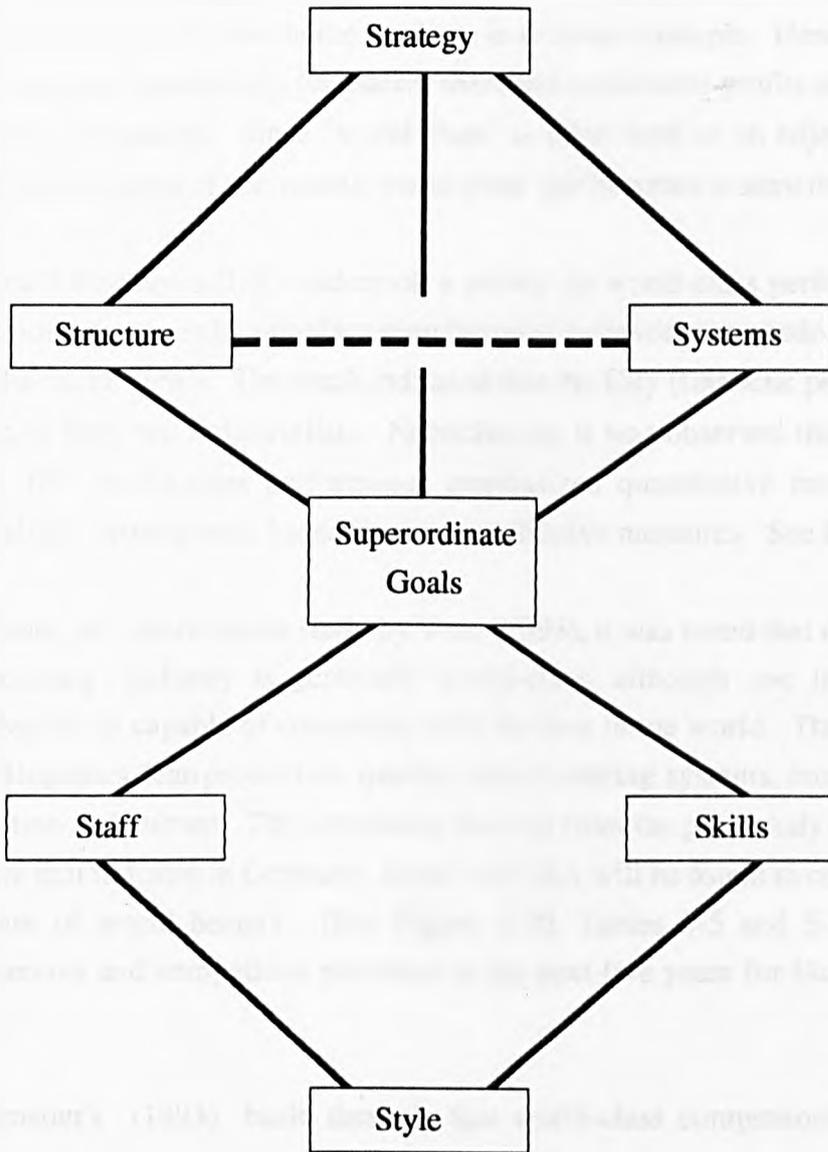
Source: E. Schein (1990), "Organizational Culture : What It Is and How to Change It," in P. Evans et al (Eds.), Human Resource Management in International Firms , St. Martin's Press, New York.

FIGURE 5.7 THE "ONION DIAGRAM": MANIFESTATIONS OF CULTURE AT DIFFERENT LEVELS OF DEPTH



Source: Hofstede, Geert (1991), Cultures and Organisations: Software of the Mind. McGraw-Hill, London.

FIGURE 5.8 THE MCKINSEY SEVEN 'S' DISGRAM



Footnote:

- hire the right Staff (ie service oriented)
- train them in the right Skills (ie emotional labour)
- manage them in the Style required (ie trust, expectation)
- select values to Share with them (ie customers first)
- instal the right Systems (ie performance appraisal)
- improve the Structure (ie less hierarchy, more cross-functional teams)

Source: Adapted from Athos, Anthony G. and Pascale, Richard Tanner (1981). The Art of Japanese Management. Penguin Books, London, pp. 202.

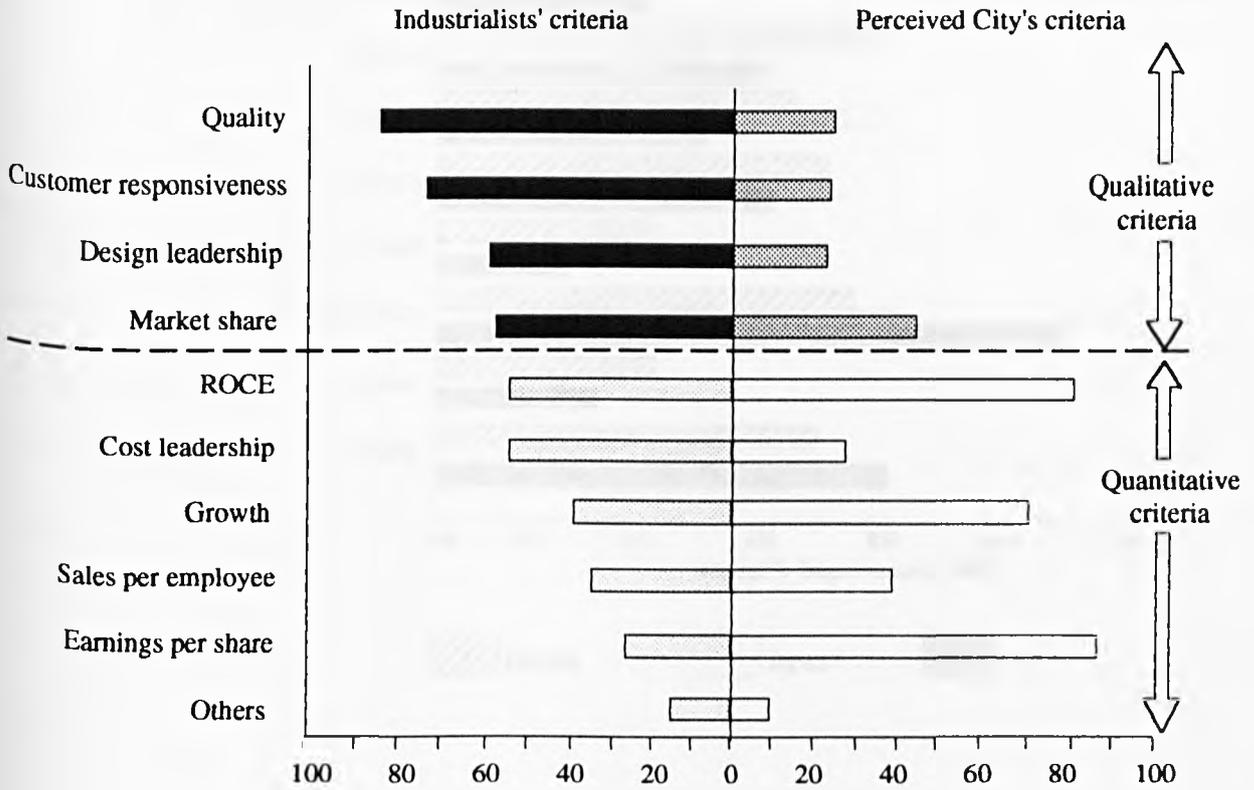
move easily into new markets with competitively superior products, companies no longer need to view geography as a significant deterrent to market entry. The rapidity with which Japanese CNC machine tool builders took market share from American and German machine tool manufacturers, even in their home markets, is a classic example. Hence, companies which want to compete successfully for market share and sustainable profits are striving to become world-class companies. Since "world-class" is often used as an adjective to describe the superior achievement of companies, world-class performance is something to strive towards.

Ingersoll Engineers (UK) undertook a survey on world-class performance to highlight what senior executives in manufacturing business believed was needed to make companies successful in the 1990s. The result indicated that the City (financial people) had a different perspective from the industrialists. Nevertheless, it was observed that the perceived City criteria for world-class performance emphasized quantitative measures, whereas the industrialists' criteria were based on more qualitative measures. See Figure 5.9.

However, in a more recent study by Voss (1993), it was noted that only 2 percent of UK manufacturing industry is genuinely world-class, although one in six plants believe themselves to be capable of competing with the best in the world. The factors it looked at included logistics, lean production, quality, manufacturing systems, concurrent engineering, organisation and culture. The conclusion derived from the pilot study of 88 companies led to believe that industry in Germany, Japan and USA will be found to contain a much higher proportion of world beaters. (See Figure 5.10, Tables 5-5 and 5-6 for performance improvements and competitive priorities in the next five years for Europe, Japan, and the USA).

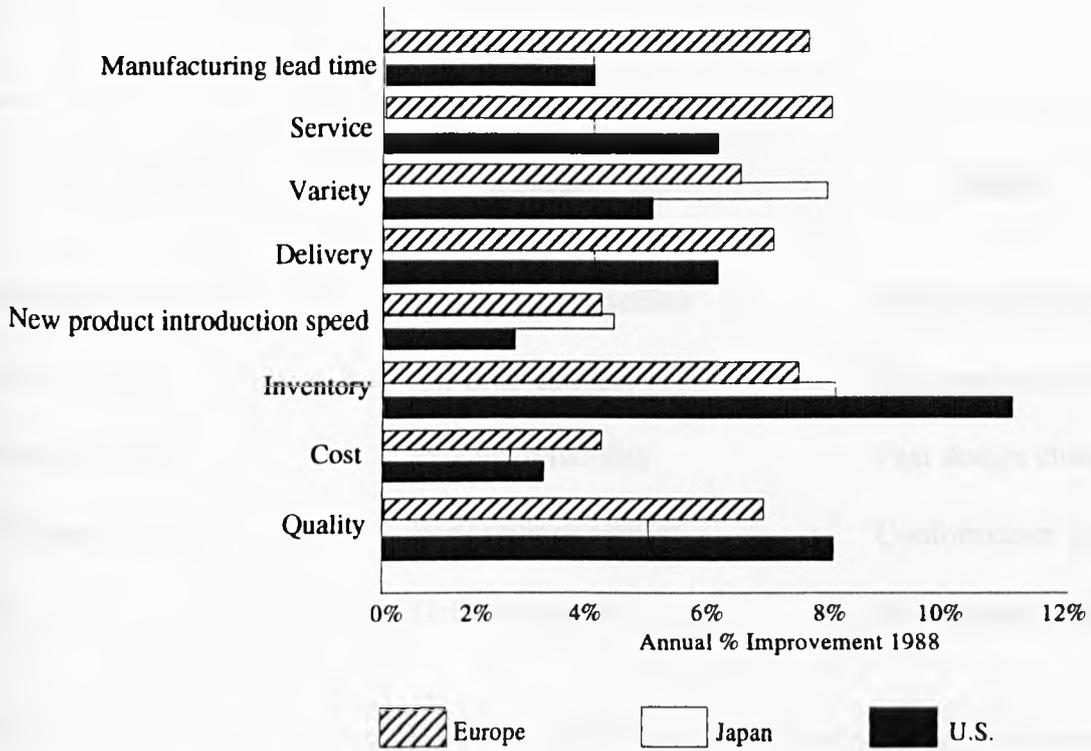
Schroeder's (1993) basic thesis is that world-class competitors transcend national boundaries and follow most of the same principles of infrastructure management. Even if a company does not have an "international product", it can learn much from the companies that are world-class competitors. These principles are followed by the best Japanese, German, and American companies. Every company has to adapt to the circumstances in its industry. But the world-class companies seem to have some things in common. If these principles are applied with a grain of commonsense and adaptation to the circumstances, management can develop a plan for achieving world-class status. That, in the end, is the essence of manufacturing/operations strategy, choosing that set of policies, principles, concepts, tools, techniques that best fit the situation and objectives of the company.

FIGURE 5.9 INDUSTRIALISTS' VIEW OF THE CRITERIA FOR DEFINING WORLD-CLASS PERFORMANCE



Source: Ingersoll Engineers (1990), World Class Performance Survey. Ingersoll Engineers Ltd, Coventry, UK.

FIGURE 5.10 PERFORMANCE IMPROVEMENTS, 1986 - 1989



Source: Miller, Jeffrey G., DeMeyer, Arnoud and Nakane, Jinichiro (1992), Benchmarking Global Manufacturing: Understanding International Suppliers, Customers, and Competitors. The Business One Irwin/APICS Series in Production Management, Homewood, Illinois, pp. 11.

TABLE 5-5 TOP FIVE COMPETITIVE PRIORITIES IN THE NEXT FIVE YEARS

<u>United States</u>	<u>Europe</u>	<u>Japan</u>
Conformance quality	Conformance quality	Product reliability
On-time delivery	On-time delivery	On-time delivery
Product reliability	Product reliability	Fast design change
Performance quality	Performance quality	Conformance quality
Price	Delivery speed	Product customization

Source: Miller, Jeffrey G., DeMeyer, Arnoud and Nakane, Jinichiro (1992), Benchmarking Global Manufacturing: Understanding International Suppliers, Customers, and Competitors. The Business One Irwin/APICS Series in Production Management, Homewood, Illinois, pp. 162.

TABLE 5-6 **MOST IMPORTANT IMPROVEMENT PROGRAMS IN THE NEXT TWO YEARS**

<u>United States</u>	<u>Europe</u>	<u>Japan</u>
• Linking manufacturing strategy to business strategy	• Linking manufacturing strategy to business strategy	• Integration of information systems in manufacturing and across functions
• Giving workers broader tasks more responsibilities	• Integrating information systems in manufacturing	• Developing new processes for new products
• Statistical process control	• Quality function deployment	• Production and inventory control systems
• Worker and supervisor training	• Training of supervisors, workers and managers	• Developing new processes for old products
• Interfunctional work teams	• Integrating information systems across functions	• Linking manufacturing strategy to business strategy

Source: Miller, Jeffrey G., DeMeyer, Arnoud and Nakane, Jinichiro (1992), Benchmarking Global Manufacturing: Understanding International Suppliers, Customers, and Competitors. The Business One Irwin/APICS Series in Production Management, Homewood, Illinois, pp. 163.

New (1993) conducted a field research on 188 plants in the UK that pursued the goals of world-class manufacturing (WCM). Ten characteristics essential for WCM were identified from the best factories:

- Be a team
- Commit to quality
- Train the workforce
- Empower the people
- Simplify the manufacturing process
- Audit what you plaudit
- Watch the detail
- Serve the customer
- Be patient
- Be flexible

In addition, those companies that pursue the WCM strategy achieved a:

- Reduction of inventory investment by 50 percent or more
- Reduction in manufacturing lead times by 50 percent or more
- Reduction in overhead/support labour by 50 percent or more
- Reduction of inventory investment by 50 percent or more
- Reduction in manufacturing lead times by 50 percent or more
- Reduction in overhead/support labour by 50 percent or more
- Reduction in manufacturing costs by 30 percent or more
- Enhance speed of new product at two to three times the present rate
- Improve quality to a "parts per million" defect level

Nevertheless, not every process needs to be world-class. The capability of a business system should be balanced, (ie one process should not out-perform other processes). The responsibility of management is to manage the business processes and relationships as a complete system. Processes that are out of control should be provided with sufficient resources to bring them into balance with the business system. If a process provides a strategic competitive advantage, resources should be reallocated to permit that process to perform to its competitive domain.

Watson (1993) provided an operating definition of a company that may be considered as a world-class player. It is considered one which:

- Knows its processes better than its competitors know their process
 - Knows the industry competitors better than its competitors know them
 - Know its customers better than its competitors know their customers
 - Responds more rapidly to customer behaviour than do competitors
 - Uses employees more effectively than do competitors
 - Competes for market share on a customer-by-customer basis
- 

Market Intelligence

Action-Oriented

To be successful, world-class companies can no longer compete on a single dimension, such as cost. Instead, they must excel at several of the traditional strategic elements. Cost leadership, high quality and superior customer service levels are now the basic ingredients of success (see Figure 5.11)

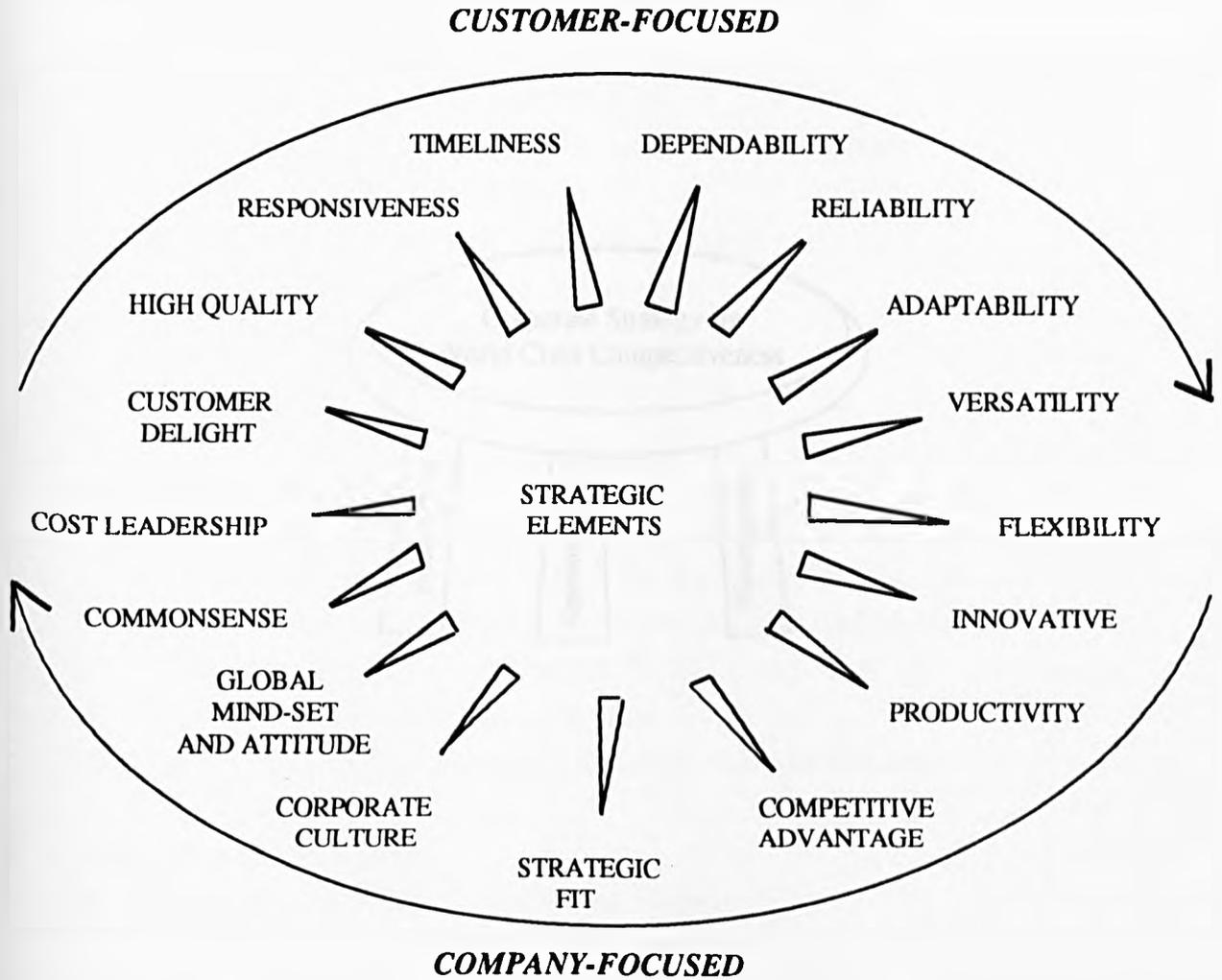
A truly world-class manufacturing company must be a world-class manufacturer as well as a world-class marketer to compete on a global basis. Today, a number of products are passing through their life cycles using a single process facility. Information, software and R&D are becoming increasingly more important than equipment and hardware. With competition based on time, and with the customer an integral part of the process, manufacturing is turning into a service. These changes are so significant that whole organizations should be redesigned to accommodate them. Interfunctional co-ordination, cooperation and communication are keys to successful corporate strategy.

Though manufacturing plays a pivotal role, other functional strategies (the output is a functional strategic plan) are no less important, eg, marketing, finance, human resources, etc (see Figure 5.12 and Tables 5-7 and 5-8). The framework for the company embodies the human, management, technology and strategic components (see Figure 5.13). It is an integrated systems and relationship management approach (new product process, the rational factory, integrated logistics, integrated organization, integrated information). See Figure 5.14.

5.10 The Concept of Globalisation

Technology has made people everywhere more alike in their wants and buying behaviour. Competitive companies should look into taking advantage of enormous economies of scale (in

FIGURE 5.11 BASIC INGREDIENTS OF SUCCESS FOR WORLD-CLASS COMPANY



Source: Author

FIGURE 5.12 THE BASIS OF A SOUND STRATEGIC PLAN FOR WORLD-CLASS MANUFACTURING COMPETITIVENESS



Source: Steudel, Harold J. and Desruelle, Paul (1992), Manufacturing in the 1990s: How to Become a Mean, Lean, World-Class Competitor. Van Nostrand Reinhold, New York, pp. 18.

TABLE 5- 7 SUMMARY OF THE TWENTY CHARACTERISTICS OF WORLD-CLASS MANUFACTURING COMPANIES

Management/Employee Involvement

1. Visionary Leadership and Champions
2. "New Culture" Goals and Thinking
3. Long-Term Strategic Plan and Direction
4. Employee Involvement and Human Resource Development
5. Integrative and Holistic Objectives
6. Goal-Consistent Measurement/Reward Systems
7. Product or Customer-Focused Organization
8. Good Communication Systems and Practices
9. Promotion/Support of Research and Education

Quality

10. Customer-Driven Product Development and Marketing
11. Cross-Functional Teams for Product Design/Manufacturing
12. Individual Responsibility and Continuous Quality Improvement
13. Statistical Process Control of Key Product Characteristics
14. Emphasis on Innovation and Experimentation
15. Partnership-Like Relationships with Quality-Certified Vendors

Production Operations

16. Continuous-Flow Processing/Cellular Manufacturing
17. Demand-Based, Not Capacity-Based, Processing
18. Quick Changeover Procedures/Small Lot Sizes
19. Emphasis on Standardizing/Simplifying Before Automating
20. Preventive/Predictive Maintenance Programs

Source: Steudel, Harold J. and Desruelle, Paul (1992), Manufacturing in the 1990s: How to Become a Mean, Lean, World-Class Competitor. Van Nostrand Reinhold, New York, pp. 10.

TABLE 5-8 CHARACTERISTICS OF WORLD-CLASS PRODUCTION/OPERATIONS

<p>WORLD-CLASS PRODUCT STRATEGY</p> <ul style="list-style-type: none"> Focuses on one or only a few products or technologies Designs products to be quality robust and continually improves product quality Continually introduces new products, and variations and options for those products Provides strong communication between customer, product, process, and suppliers Links product strategy and investment to market share, product life cycles, and breadth of product line 	<p>WORLD CLASS HUMAN RESOURCE STRATEGY</p> <ul style="list-style-type: none"> A high degree of employee participation and commitment to objectives is present Few job classifications Employees are cross-trained and can perform a variety of jobs Open communication is enhanced via few hierarchical levels Mutual trust and respect are fostered, resulting in high level of morale Outstanding staffing via effective recruiting, selection, training, and retention is attained.
<p>WORLD-CLASS PROCESS STRATEGY</p> <ul style="list-style-type: none"> Designs direct material flows with each operation adding value Encourages development of special, uniquely efficient proprietary equipment or process Generates a dollar of sales with low capital requirements relative to the competition Makes investment decisions on a criterion of winning profitable orders Uses ROI as only one criterion for investment 	<p>WORLD-CLASS SCHEDULING TACTICS</p> <ul style="list-style-type: none"> Capital is effectively used by high utilization Processes are shut down when demand does not exist Facility and capital utilization is enhanced via effective scheduling Stable production schedules (requirements) are developed Flexibility in production scheduling to meet customer demand is maintained
<p>WORLD-CLASS LOCATION STRATEGY</p> <ul style="list-style-type: none"> Uses work cells and focused facilities Adds value with each movement of material by streamlining material flow 	<p>WORLD-CLASS INVENTORY TACTICS</p> <ul style="list-style-type: none"> Minimize investment in inventory Uses JIT techniques to minimize work-in-process inventory and to ensure consistent quality Uses cycle counting, not annual physical inventories
<p>WORLD-CLASS PROCUREMENT STRATEGY</p> <ul style="list-style-type: none"> Suppliers are evaluated and then developed into world-class performers Suppliers are integrated into the production system and the requirements of the end customers Suppliers develop just-in-time techniques 	<p>WORLD-CLASS QUALITY TACTICS</p> <ul style="list-style-type: none"> Quality is approached via quality management, not quality control Employee participation in quality enhancement is widespread Quality is the major determinant of supplier relationships Continuous quality improvement is seen as a major way to reduce cost as well as win orders <p>WORLD-CLASS MAINTENANCE TACTICS</p> <ul style="list-style-type: none"> Preventive maintenance is excellent, reducing variability in throughput Operating employees are trained to do equipment inspection and and minor preventive maintenance

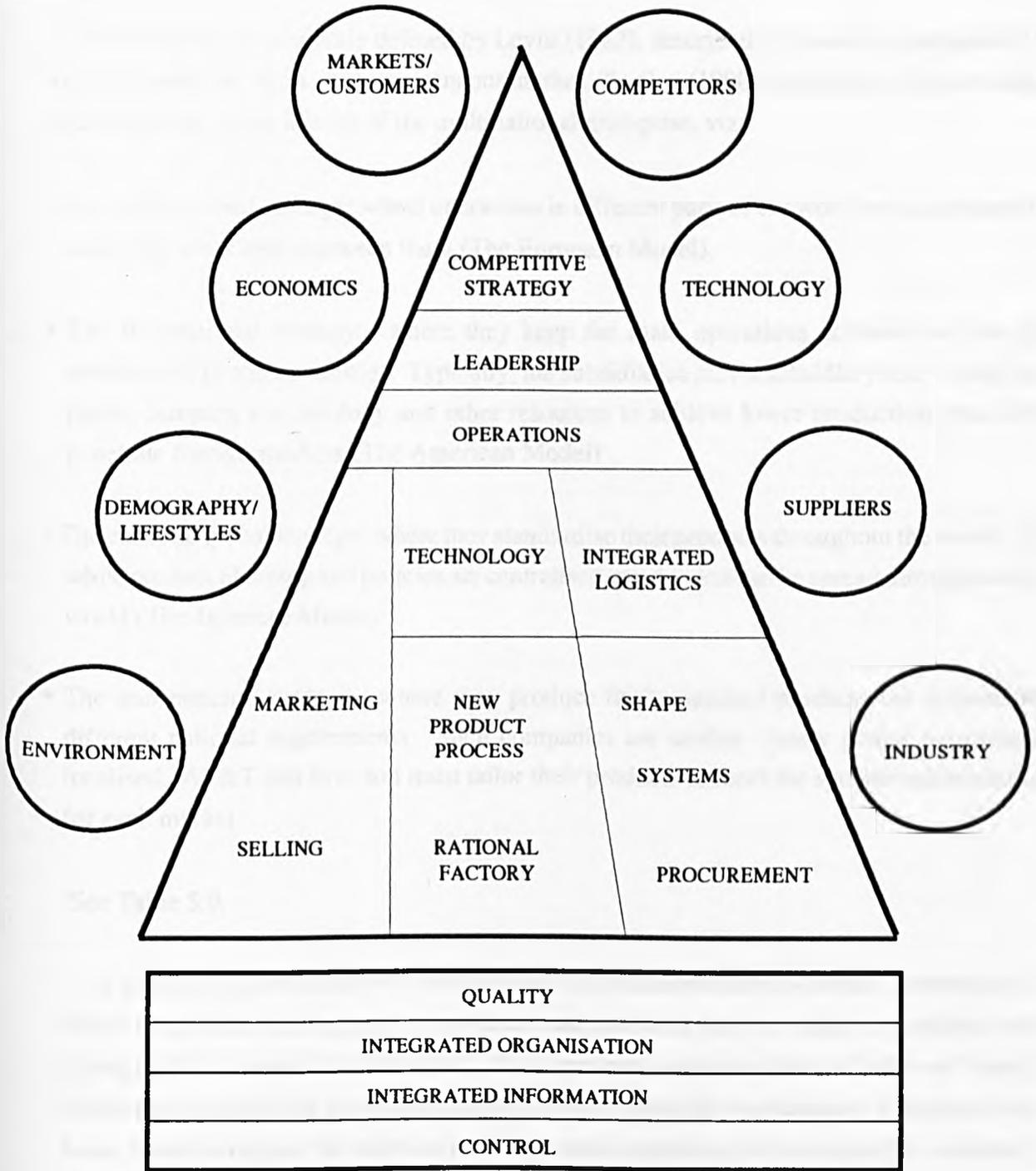
Source: Heizer, Jay and Render, Barry (1993), Production and Operations Management. Third Edition, Allyn and Bacon, Massachusetts, pp. 37.

FIGURE 5.13 FRAMEWORK FOR WORLD CLASS MANUFACTURING COMPANY



Source: National Center for Manufacturing Science (1990), Competing in World-Class Manufacturing: America's 21st Century Challenge. Business One Irwin, Homewood Illinois, pp. 18.

FIGURE 5.14 MANUFACTURING BUSINESS PYRAMID



Source: PA Consulting Group (1989) report for DTI, Manufacturing into the late 1990s. HMSO, London, pp. 6.

production and distribution) by marketing standardised products to selected global segments. Companies should first learn to look at nations not for how different but for how similar they are.

Globalisation, as originally defined by Levitt (1983), described the move by companies to view the whole world as one homogeneous market. Bartlett (1990) refined this. He identified four variations in the history of the multinational enterprise, viz:

- The multinational strategy: where operations in different parts of the world are autonomous, with only weak links between them (The European Model).
- The international strategy: where they keep the main operations at home and set up subsidiaries in other countries. Typically, the subsidiaries play a subsidiary role - using the parent company's technology and other resources to achieve lower production costs and penetrate foreign markets (The American Model)
- The classical global strategy: where they standardise their products throughout the world. So while product planning and policies are centralised, production can be spread throughout the world (The Japanese Model)
- The transnational strategy : where they produce fairly standard products but respond to different national requirements. Such companies are neither clearly global nor clearly localised. AT&T and Ericsson must tailor their products to meet the special requirements for each market

See Table 5.9.

As global forces of integration and national differentiation have increased, companies in either the global, international or multinational positions have to adapt to positions and strategies that are more "transnational". No longer can companies think in "either-or" terms. No longer is it sufficient to capture a single source of competitive advantage. Companies are being forced to capture the efficiency of the global competitors, to be responsive to national differences, to capture the ability to innovate on a worldwide basis, to establish an integrated network of subsidiary operators that are integrated into a worldwide set of operators. Subsidiaries are seen as vital strategic assets - as sources of scarce information, or knowledge,

TABLE 5-9

HISTORY OF THE MULTINATIONAL ENTERPRISE

Model	The Europeans	The Americans	The Japanese
Period	Strategic mentality and organization structure shaped by Pre-World War II Environment.	Strategic mentality and organization structure shaped by post-war environment.	Strategic mentality and organization structure of 1960s and 1970s dominated by Japanese internationalization.
Characteristics	Colonial markets <ul style="list-style-type: none"> • High and rising barriers <ul style="list-style-type: none"> - logistical barriers - taste and preference barriers - high tariff barriers of late 1920s and early 1930s 	Reconstruction in Europe and granting of independence to former colonies generated huge demand particularly for advanced capital goods. American companies were pulled offshore by the demand of post war world construction.	Strong reconstruction in Japan. A world market open to export. Tariff barriers were low under GATT negotiations. Jet age transportation and containerisation. Consumer preferences were converging. Modern telecommunications.
Management/ Style	Each foreign subsidiary given assets, resources responsibility to develop, manufacture and market products locally.	Overseas subsidiaries often given sales and manufacturing self-sufficiency, but responsibility was strongly contained by strong planning, control and information systems at H.Q.	Centralised hub: Group management and consensus building. Home-based decision making
Form of Control	Process of personal management: the old-boy network .	Professional management. Technology and expertise resided at H.Q. provided a powerful means of control.	Standardize products. Rationalize operations. Centralised coordination and control.
Mode of Operations	<ul style="list-style-type: none"> • Decentralised federations of independent operations • Very sensitive, responsible to national differences 	Transfer of knowledge, expertise around the world.	Economies of scale. Overseas subsidiaries became the delivery pipeline for products and strategies developed at the centre.
Strategy	The Multinational companies (A portfolio of multiple operations, each managed as separate independent unit)	The International companies treating overseas operations as offshoots of a domestic position	Global Companies (The world as a single strategic unit)
Examples	Unilever, Philips, Nestle, ICI	Procter & Gamble, General Electric, Pfizer	Canon, Toyota, Komatsu, Matsushita

Source: Adapted by Author

scarce assets and skills and capabilities, as generators of innovative responses. The central task is to begin by changing the organization's physiology (the flow of information across organizations) and building an organization psychology (broadening perspectives and changing strategic mentalities) while capturing the advantage of linking and leveraging expertise and learning on a worldwide basis. The transnational strategies is more than just a quest for low-cost labour and incremental market, but it is a quest for information, knowledge, resources, skills, strategic positions that together create an integrated network of operations that is a transnational company.

Many, however, still use the terms "multinational", "transnational", "International", and "global" loosely and interchangeable. For example, the term "transnational" was created by the United Nations in the 1960s in an effort to progress constructive negotiations between developing countries and businesses as "multinational" was associated with exploitation in many people's minds. Yip (1992) preferred "multilocal" to "multinational" as the latter term has come to be associated with a type of company. Whilst scholars (for example Keegan; Robock and Simmonds; Young, etc) continue the discourse in an attempt at precision and exact definition, globalisation implies a worldwide orientation and global players cross national boundary in worldwide search of foreign markets and competitive factors of production.

Yip (1992) noted that the recent popularity of global strategy has caused overuse of the terms "global" and "globalize". "Global" refers to different types of international strategy. The term "worldwide" is used as a neutral designation. A worldwide business is one that has widespread and significant operations on more than one continent. Furthermore, a worldwide business is defined as one that produces as well as sells in multiple countries (if not continents). "International" refers to anything connected with doing business outside the home country. "Multilocal" and "global" refer to types of worldwide strategy. A multilocal (or multinational) strategy treats competition in each country or region on a stand alone basis, while a global strategy takes an integrated approach across countries and regions.

Daniels and Daniels (1993) preferred to use "global" instead of "transnational" because the latter emphasizes the existence of borders in international business and does not go far enough in emphasizing the borderless, holistic or systemic nature of global companies. Companies are attempting to cross the global frontier from three very different starting positions, that of a global exporter (typically a Japanese approach), a company with a multifocal form of operation (typically a European approach), or a company with a multinational form (typically an American approach). See Table 5-10.

TABLE 5-10

**BUSINESS CHARACTERISTICS OF GLOBAL EXPORTER,
MULTINATIONAL, MULTILocal, AND GLOBAL COMPANIES**

Characteristics	Global Exporter	Multinational	Multilocal	Global
Products and services	Homogeneous	Homogeneous; some customized	Customized; some homogeneous	Flexible architecture allowing for mass customization
Value chain activities	Highly concentrated in home country	Distributed, but highly controlled by home country	Highly duplicated in each country	Highly networked and distributed around the globe
Basis of competition	Economies of scale in production	Sharing innovations outbound from H.Q.	Local responsiveness	EOS of production and knowledge; low cost/customer driven
Organization	Home-country nationals	H.Q. controls national companies	Strong national organizations; H.Q. plays primarily financial role	Decisions made at centers of competence
Customers	Global and local customers get the same treatment	Local customers supported by national sales companies; global customers supported with difficulty	Local customer-focused; global customers supported only with great difficulty	Supports global and local customers

Source: Daniels, John L. and Daniels, N. Caroline (1993), Global Vision: Building New Models for the Corporation of the Future. McGraw-Hill, New York, pp. 32.

Differences in Bartlett's (1990) and Daniels and Daniels' (1993) use of the terms are highlighted below:

	Bartlett's (1990) <u>Model</u>	Daniels and Daniels' (1993) <u>Approach</u>
The European	Multinational	Multilocal
The American	International	Multinational
The Japanese	Global	Global Exporter
	Transnational	Global

Daniels and Daniels (1993) shared some generalizations about the "definition" of a global company, viz:

- Global is a business concept. To be global means that you have a global strategy and you have a worldwide plan in terms of your products, marketing, manufacturing, logistics, and R&D. These activities need to be looked at holistically, thought of and treated as being driven by the mindset of a global system. These mission-critical activities need to be undertaken wherever it makes sense.
- A global company has no boundaries. Where a global company has its headquarters should be transparent to the market or individual customer. Being global means extending a company's reach and presence within its sphere of influence, to be broader in scope than only where it has facilities. A global company knows where its customers and its customers' customers are going with respect to becoming global themselves.
- Not only does a global company serve its global customers with excellence, but a global company has a delivery system that is highly sensitive to local customer needs. To prosper, to succeed in the long term, a global company must be perceived wherever it does business as a respected member of society. A global company adjusts its business to the countries it is in. It takes a basic set of values, business principles, and systems, then tailors them to the areas in which it does business. Being global requires a high degree of cultural diversity and understanding.
- A global company balances those aspects of the company that must be viewed and planned as a global system with those aspects that must be highly sensitive to local requirements. This

means striving to be more accommodating to the local environment, while simultaneously striving to act as an integrated global system.

Daniels and Daniels (1993) listed ten critical attributes of a global mindset that are the core of the global vision. They represent a move from an industrial perspective to a global, information age perspective of doing business:

- From a geographic concept (where I do business) to a business concept (how I do business)
- From a focus on centralization versus decentralization to business "any place"
- From a mechanistic view (the whole of the business equals the sum of its parts) to a holistic view of business (the whole is greater than the sum of its parts)
- From isolationism to low or nonexistent boundaries
- From "not invented here" to networks of trust
- From mere physical geographic presence to acceptance by the local culture
- From centralized controllers to core management
- From duplication of resources to taking advantage of economies of scale
- From vertical "stovepipe" communications to communication networks
- From a solely short-term focus to including a long-term view

Global exporter business attributes, multinational business attributes, and multilocal business attributes are in Figures 5-15, 5-16 and 5-17.

Virtually every industry has aspects that are global or potentially global. An industry is global to the extent that there are intercountry connections. A strategy is global to the extent that it is integrated across countries. Global strategy should not be equated with any one element - standardized products or worldwide market coverage or a global manufacturing network. Global strategy should instead, be a flexible combination of many elements.

FIGURE 5.15 GLOBAL EXPORTER BUSINESS ATTRIBUTES

Today	<i>Business attributes to be transformed</i>						Global
Geographic concept	➤	➤	➤	➤	➤	➤	Business concept
Centralization/ decentralization	➤	➤	➤	➤	➤	➤	Any place
Mechanistic	➤	➤	➤	➤	➤	➤	Holistic
Isolationism	➤	➤	➤	➤	➤	➤	Low boundaries
Not invented here	➤	➤	➤	➤	➤	➤	Networks of trust
Geographic presence	➤	➤	➤	➤	➤	➤	Cultural fit
Central controllers	➤	➤	➤	➤	➤	➤	Core connectors
Replication of resources	➤	➤	➤	➤	➤	➤	Economies of scale
Stovepipes	➤	➤	➤	➤	➤	➤	Great communications
Short-term focus	➤	➤	➤	➤	➤	➤	Long-term view

Source: Daniels, John L. and Daniels, N. Caroline (1993), Global Vision: Building New Models for the Corporation of the Future. McGraw-Hill, New York, pp.27

FIGURE 5.16 MULTINATIONAL BUSINESS ATTRIBUTES

Today	<i>Business attributes to be transformed</i>						Global
Geographic concept	➤	➤	➤	➤	➤	➤	Business concept
Centralization/ decentralization	➤	➤	➤	➤	➤	➤	Any place
Mechanistic	➤	➤	➤	➤	➤	➤	Holistic
Isolationism	➤	➤	➤	➤	➤	➤	Low boundaries
Not invented here	➤	➤	➤	➤	➤	➤	Networks of trust
Geographic presence	➤	➤	➤	➤	➤	➤	Cultural fit
Central controllers	➤	➤	➤	➤	➤	➤	Core connectors
Replication of resources	➤	➤	➤	➤	➤	➤	Economies of scale
Stovepipes	➤	➤	➤	➤	➤	➤	Great communications
Short-term focus	➤	➤	➤	➤	➤	➤	Long-term view

Source: Daniels, John L. and Daniels, N. Caroline (1993), Global Vision: Building New Models for the Corporation of the Future. McGraw-Hill, New York, pp. 29.

FIGURE 5.17 MULTILOCAL BUSINESS ATTRIBUTES

Today	<i>Business attributes to be transformed</i>						Global
Geographic concept	➤	➤	➤	➤	➤	➤	Business concept
Centralization/ decentralization	➤	➤	➤	➤	➤	➤	Any place
Mechanistic	➤	➤	➤	➤	➤	➤	Holistic
Isolationism	➤	➤	➤	➤	➤	➤	Low boundaries
Not invented here	➤	➤	➤	➤	➤	➤	Networks of trust
Geographic presence	➤	➤	➤	➤	➤	➤	Cultural fit
Central controllers	➤	➤	➤	➤	➤	➤	Core connectors
Replication of resources	➤	➤	➤	➤	➤	➤	Economies of scale
Stovepipes	➤	➤	➤	➤	➤	➤	Great communications
Short-term focus	➤	➤	➤	➤	➤	➤	Long-term view

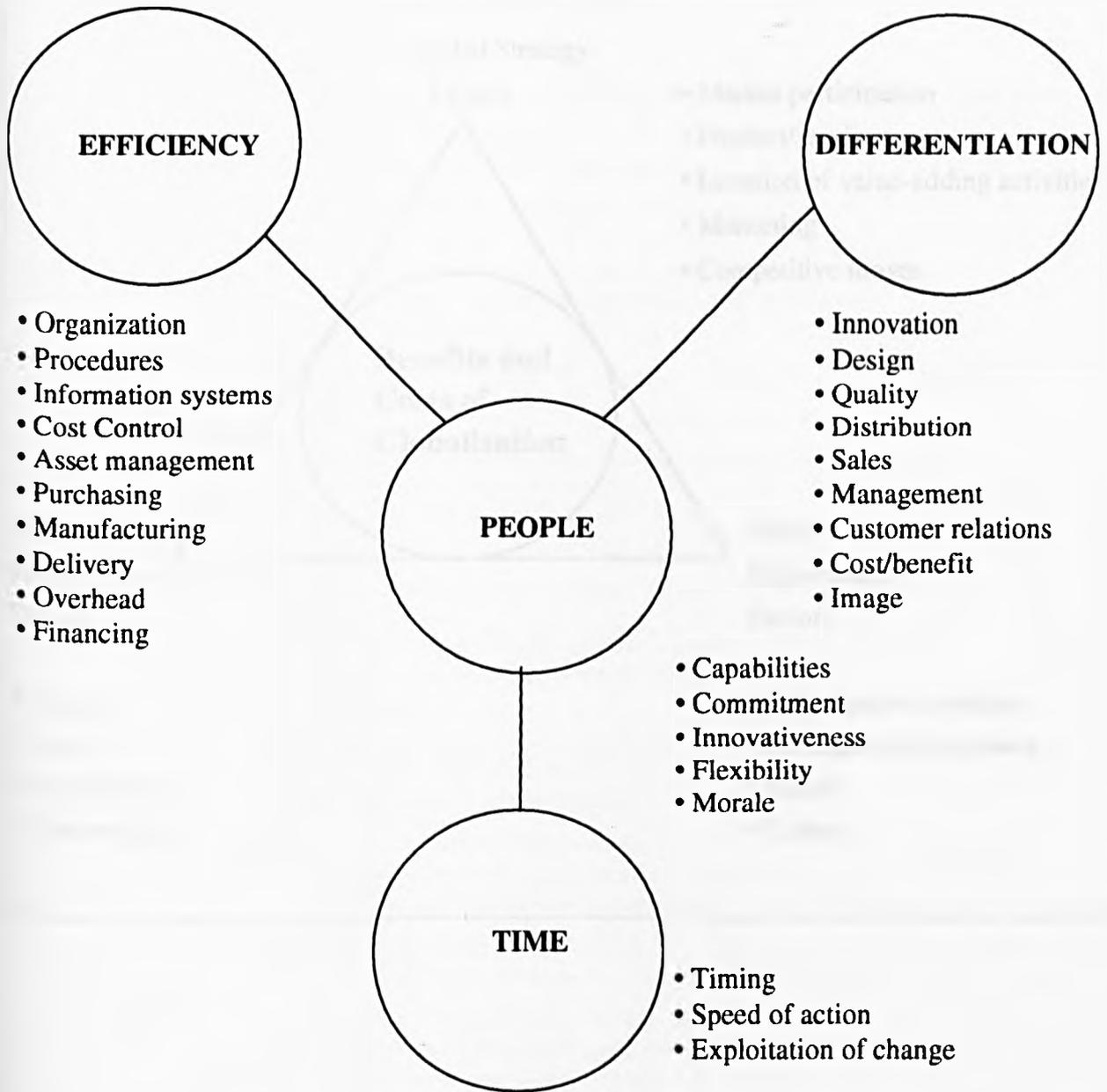
Source: Daniels, John L. and Daniels, N. Caroline (1993), Global Vision: Building New Models for the Corporation of the Future. McGraw-Hill, New York, pp. 31

Indeed, having a sound global strategy may well be the requirement for survival as the changes accelerate. These changes include the growing similarity of countries in what their citizens want to buy, a point argued forcefully by both Levitt (1983) and Ohmae (1986). Further, manufacturing scale efficiency forced companies to capture minimum scale that exceeded national volumes. Other changes are the reduction of tariff and nontariffs barriers, technology investments that are becoming too expensive to amortize in one market only, and competitors who are changing the nature of rivalry from country-by-country competitions to global competition. Trade barriers are also falling; Japan is also gradually opening up its long barricaded markets. Maturity in domestic markets is driving companies to seek international expansion. This is particularly true for American companies nourished by a huge domestic market and have typically lagged behind their European and Japanese rivals in internationalization. The recent surge of foreign acquisitions in the US has further globalized the nature of competition in many industries. Between 1977 and 1986 the share of US manufacturing assets owned by foreign companies doubled from 6 percent to 12 percent and has continued to rise. Increased volatility in exchange rates has helped to spur cycles of acquisitions as companies in countries with temporarily high exchange rates buy assets in countries with temporarily low rates. The rise of the NICs (like Hong Kong, Taiwan, South Korea, Singapore, Thailand, Malaysia, Mexico, and Brazil) has also increased the number of viable sites for sophisticated manufacturing operations with low labour costs.

Foreign competition exists in the major world economies for virtually every product or service - computers, fast food, medical diagnostic equipment. Increasing foreign competition, increasing cost of new technologies and shortening product life cycles are reasons for a business to globalize - in order to gain the size and skills to compete more effectively. But an even greater spur to globalization is the advent of new global competitors who manage and compete on an integrated global basis. *These global competitors have been primarily Japanese!* Their central approach to global competition is one of the factors that has allowed Japanese companies to conquer so many Western markets. (Bartlett, 1990; Yip, 1992; Daniels and Daniels, 1993).

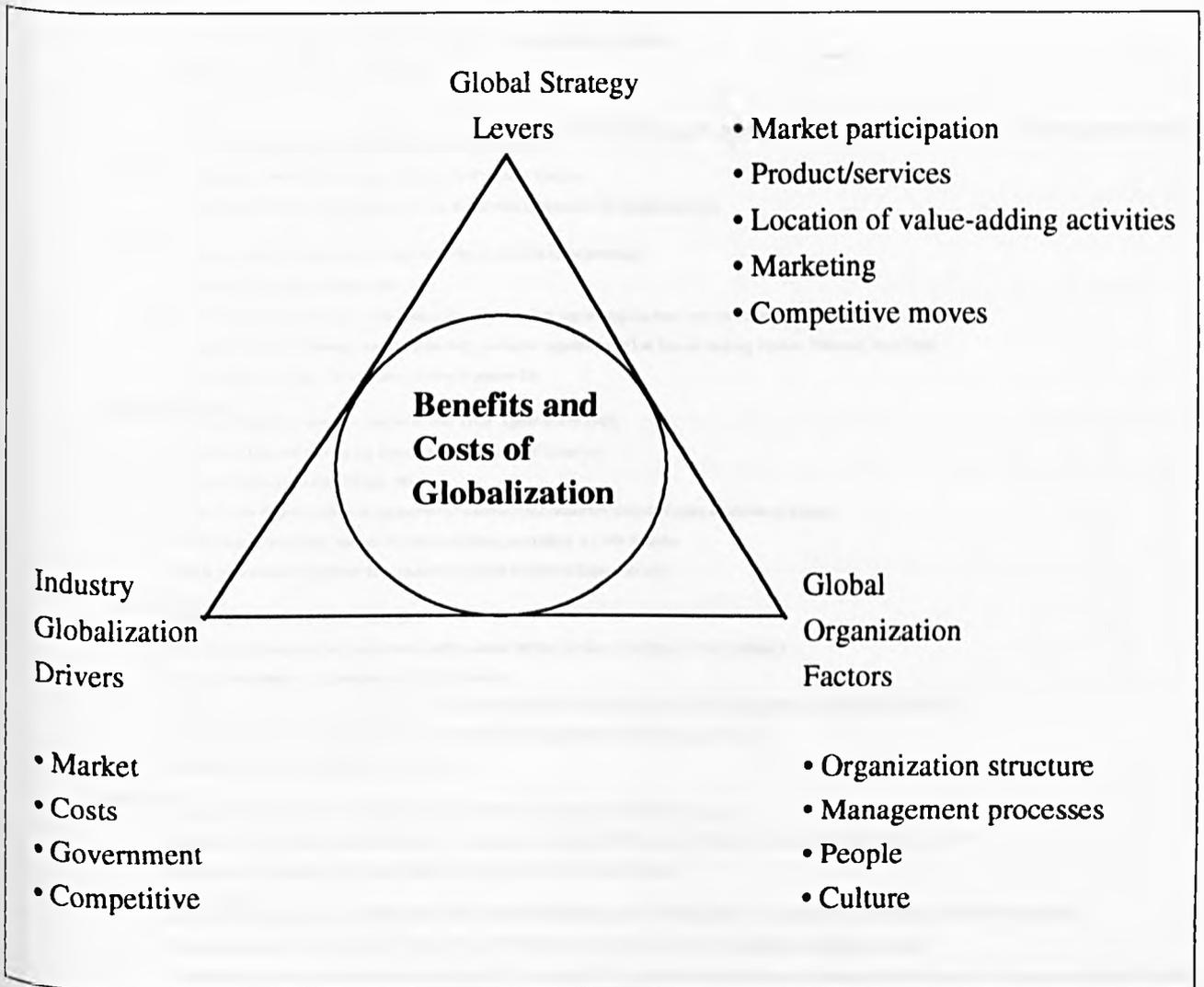
The communications and information revolution made it more possible to manage in globally integrated fashion. The framework for diagnosing and developing globalization strategy is in Figures 5.18 and 5.19. The industry globalization drivers, global strategy levers and global organization factors are shown in Table 5-11.

FIGURE 5.18 SOURCES OF STRATEGIC EXCELLENCE



Source: Dymont, John J. (1992), "Strategies and Management Controls for Global Corporations", The Journal of Business Strategy, December, pp. 25.

FIGURE 5.19 THE GLOBALIZATION TRIANGLE



Source: Adapted from Yip, George S. (1992). Total Global Strategy: Managing for Worldwide Competitive Advantage. Prentice Hall, Englewood Cliffs, New Jersey, pp. 9.

TABLE 5-11 THE INDUSTRY GLOBALIZATION DRIVERS, GLOBAL STRATEGY LEVERS AND GLOBAL ORGANISATION FACTORS

- **Market Drivers**
 - Per capita income converging among industrialized nations (eg Japan overtaking the US, Hong Kong overtaking New Zealand)
 - Convergence of life-style and tastes (eg McDonald's in Paris and Perrier in America)
 - Increasing travel creating global consumers
 - Organizations beginning to behave as global customers
 - Growth of global and regional channels (eg agreement in 1989 by three of Europe's largest supermarket chains to cooperate in purchasing and marketing, namely, Casino of France, Abold of the Netherlands, and Argyll Group of Britain)
 - Establishment of world brands (eg Coca-Cola, Levi's, Louis Vuitton)
 - Push to develop global advertising (eg Saatchi & Saatchi's commercial for British Airways)
- **Cost Drivers**
 - Continuing push for economies of scale (but offset by flexible manufacturing)
 - Accelerating technological innovation
 - Advances in transportation (eg use of Federal Express to deliver urgent supplies from one continent to another)
 - Emergence of newly industrializing countries with productive capability and low labour costs (eg Taiwan, Thailand, and China)
 - Increasing cost of product development relative to market life
- **Government Drivers**
 - Reduction of tariff barriers (eg Canada-US Free Trade Agreement of 1987)
 - Reduction of nontariff barriers (eg Japan's gradual opening of its market)
 - Creation of trading blocs (eg Europe 1992)
 - Decline in role of governments as producers and customers (eg denationalization of many industries in Europe)
 - Privatization in previously state-dominated economies, particularly in Latin America
 - Shift to open market economies from closed communist systems in Eastern Europe
- **Competitive Drivers**
 - Continuing increase in level of world trade
 - More countries becoming key competitive battlegrounds (eg rise of Japan to become a "lead" country)
 - Increased ownership of corporations by foreign acquirors
 - Rise of new competitors intent upon becoming global competitors (eg Japanese companies in automotive and electronics industries)
 - Growth of global networks making countries interdependent in particular industries (eg electronics)
 - Increased formation of global strategic alliances
- **Other Drivers**
 - Revolution in information and communications (eg personal computers and facsimile machines)
 - Globalization of financial markets (eg listing of corporations on multiple exchanges, global market collapse on Black Monday in 1987)
 - Improvements in business travel (eg Concorde and rise of international hotel chains)
- **Global Strategy Levers**
 - *Market participation* involves the choice of country-markets in which to conduct business and the level of activity, particularly in terms of market share
 - *Products/services* involve the extent to which a worldwide business offers the same or different products in different countries
 - *Location of value adding activities* involves the choice of where to locate each of the activities that comprise the entire value added chain - from research to production to after-sales service
 - *Marketing* involves the extent to which a worldwide business uses the same brand names, advertising, and other marketing elements in different countries
 - *Competitive moves* involve the extent to which a worldwide business makes competitive moves in individual countries as part of a global competitive strategy
- **Global Organization Factors**
 - *Organization structure* comprises the reporting relationships in a business - the "boxes and lines"
 - *Management processes* comprise the activities such as planning and budgeting, as well as information systems, that make the business run
 - *People* comprise the human resources of the worldwide business and include both managers and all other employees
 - *Culture* comprises the values and rules that guide behaviour in a corporation

Source: Adapted from Yip, George S. (1992). Total Global Strategy: Managing for Worldwide Competitive Advantage. Prentice Hall, Englewood Cliffs, New Jersey, pp. 13 - 15.

5.10.1 Keys to a Successful Total Global Strategy

Given the intricacies and complexities of global competition, the idea of a global corporate village where a common culture of management unifies the practice of business around the world is more dream than reality. The conflict between the opportunities for companies to do business anywhere and the need for people to have a local identity is one of the key tensions of our time. Global companies cannot ignore local difference. This is the result of the World Leadership Survey by Harvard Business Review. The survey proved that change is indeed everywhere - regardless of country, culture, or corporation. Experts tend to believe that rapid globalisation of markets and technological advances are changing the structure of corporations and their boundaries.

Daniels and Daniels (1993) listed the following global strategic imperatives or steps for becoming a *Truly Global Company within a 5-year Time Frame* (see Annex 7):

- | |
|---|
| <p>Step 1: Create a clarity of vision and mindset</p> <p>Step 2: How is your company positioned today</p> <p>Step 3: Understand your global customer's demands and needs</p> <p>Step 4: Balance global/local activities</p> <p>Step 5: Build global teams and individuals</p> <p>Step 6: Global I.T. - connecting the world</p> <p>Step 7: Take steps toward creating global strategic advantage with I.T.</p> <p>Step 8: Accelerate and streamline the globalization process</p> |
|---|

A total global strategy has three separate components (depicted in Figure 5.18):

- Developing the core strategy, which is the basis of sustainable strategic advantage. This is usually, but not necessarily, done for the home country first. Without a sound core strategy upon which to build, a worldwide business need not bother about global strategy
- Internationalizing the core strategy, through international expansion of activities and adaptation of the core strategy on which to build, a worldwide business need not bother about global strategy

- Globalizing the international strategy, by integrating the strategy across countries

5.10.2 Global Players in Competition

Once US corporations dominated in terms of global reach. The reality now is that on an asset basis, two-thirds of the world's one hundred largest corporations are non-US. The global economy based on the spirit of free enterprise does provide the battleground for companies from one country to compete with companies from other countries.

Despite its high-tech weapons, the USA is sinking to second-rank in a wide field of technologies considered vital for the global economy of the 1990s, according to a news report released against the background of widespread euphoria over the success of advanced US weapons in the Gulf War (*Business Times*, December 5, 1992). The report portrayed the US as a country that often fails to translate new ideas into commercial success. The report is a product of a two-year study by the Washington-based Council on Competitiveness. The Council is a non-profit organization of academics, labour leaders and executives from a wide range of businesses, from American Express and the New York Stock Exchange to Ford, Chrysler and Boeing.

According to the study, US productivity, economic growth and competitiveness in the 1990s will be driven by ninety four technologies - and US has fallen behind or already lost out in more than a third of them. Areas where the US is behind or likely to fall behind in the next five years ranged from advanced metals and membranes to quality management. In all, the report singled out thirty three fields in which the US is no longer a player. US still leads the world in genetic engineering, artificial intelligence, most information technologies, rock propulsion and microprocessors. As a result of intense international competition, America's technological edge has eroded in one industry after another. Even such American success stories as chemicals, computers and aerospace have foreign competitors close on their heels. While high technology was once viewed as the inviolate advantage of American industry, it is now the inevitable target of foreign competition, especially from Japan and Europe.

Like similar studies in the past, the latest report noted that the US has difficulties in converting scientific excellence and new technology into products, processes and services that can compete in the international market-place. Although the numerical control technology for machine tools was invented in the US in the early 1950s, it was Japanese companies that mass-produced and perfected the technology and turned it into a corner-stone of the multi-billion dollar CNC (computer numerically controlled) machine tool industry.

5.10.3 Competitive Advantage of Nations

National competitiveness has emerged as a pre-eminent issue in almost every nation for the governments as well as the companies. Most efforts to explain national competitiveness have taken an aggregate perspective:

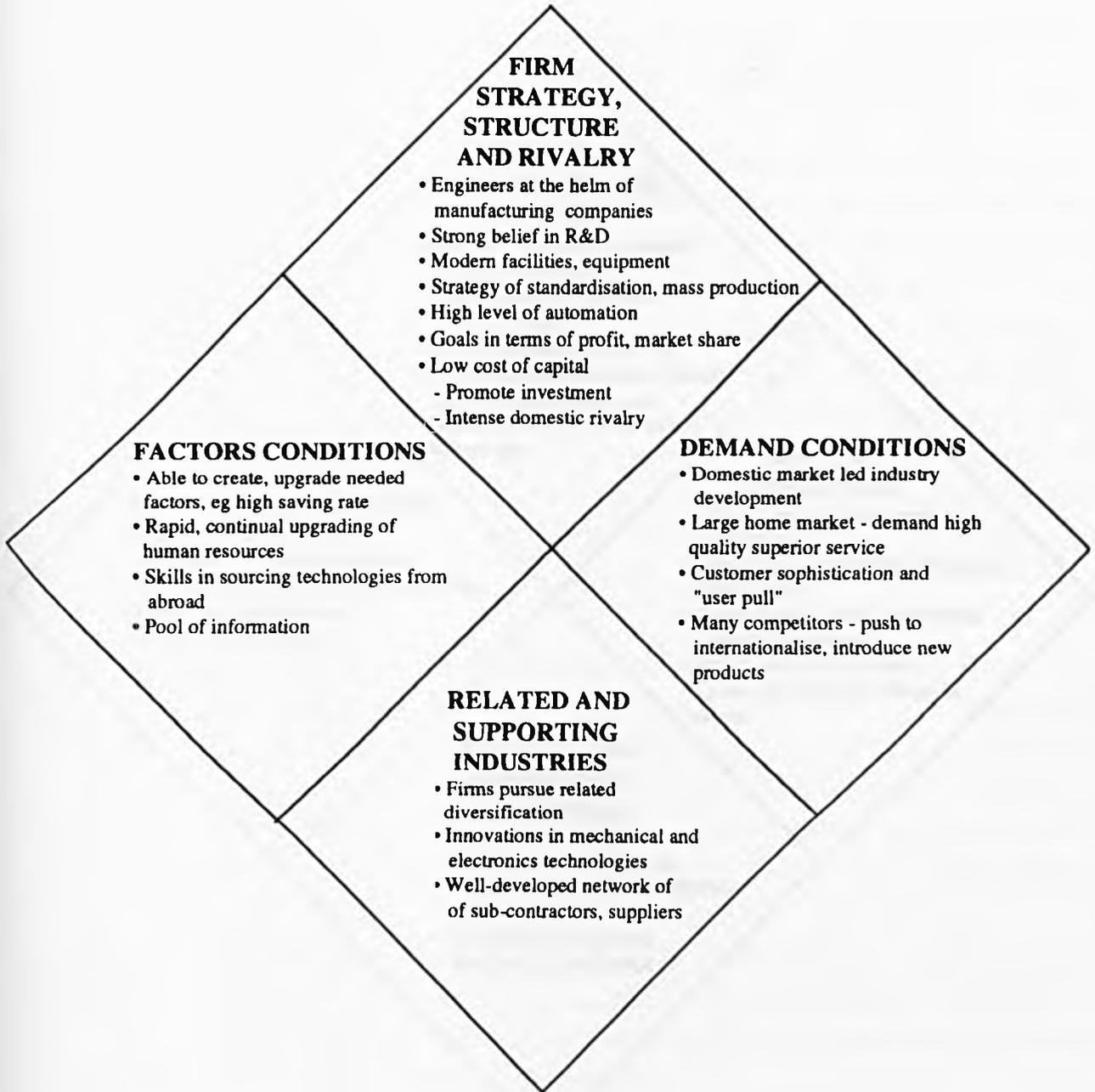
- Macro-economic factors, eg exchange rates, interest rates, government deficits
- Bountiful natural resources
- Unit labour costs
- Upgrading of human resources and infrastructure
- Labour-management relations
- Difference in management practices
- Cultural differences
- Government's role in enhancing national advantage

The author's summary of the national competitiveness of Japan and Taiwan in the machine tool industry is in Figures 5.20 and 5.21, respectively.

According to Porter (1990), the only meaningful concept of competitiveness at the national level is the productivity with which a nation's resources are deployed. Productivity is the value of the output produced by a unit labour or capital through high level of skills and technology. A rising standard of living depends on the capacity of a nation's companies to achieve high levels of productivity and to increase productivity over time through the capacity to upgrade the sophistication of competitive positions and how it competes in the industry.

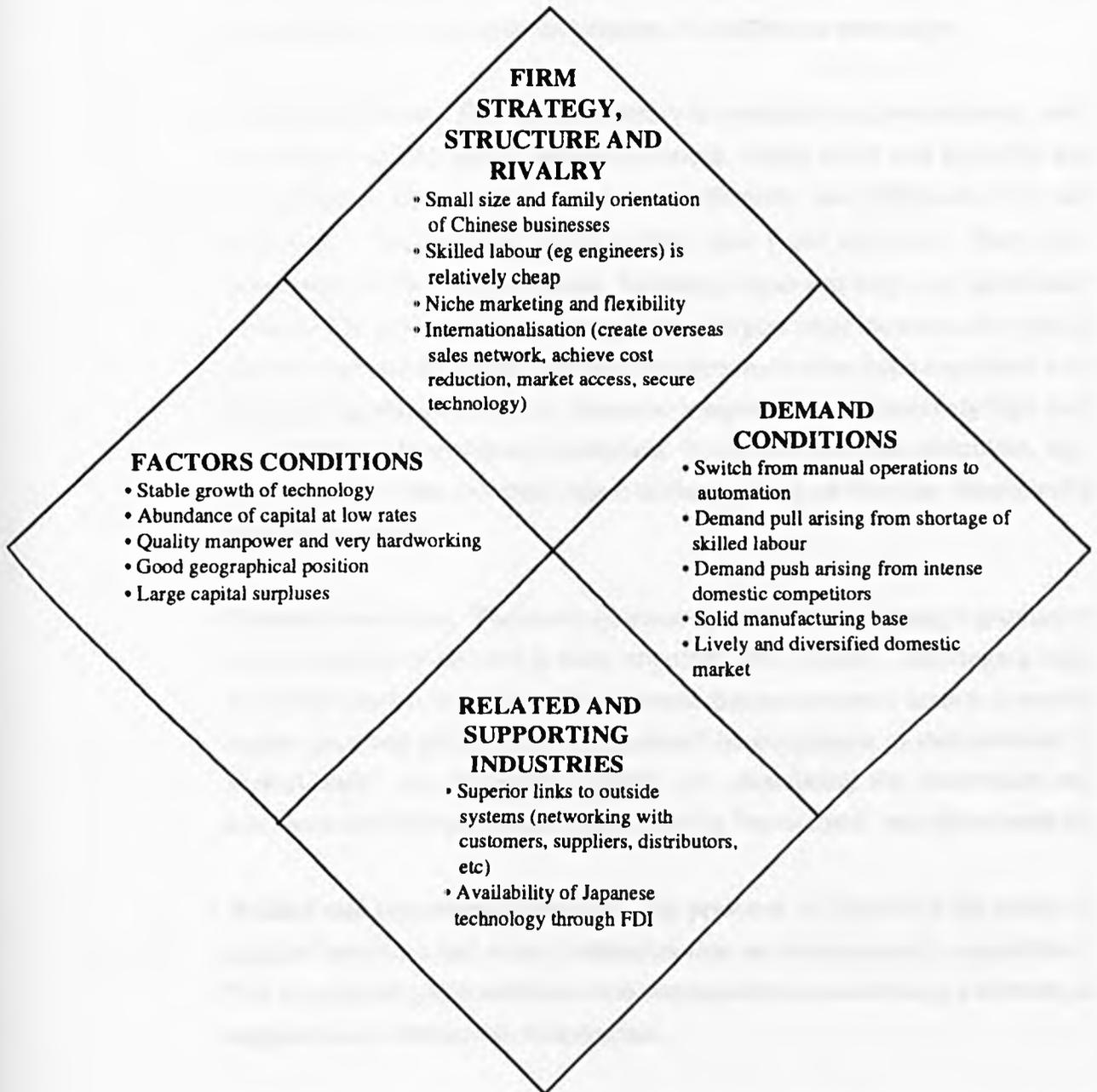
Seeking to explain "competitiveness" at the national level, then, we must focus not on the economy as a whole but on specific industries and industry segments. International advantage is often concentrated in narrowly defined industries and

FIGURE 5.20 NATIONAL COMPETITIVENESS OF JAPAN IN THE MACHINE TOOL INDUSTRY



Source: Author

FIGURE 5.21 NATIONAL COMPETITIVENESS OF TAIWAN IN THE MACHINE TOOL INDUSTRY



Source: Author

industry segments. See Table 5-12 for representative sample of competitive industries.

A nation achieves international success in a particular industry because of four broad attributes that promote the creation of competitive advantage:

- ***Factor conditions.*** The inputs necessary to compete in a given industry, such as cheap or skilled labour, natural resources, capital stock and scientific and technological infrastructure - and how efficiently and effectively they are deployed. The most successful nations have faced adversity. They have possessed few obvious advantages. Germany, Japan and Italy were all defeated powers. The greatest labour shortages, the sharpest wage increases, the highest energy costs and the fewest inherited resources have often been associated with the most significant advances. Japanese companies faced extremely high land cost and severe factory space constraints. To circumvent these difficulties, they created just-in-time and other space-saving techniques that also dramatically reduced inventory
- ***Demand conditions.*** The nature of home demand for the industry's product or service; quality of demand is more important than quantity. Although a large home base market may be necessary to underpin economies of scale in lowering supply costs and prices, Porter emphasized the importance of this presence of sophisticated and demanding buyers in stimulating the innovation and introduction of new products capable of being "transferred" into global markets
- ***Related and supporting industries.*** The presence or absence in the nation of supplier industries and related industries that are internationally competitive. This provides an important bedrock to competitive success through a network of suppliers and commercial infrastructure
- ***Firm strategy, structure and rivalry.*** The conditions in the nation governing how companies are created, organized and managed, and the nature of domestic rivalry. While international rivalries tend to be "analytical and distant", local rivalries become intensely personal, but beneficial in providing a "springboard" for international success. Nations with leading world positions

TABLE 5-12 REPRESENTATIVE SAMPLE OF COMPETITIVE INDUSTRIES

<u>UNITED STATES</u>	<u>JAPAN</u>	<u>GERMANY</u>
Construction Equipment	Machine Tools	Printing Presses
Patient Monitoring	Carbon Fibres	Chemicals
Air Conditioning	Trucks	Optical Goods
Construction	Facsimile	Automobiles
Advertising	Robotics	Cutlery
Aircraft	Car Audio	Plastic Working Machinery
	Musical Instruments	
<u>SWITZERLAND</u>	<u>ITALY</u>	<u>KOREA</u>
Chocolate	Ceramic Tiles	Steel
Trading	Woolen cloth	Apparel
Banking	Footwear	Semiconductors
Pharmaceuticals	Appliances	Automobiles
Textile Machinery	Packing Machinery	Construction
Hearing Aids	Factory Automation Equipment	Shipbuilding
<u>SWEDEN</u>	<u>U.K.</u>	<u>DENAMRK</u>
Mining Equipment	Pharmaceuticals	Dairy Products
Heavy Trucks	Auctioneering	Insulin
Newsprint	Insurance	Furniture
Specialty Shipping Control	Confectionery	Pollution Equipment
Water Pollution Control	Whiskey	Agricultural Machinery
Hardwood Flooring	Chemicals	Specialty Electronics

Source: Adapted from Porter, Michael E. (1990), The Competitive Advantage of Nations. The Free Press, New York.

often have strong local rivals: the Swiss in pharmaceuticals, Germany in chemicals, the USA in computers and software, the Japanese in CNC machine tools. And nowhere is the extent of domestic rivalry greater than in Japan. In global competition, monopolies or cartels will lose to companies from more competitive environments.

Two additional variables can influence the national system in important ways: chance and government. Chance events are developments outside the control of companies, such as wars, external political developments and breakthrough in basic technologies. Government's real role is in influencing the four determinants.

Nations are more likely to succeed in industries where the national "diamond" - the determinants as a system - is the most favourable. The effect of one determinant is contingent on the state of the others. Favourable demand conditions, for example, will not lead to competitive advantage unless the state of rivalry is sufficient to cause companies to respond. A nation need not always have advantages in all determinants to succeed internationally. Where a nation has a disadvantage in one determinant, national success normally reflects unusual advantage in others. All these factors are interrelated, creating a "virtuous circle" of resource generation and application and sensitivity in meeting customer demands.

Porter (1990) concluded that national prosperity is created, not inherited. It does not grow out of a country's natural endowments such as resources and raw materials as claimed in classical economics. Rather, competitive advantages have been created by several nations (eg Japan, South Korea, Taiwan, Hong Kong, Singapore) to overcome disadvantages in natural resources. These countries have generated their own competitive advantage by creating new strengths such as highly skilled and dedicated workers or top class infrastructure. For example, the shortage of labour in Japan spurred innovations by Japanese companies in automation technology. Japan is now a leader in the development and application of this automation technology. In 1965, when Singapore separated from Malaysia, markets, raw materials and resources were suddenly lost. Singapore compensated by building up superior infrastructure, and creating the most favourable conditions including good labour-management relations so that international businesses can

flourish, and through them, Singaporeans can plug into the global economy. Nation-specific factors provide an important "backdrop" to the creation and enhancement of company competitive advantage on a global basis.

5.11 Commonsense Nations

The Chambers Twentieth Century Dictionary defines the philosophy of commonsense as "that school of philosophy which takes the universally admitted impressions of mankind as corresponding to the acts of things without any further scrutiny". The Oxford Advanced Learners's Dictionary defines commonsense as "practical good sense gained from experience, not by special study".

Commonsense is not taught in any school nor university. There is no course of study on it. Casson's book "Common-Sense Plus" (1960) is about the only book that attempted to define its value and its limitations. To him, commonsense is a word that is characteristically English. It cannot be translated into a single word in any other languages. In his opinion, if a man has no commonsense, he cannot acquire it; but if he has even just a little, he can acquire more. The plea of possessing commonsense is the commonest excuse of the unteachable. It is set up as a barrier against new methods and ideas. The delusion that it is a substitute for knowledge still prevails. And this delusion should be dispelled. A man who has commonsense is usually level-headed. He has mental balance. His opinions are based on facts. Commonsense tells a man what to hold fast to, and what to let go. It gives him a sense of perspective. He concentrates his attention on whatever is most important. There is an element of shrewdness in commonsense. It enables a man to foresee what will be advantageous. It gives him caution, and caution is needed every step of the way in the business world.

Tracy (1989) observed that commonsense is the great untapped resource in management today. Business leaders are inundated by sophisticated theories and models of management, but they are seldom taught to trust their own innate knowledge and wisdom. The result is a lack of sound judgement, sensitivity, and compassion for people, all of which are essential to effective leadership and meeting the goals of the company. Some examples of her practical advice and commonsense guide for managers are in Table 5-13. She advocated greater use of commonsense, humanity and sensitivity to people for the primary responsibility of a manager is to get the work done through other people.

Pearson (1987) observed that millions of managers and business owners have read books or

TABLE 5-13 EXAMPLES OF PRACTICAL ADVICE AND COMMONSENSE GUIDE
FOR MANAGERS

Ten Cardinal Rules Of What *NOT* To Do As A New Manager

1. Do not take on an ego trip
2. Do not make careless promise
3. Do not play Genghis Khan (Do not act like a tyrant)
4. Do not play favourites
5. Do not babble without thinking
6. Do not hoard the work
7. Do not pass the buck
8. Do not throw temper tantrums
9. Do not take special privileges
10. Do not be too much of a company Man or too much of a Buddy

How Does the Manager Do His Job!

1. Keep employees safe
2. Get people to work together
3. Develop and maintain a team spirit
4. Teach what you know
5. Keep good records
6. Balance responsibilities
7. Manage people by leading

How To Be A Leader

1. A leader is loyal
2. A leader is an Optimist
3. A leader likes people
4. A leader is courageous
5. A leader looks over the fences (knowledgeable about all aspects of company operations)
6. A leader is decisive
7. A leader is tactful and considerate
8. A leader is, above all, fair
9. A leader is honest
10. A leader has ambition
11. A leader is consistent
12. A leader is humble
13. A leader is self-confident
14. A leader is a teacher

How To Be A Teacher

The Principles of Learning : Learning is a change that happens when a person responds physically and mentally to external stimuli.

The more senses that are stimulated, the more likely the change will take place.

1. People learn when they are ready
2. People like to do what they do well
3. Practice, Practice, Practice
4. Friendly competition speeds learning
5. Learning moves in fits and starts
6. It takes both Sender and Receiver (Teacher and student have equal responsibility for progress)
7. Divide the materials into steps
8. Make the classroom comfortable
9. Be enthusiastic
10. Do your homework

Source: Tracy, Diane (1989), The First Book of Common-Sense Management. William Marrow and Company, Inc, New York.

attended seminar on strategy. But, those who become millionaires are the ones who use commonsense, not complex planning techniques because planning techniques have become so complicated that they are the preserve of "planning experts". Action summary of his commonsense business strategy is in Table 5-14, a list based on over ten years of experience gained from advising and working with chief executives, entrepreneurs and partners in professional companies.

Whenever a nation acquires commonsense, then comes tolerance and a spirit of compromise. The more nationalism there is in any country, the less commonsense there is. Already several nations have been completely unbalanced by epidemics of extreme nationalism, which inevitably destroy the freedom and prosperity of a country. The three legs, ie political stability, economic prosperity and social harmony may be likened to a tripod holding the country in perfect balance. To Wu (*Straits Times*, June 5, 1992), a nation must have the five "senses" of history, mission, purpose, vision and commonsense to do well.

Commonsense is the practical understanding - ordinary capacity to see and take things in their right light-sound judgement, and a sense of perspective. The attitude of mind is "will it work?". The concentration of time, brains and capital is upon development and progress. But, we are not accepting as superior the culture or way of life. On the other hand, traditional Asian values and customs vary in their relevance to the present and future. We have to use commonsense to decide what to keep and what to discard. There is this sense of strategic intent to persevere and succeed notwithstanding the often long and indeterminate time span.

Taiwan's booming economy was group-started by the offshore production of American corporations and this pattern has been repeated in Singapore and other Pacific Basin countries. Subsequently, the impressive models of economic growth came not from Western Europe but from the commonsense nations of the Far East - Japan, Taiwan, Korea and Singapore. The economic growth has been produced by the way they have embraced the market, competed in international markets and exploited Western technology, but rejected key elements of Western liberal culture, particularly its individualism. These countries recognise that the way to discover the possibilities inherent in one's own culture lies in reflecting on its historical memory. Hence, Taiwanese students should not merely study the main currents of the Western tradition, but also study the Confucian philosophy that is part Chinese culture (*China Post*, April 11, 1994).

TABLE 5-14 ACTION SUMMARY OF COMMONSENSE BUSINESS STRATEGY

How to Manage Strategically, Using Commonsense

- Make time to create a vision for success, and do not confuse work with results
- Demand a quantum jump in results.
- Identify the crucial issues and opportunities for success, and concentrate on them
- Set major business-development projects to turn the vision into tangible achievement. Do not rely on evolution for success

How to Lay The Foundations for Success

- Identify sales opportunities with major customers by comparing actual and potential sales to each one
- Ask subsidiary company customers to provide an introduction to pursue sales opportunities throughout their group
- Ask other subsidiaries in your group to introduce you to their customers
- Plan to become the lowest cost producer for a given specification of product or service
- Set measurable standards for customer service and product quality, and monitor performance regularly
- Plan to improve your corporate image and presentation to customers
- Remember that line managers should manage fixed assets and working capital
- Identify and sell off redundant fixed assets and stock, which are often allowed to remain for years before action is taken
- Review the reasons for and benefits from retaining minority equity stakes in other companies, and consider realising the investments and using the cash to develop wholly owned business

How to Take Stock of Your Market Place

- Analyse your business into market segments and geographical territories to understand better what you are achieving within the market place
- Collect tangible evidence about the size and nature of the market and the factors likely to influence it
- Identify external trends and likely developments, so that you swim with the tide of opportunity and not against it
- Channel resources, people and money into the most attractive market segments in terms of profit growth potential as far as possible
- Look out for new market segments emerging and respond to the opportunities quickly

How to Take Stock of Your Company's Performance

- Measure performance quantitatively wherever possible, and compare it with competitors in terms of:
 - management
 - products and services
 - technology and innovation
 - manufacturing
 - marketing and selling
 - distribution
 - customer care
 - financial performance
- Consider using someone from outside to help take stock of company performance objectively
- Consider the appointment of a non-executive chairman for subsidiary companies and unquoted ones, as well as for those listed on a stock exchange, to help achieve more objectivity of outlook.
- Identify and evaluate emerging competition as well as existing competitors

How to Develop a Vision to Ensure Success

- Write a vision for your business, using only one sheet of paper
- Consider the questions of ownership and size as part of the vision for future success
- Set no more than two or three key financial goals as part of the vision
- Demand a total commitment from each member of the executive committee to make it happen. *Then it will happen.*

To Overcome Obstacles to Success

- Identify and tackle internal obstacles vigorously
- Bring someone from outside into the business if there is resistance to change
- Anticipate external obstacles to success by monitoring trends, and turn them into opportunities
- Identify surplus assets and stock, then sell them to realise cash and to release space

How to Develop Major Alternatives

- Identify and evaluate the major alternatives for corporate development across the whole spectrum of possibilities
- Consider organic growth, licensing and royalty deals, franchising your business, minority equity stakes, joint ventures and consortia projects, mergers and demergers, major equity stakes, and take-overs and reverse take-overs.
- Encourage each functional manager to identify and evaluate the major alternatives possible within his own function.

How to Make Successful Acquisitions

- Write an acquisition profile to translate your vision for success into a focused search for attractive target companies
- Carry out an active acquisition search programme to make successful acquisitions happen. It is not enough simply to find out which companies are known to be available to acquire
- Persuade the target company to merge with you. Seek an agreed bid for a listed company if possible
- Investigate the target company as thoroughly as possible before valuing the worth of the business to you
- Consider using specialist outside help for negotiation and managing the bid tactics
- Start preparing for post-acquisition success before legal completion and ensure financial control is secured immediately.

How to Turn Around Loss-Making Companies

- Take control and make an impact on the first day
- Attack a cash-flow crisis during the first week
- Assess each department and decide the initial cost reduction required during the first month
- Carry out any headcount reduction needed during the second month
- Develop a vision for future success and define major business-development projects during the third month
- Recognise that approximate financial analysis done quickly is much more valuable than waiting for accurate figures to be produced.

How to Hold a Strategic Workshop

- Use strategic workshops.
- Keep the agenda to issues of strategic importance
- Put the most important item first on the agenda, not last.
- Restrict the numbers attending to members of the executive committee
- Hold the workshop away from the office to avoid interruptions
- Ensure that action of strategic importance result from the workshop, with personal accountability assigned
- Consider using an outsider to short-cut the inevitable learning process when using a workshop for the first time

How to Make the Vision Become Reality

- Define major business-development projects and measurable progress milestones to complete during the next 12 months, with individual accountability for each one, to make the vision happen
- Minimise the number of staff employed centrally and concentrate on strategic business and profit-centre accountability
- Evaluate research and development projects in market and financial terms before authorising expenditure
- Evaluate capital-expenditure projects in terms of the cash-flow payback period or the discounted cash-flow rate of return
- Carry out audits on major capital projects to ensure that satisfactory results are being achieved
- Generate excitement and enthusiasm as a conscious part of your management style

How to Make Successful Management Buy-Outs and Buy-Ins

- Consider initiating a management buy-out of your company, provided that cash flow can be generated and asset backing exists to support the necessary borrowing
- Consider a management buy-in of a suitable company in a similar industry, if your attempts at a buy-out are rejected
- Recognise that cash-flow management is crucial in any buy-out or buy-in
- Use external advice to help negotiate the best deal for yourself
- Consider setting up profit-sharing and equity incentives for staff at the outset to ensure maximum cooperation and commitment

Source: Pearson, Barrie (1987), Commonsense Business Strategy: How To Improve Your Profits And Cash Flow Dramatically. Mercury Books, London.

In Singapore, we have to learn from the West if Singapore were to succeed. The use of English facilitated institutional continuity in Parliament, the Civil Service and the law courts and help maintain our international position as a hub city. The emancipation of women, the rule of law, the equality of citizens irrespective of race, language or religion, the right to representative government : these are values that we have adopted from the West. Without the West, the East would not have made this historic transformation. It was the Western challenge which created this earth-shaking Eastern response. In the process, the East recreates itself (George Yeo, *Straits Times*, September 20, 1992).

The success of a country's economy is not decided by its physical infrastructure or geographic conditions. It is the way the administration brings all the elements together to make them work as one harmonious whole. When Singapore started to modernise 34 years ago, it had rolling five-year plans, which were used as guidelines that were reviewed according to the prevailing conditions. Similarly, Japan did not have a clear blueprint after World War II to get to where it is today. What Japan did was to adjust its plan as the world unfolded before its eyes. It seized the opportunity when the Americans decided to help the country reindustrialise after the Korean War in the 1950s, and ventured into steel, ship-building, and petrochemicals. Later in the 60s and 70s, it moved on to electronics, computers and micro-processors, and forged ahead (Lee Kuan Yew, *Straits Times*, October 3, 1992).

Mr Lee Kuan Yew's commonsense approach to the challenges facing the island-state of Singapore is reflected in his stance on the following issues:

- Nation Building
 - Building a nation together
 - National survival is everybody's business
 - Ensuring a better future for the next generation
 - Helping the less able in society
 - The different races must work together in times of crisis
 - We must face and resolve our racial problems
 - National success depends on the people

- Language and Education
 - Transmitting cultural values through the mother tongue
 - Providing better education for the next generation

- Chinese Singaporeans must learn Chinese whatever the difficulties
- Chinese is worth preserving in Singapore
- Traditional values
 - Chinese traditional values are worth retaining
 - Children have an obligation to take care of their parents
 - Preserving the three-generation family
 - Young people should change their attitude towards marriage partners
 - Adapting traditional customs to meet the social environment
 - Building a more gracious society
 - Singapore cannot become a pseudo-western society
 - Instilling Asian values among the young
 - Singapore can only improve by resisting westernisation
 - Strengthening family tie
 - Retaining basic Confucianist principles
 - Confucianist values should not be lightly abandoned

5.12 Summary

The overall concept of World-Class Manufacturing Company (WCC) can be represented by Model 1 (Micro Level, see Figure 5.22) and Model 2 (Macro Level, see Figure 5.23), respectively.

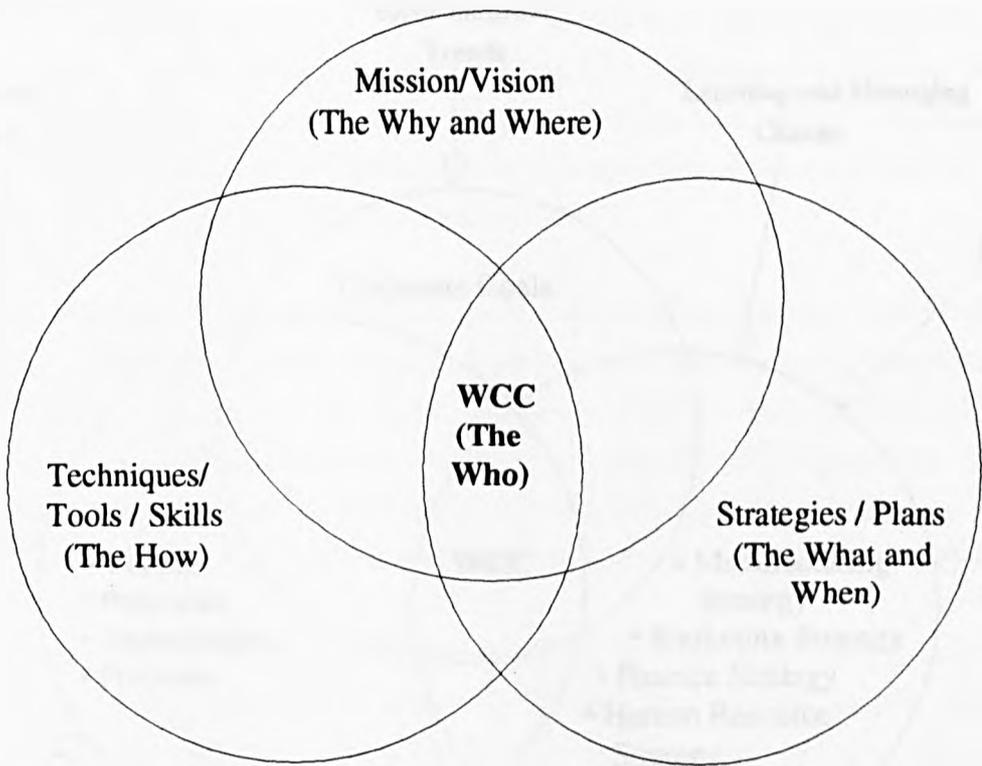
Model 1 (Micro Level) is in fact the *Integrative Manufacturing Company (IMC)*. It addresses the 4"Ws" and 1"H" of the concerns of the Who (the world-class manufacturing company). Model 2 (Macro Level) of the IMC highlights the following challenges:

- The ongoing commitment to utilise the company's four basic value added resource, ie People, Processes, Technologies, and Products, within the framework of an integrated corporate strategy (manufacturing, marketing, finance, human resource, etc) in pursuit of corporate goals
- The key issues and concerns the company faces

Major developments in the geo-political and strategic global environment are:

FIGURE 5.22 MICRO LEVEL OF WORLD-CLASS MANUFACTURING COMPANY

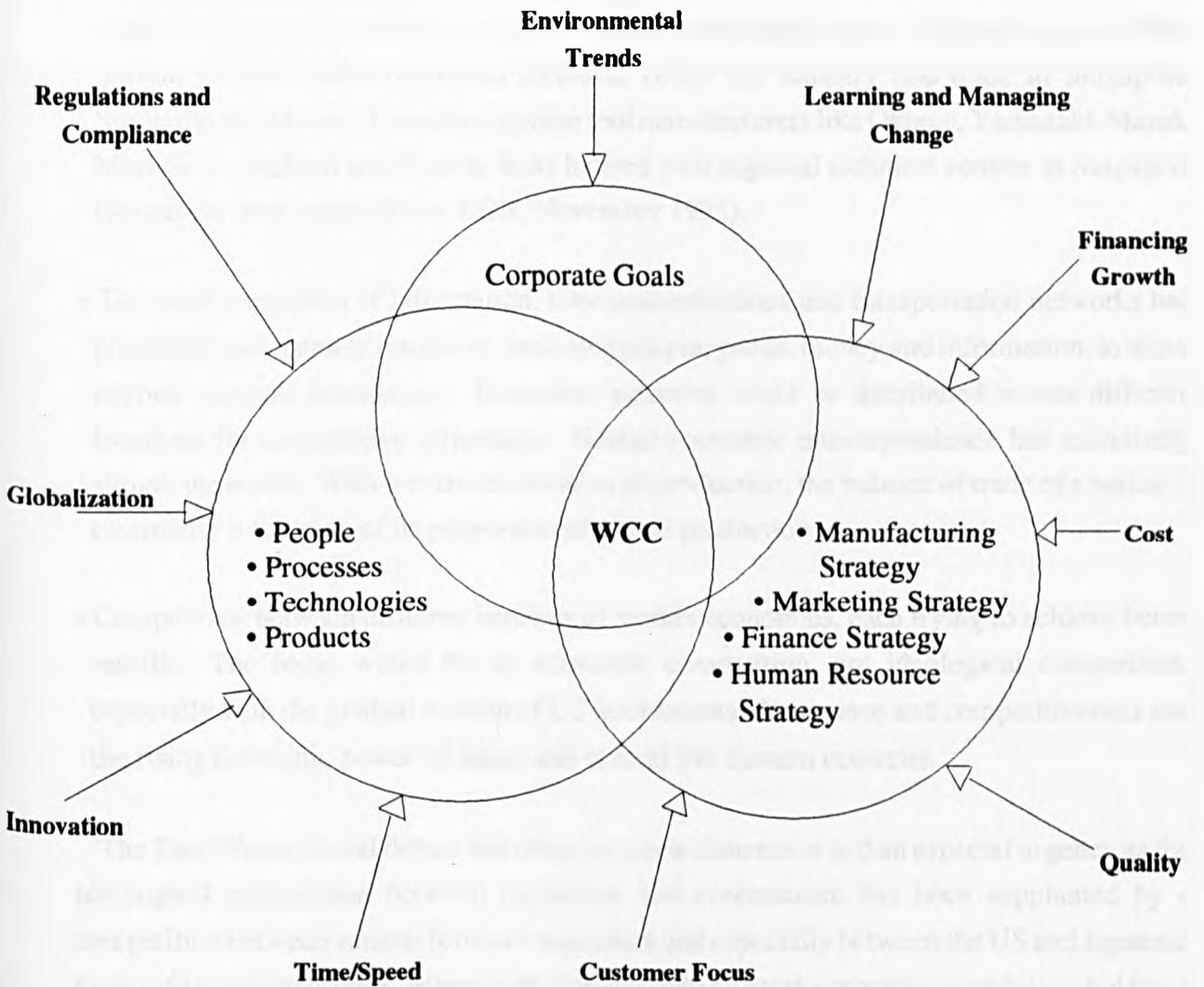
MODEL 1



Source: Author

FIGURE 5.23 MACRO LEVEL OF WORLD-CLASS MANUFACTURING COMPANY/
INTEGRATIVE MANUFACTURING COMPANY

MODEL 2



Source: Author

- A revitalised Europe and the gradual opening of major new markets like China, India and the Arab countries have become attractive to both Japanese and American investments
- Asia-Pacific is developing as a major source for goods from the USA, Japan and Europe, as well as a centre for manufacturing and services such as tourism, banking, software; and increasingly, as a source of technological innovation, new ideas and new products and new ways of doing business. Trumpf GmbH, an acknowledged pioneer in laser-cutting technology, has a S\$7 million regional technical centre in Singapore for ASEAN and Australasia region, serving as a showcase of the company's products. Taking cognizance of the growing importance of this region, the small and medium-sized companies set up a S\$50 million German multi-functional technical centre for industry and trade in Singapore. Similarly, world-class Japanese machine tool manufacturers like Okuma, Yamazaki-Mazak, Mori-Seiki, Makino and Hitachi Seiki located their regional technical centres in Singapore (*Singapore Investment News*, EDB, November 1993).
- The rapid expansion of information, telecommunications and transportation networks had propelled management resources, including people, goods, money and information, to move beyond national boundaries. Economic activities could be distributed across different locations for competitive advantage. Global economic interdependence has effectively shrunk the world. With worldwide division of production, the balance of trade of a nation is essentially a function of its proportion of global production.
- Competition between different versions of market economies, each trying to achieve better results. The focus would be on economic competition, not ideological competition, especially with the gradual erosion of US international dominance and competitiveness and the rising economic power of Japan and several Far Eastern countries

The East-West cultural debate has taken on a new dimension and an especial urgency as the ideological competition between capitalism and communism has been supplanted by a competition between various forms of capitalism and especially between the US and Japanese forms of capitalist systems. Whereas the former emphasizes the importance of the market freed from state intervention, the latter is based on a greater partnership between private enterprise and the state (Gilpin, 1993).

As a corollary, the 1990s and beyond would see greater international economic competition between nations and between companies. Today's radically transformed competitive environment is a domain which encompasses not just companies or industries, but nations (Lodge, 1991). Competitiveness ensures that nations can produce goods and services that meet the test of international markets while simultaneously maintain or expand the real incomes of its citizens. Competitiveness ensures increased profitability and market share for companies. Nations and companies, like species, must enhance their competitiveness to survive and flourish in a volatile world (Tu, 1991). The performance measures of competitiveness by level of analysis developed by Buckley, et al (1992) is in Table 5-15. Competitiveness must be viewed as dynamic, relative and multi-faceted, evident by the shifting competitive advantage of companies and nations. Of the hundred largest US companies in 1900, only sixteen are still in business. Scrutiny of the top 100 companies on the first Fortune 500 list in 1955 showed a 71 percent drop-out rate over just 37 years. Two years after "In Search of Excellence" was published, fourteen of the forty-three "Excellent" companies had fallen on difficult times (Farrell, 1993). Striving far and maintaining international competitiveness is the number one challenge facing US corporations of the 1990s and beyond. See Table 5-16 for Comparative Industrial Leadership of the USA and Japan. Japan is the world's most competitive nation (Vogel, 1986). Japanese manufacturing companies, in particular the machine tool industry, are outstandingly competitive because they are in the world-class league (Ishihara, 1994). Hence, world-class status is the link between the *Wheel of Competition* of Producers in the Asian Machine Tool Industry in ASEAN Region and *FIRMS*. World-class status is the criterion for entry into the global competition (See Figure 5.24 for the interrelated models of competitiveness).

The concept of being world-class is synonymous with athletes qualifying for the Olympics. As long as the athlete has qualified to race in the Olympics then he or she has achieved world-class, ie it does not really matter whether he/she comes in as first, second or tenth position, etc. Hence companies can be considered to attain world-class status (eg Japanese machine tool builders like **Amada, Yamazaki, Fanuc, Mori-Seiki and Okuma**) by virtue of their dominant sales turnover and/or market share/profitability. In 1991, according to the *American Machinist*, eleven out of twenty top machine tool companies by sales ranking were Japanese; coupled to the fact that Japan's machine tool production value of US\$9.65 billion in 1991 accounted for 31 percent of global production, maintaining the number one position the nation has held for 11 years after overtaking the USA in 1982 as the world leader in production. It is obvious that a few of the premier Japanese machine tool companies fit into the category of not just only a **World-Class Company** but also a **Global Player**.

TABLE 5-15 PERFORMANCE MEASURES BY LEVEL OF ANALYSIS

FACTOR	COMPETITIVENESS	MARKET POTENTIAL	MANAGEMENT PROCESS
Country	<ul style="list-style-type: none"> • Export Market Share • Percentage Manufacturing in Total Output • Balance of Trade • Export Growth • Profitability 	<ul style="list-style-type: none"> • Comparative Advantage • Cost Competitiveness • Productivity • Price Competitiveness • Technology Indicators • Access to Resources (May vary by industry) 	<ul style="list-style-type: none"> • Commitment to International Business • Government Policies • Education/Training
Industry	<ul style="list-style-type: none"> • Export Market Share • Balance of Trade • Export Growth • Profitability 	<ul style="list-style-type: none"> • Cost Competitiveness • Productivity • Price Competitiveness • Technology Indicators 	<ul style="list-style-type: none"> • Commitment to International Business (Trade Association etc)
Company	<ul style="list-style-type: none"> • Export Market Share • Export Dependency • Export Growth • Profitability 	<ul style="list-style-type: none"> • Cost Competitiveness • Productivity • Price Competitiveness • Technology Indicators 	<ul style="list-style-type: none"> • Ownership Advantage • Commitment to International Business • Marketing Aptitude • Management Relations • Closeness to Customer • Economies of Scale and Scope
Product	<ul style="list-style-type: none"> • Export Market Share • Export Growth • Profitability 	<ul style="list-style-type: none"> • Cost Competitiveness • Productivity • Price Competitiveness • Quality Competitiveness • Technology Indicators 	<ul style="list-style-type: none"> • Product Champion

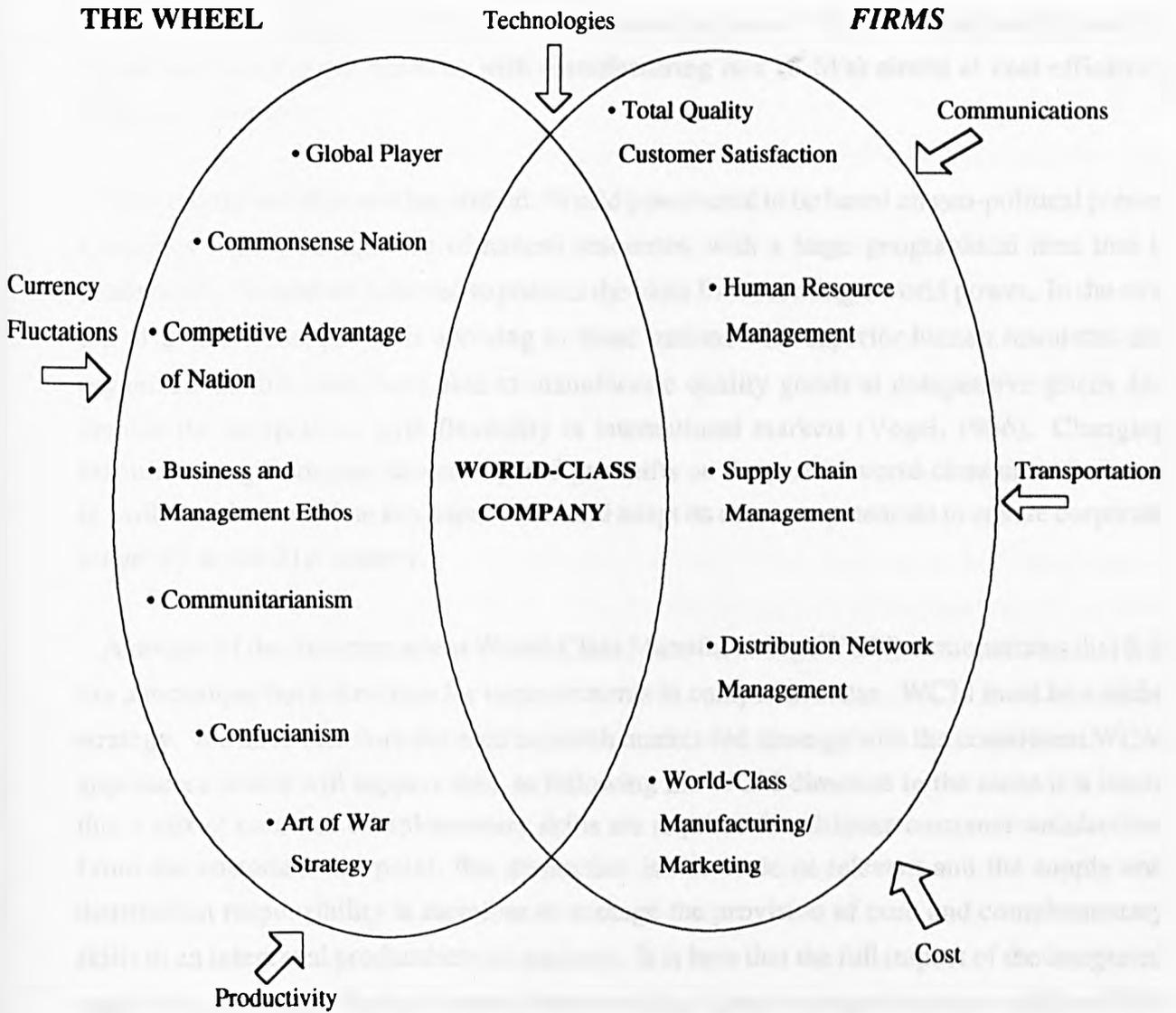
Source: Adapted from Buckley, Peter J., Pass, C.L. and Prescott, Kate (1992) , Service International Markets: Competitive Strategies of Firm. Blackwell Publishers, Oxford, pp. 18.

TABLE 5-16 COMPARATIVE INDUSTRIAL LEADERSHIP OF THE USA AND JAPAN

JAPANESE LEADERSHIP	USA LEADERSHIP
Automobiles and Motor Vehicles	Agriculture
Household Appliances	Aircraft
Industrial Robots	Nonferrous Metals
Compact Word Processors	Advanced Telecommunications Equipment
Precision Machinery (CNC)	Organic and Inorganic Chemicals
Optical Equipment	Pharmaceuticals
Compact Computers	Large Scale Computers
Special Steel	Large Earth-Moving Equipment
Consumer Electronics	Gas Turbines
Cameras	Communications Satellites (Rocket Technology)

Source: Ali, Abbas, J. (1992), How to Management International Competitiveness. International Business Press, pp. 65

FIGURE 5.24 THE NEW PARADIGM FOR INTERNATIONAL BUSINESS



Source: Author

Nevertheless, to maintain the number one position it is imperative to go beyond world-class, ie to beat the current world-class record. To drive this strategic intent, you need to create innovative products through lead-marketing-manufacturing strategy, ie lead the customers to see the benefits/uniqueness in terms of the marketing mix (7 P's) and value added service, create and develop the markets, with manufacturing mix (5 M's) aimed at cost-efficiency (value-for-money).

The basis for world power has shifted. World power used to be based on geo-political power. Countries with a strong base of natural resources, with a large geographical area that is strategically located are believed to possess the basis for becoming a world power. In the new era of global trade, power is accruing to those nations with superior human resources and organizations that have been able to manufacture quality goods at competitive prices and combat the competition with flexibility in international markets (Vogel, 1986). Changing manufacturing landscape demands paradigm shifts on the part of world-class manufacturers to evolve and accumulate key capabilities and adapt its core competencies to ensure corporate longevity in the 21st century.

A review of the literature about World-Class Manufacturing (WCM) demonstrates that it is not a technique but a direction for improvements in competitiveness. WCM must be a niche strategy. We have therefore the need to match market-led strategy with the constituent WCM approaches which will support this. In following the WCM direction in the niche it is likely that a mix of core and complementary skills are required for ultimate customer satisfaction. From the customer viewpoint, this distinction is not made or relevant and the supply and distribution responsibility is therefore to manage the provision of core and complementary skills in an integrated product/service package. It is here that the full impact of the integrated supply chain and distribution network becomes clear since the complementary skills will be those provided by the relevant supply chain partners and distributor network. In many cases, the services provided by the complementary skills groups will contribute significantly to competitive differentiation and advantage.

The relationship between the internal core competencies and the external skills in the virtual factory are set in a wider relationship network context. This provides a new approach to framing both corporate and manufacturing strategy founded on principles of collaboration or Partnering, not narrowly adversarial behaviour. This is consistent with systems view and a learning community approach to capability enhancement.

This approach has impact on business decision processes and on the nature of operations management teaching and research. The evidence from the field is that few organisations have fully understood the scale of the impact of relationship management on both operational and strategic capability and the change management processes needed to effect a move to collaborative approaches. This will be explored in *FIRMS* of Chapter 6.

A more realistic assessment of the performance of Japanese and Taiwanese machine tool builders must first evaluate what world-class companies have accomplished to help themselves (*company-focus* is addressed in *FIRMS*) and how the politico-socio-cultural environment within national borders has engendered and facilitated a stronger competitive drive through the nurture of world-class companies (*national-focus* is addressed in the *Wheel*). This points to a symbiotic relationship between the company and the nation. See Table 5-17.

5.13 Conclusion

In Taiwan, the government has consistently regarded Confucianism as the foundation of China's cultural heritage, and presented Confucius' teachings as the foundations of the modern social order. It consistently revered Confucianism for its contribution to building social ethics and to encouraging education. In the mid-1960s, a cultural renaissance movement was initiated in Taiwan for purpose of promoting a better understanding of the applications of Confucianism to daily life in contemporary society.

Although Confucianism was the historical product of an agrarian society, its emphasis on hardwork, thrift, social harmony, private ownership, equitable distribution of wealth, and its tolerance of profit-making activities have contributed greatly to social stability and mobility, political democratization and economic growth in Taiwan (Chang, 1991). Taiwan has astonishing large capital surpluses.

The Confucian classics were first introduced to Japan in the 3rd century A.D. By the 17th century A.D., Confucian ideals were adopted as the basis of the Japanese constitution. In the process of development, Confucianism in Japan gradually amalgamated with Shintoism, Buddhism and the samurai spirit, to create a new form. During the Meiji Restoration in the 19th century, Japanese moral education was still based upon Confucianism even though Japan by then was Westernised and had achieved great progress in commerce, industry, science and technology. Despite modernization and industrialisation, Confucian values have been maintained in Japan and Confucianism still plays a role in shaping Japanese society.

TABLE 5-17 ELEMENTS OF THE WHEEL OF COMPETITION OF ASIAN PRODUCERS

World-Class Status	Global Player	Competitive Advantage of Nations	Commonsense Nations Nations	Communitarianism	Confucianism	Art of War	Business and Management Ethos
<ul style="list-style-type: none"> • World-Class brand • Benchmarking • Corporate identity/ World-Class image • Worldwide standard quality • Worldwide distribution and service • Financial strength • Worldwide customer service 	<ul style="list-style-type: none"> • Global reach • Significant market share • Leader in R&D/ Innovation • Global strategy 	<ul style="list-style-type: none"> • Firm strategy structure • Factor conditions • Demand conditions • Related and supporting industries 	<ul style="list-style-type: none"> • Political stability • Economic development • Social harmony • Takes the best from others • Reverse engineering/ Innovation • Trade surplus • Competitive cooperation • Enhanced standard of living 	<ul style="list-style-type: none"> • Equality of Result/hierarchy • Consensus • Community need • Active planning state • Holism 	<ul style="list-style-type: none"> • Thrift • Reverence to elders • Hardwork • Social responsibility • Hierarchy • Loyalty • Sacrifice • Education 	<ul style="list-style-type: none"> • Principles of detailed planning through SWOT Analysis • Principle of Intelligence and Security • Principle of Swiftiness • Principle of Adaptability • Principle of Deception • Principle of Priority (of goals) and Proactivity • Principle of Alternatives (in Strategies) 	<ul style="list-style-type: none"> • Superordinate goals • Strategy • Systems • Structure • Skills • Staff • Style

Source: Author

The best and most celebrated example of relationship between homogeneous national culture and corporate cultures is found in Japan. In discussion of Japanese organizational and working practices, emphasis is often placed on the values identified in Table 5-18 which also shows the way they are said to be manifest in the company. Corporate culture is seen as predominantly derived from accumulated and shared social experiences and values from a wider national context (Dawson, 1992). Ethnically Japan is a comparatively homogeneous society. This reflects careful control of immigration and multiple channels of reinforcement of dominant codes of conduct (eg through family, school and employment).

Sociologist Peter Berger (1984) pointed out that "it is unimaginable that Confucian values such as the positive attitude of this-worldliness, the rule-abiding and active seeking of well-being of life, the respect for authority, the emphasis on frugality, and the strong concern for a stable family life, could be without any relation to the job ethics and the attitude of the whole East Asian community". To quote Senior Minister Lee Kuan Yew on the culture of success: "If you have a culture that does not place much value in learning and scholarship and hardwork and thrift and deferment of present enjoyment for fortune gain, the going will be much slower" (*Straits Times*, March 11, 1994).

In Kotkin's (1992) landmark study of racial and ethnic factors in the evolution of international business, he focused on the development of five globally dispersed ethnic groups or global tribes bound together by a shared tradition, not geography, ie the Jews, the British, the Japanese, the Chinese and the Indians, whose impact on the world economy has been most profound. Despite vastly different histories, each global tribe shares quite essential characteristics that will determine success in the economy of the 21st century:

- A strong ethnic identity, with a strong sense of common origin, mutual dependence, shared values and emphasis on the family structure and beliefs. Historically conditioned values and beliefs help the group to adjust to a fickle global economy and political order and remain cohesive
- A global network based on tribal trust that allows the group to function collectively and to transcend the confines of national or regional borders
- A passion for technology and other knowledge and a belief in scientific progress, together with an open-mindedness that fosters rapid development critical to success in current times.

**TABLE 5-18 VALUES ATTRIBUTED TO THE JAPANESE AND THEIR
MANIFESTATION WITHIN THE COMPANY**

Social Values	Corporate Manifestation
Stress upon vertical rather than horizontal relationships	Loyalty to company Loyalty to "boss" Less Loyalty to "profession"/occupational group
Stress upon consensus	Apparently loose and under-defined structures for decision making from which consensus emerges
Stress upon rights and obligations in all relationships	Reciprocity between functional groups and between levels
Stress upon diligence, tenacity and responsibility	Pride in performance, quality and service
Stress upon distinction between insiders and outsiders	Company/group membership is all important and claims primary loyalty over other collectivities. But company looks after family, so there should be no conflict between company and family

Source: Dawson, Sandra (1992), Analysing Organisations. Second Edition, The Macmillan Press, London.

Also, the ability to work harder than the established majority in their adopted country.

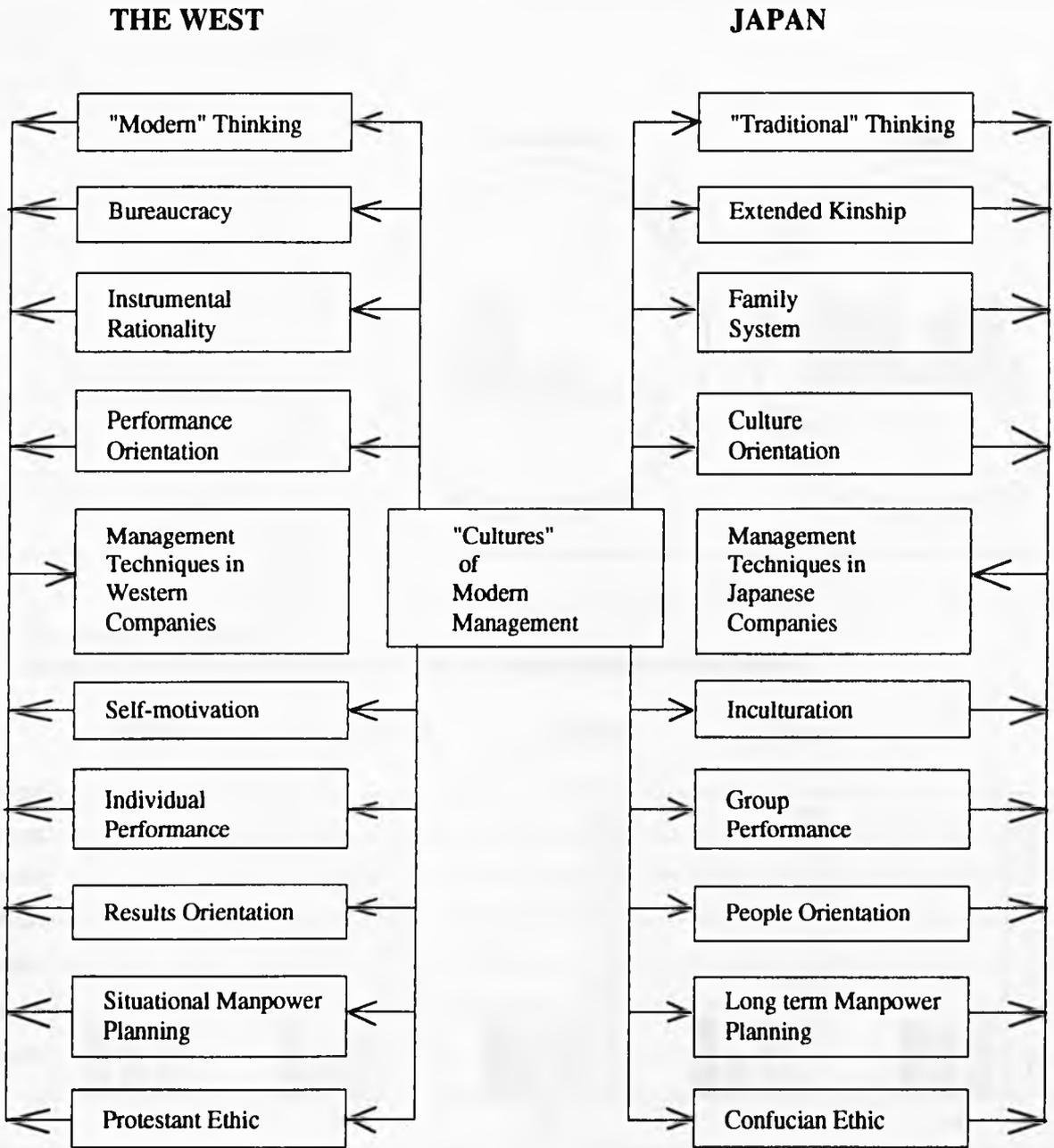
With the rise of new post-Cold War global economy, age-old ethnic ties are emerging as the most powerful force in international business. Clearly identifiable values - such as a strong ethnic identity, a belief in self-help, hard-work, thrift, education and the family - have stripped of the burdens of Cold War ideology and racism, the relationship between such values and group success is simply too self-evident to ignore.

The notion that culture and performance are somewhat bound together in a unidimensional wall is unrealistic. The author agrees with Dawson (1992) that cultural characteristics, whether imprinted from the wider national contexts or developed and nurtured within the corporate context can determine or explain corporate performance or even national economic and industrial performance is gross oversimplification. Dawson's "Virtuous Circle" (see Figure 6.8, page) shows a view in which, at the national level, cultural values have a place, but it is only one place amongst many in explaining virtuous (or, in other circumstances, vicious) circles of Japanese economic performance. Similarly, the author's "Wheel of Producers" has other parameters besides socio-cultural belief systems, to explain the performance of Japanese and Taiwanese business. Comparison of modern Western company and the retention of traditional spirit in Japanese company is in Figure 5.25.

Europe is being left behind in the race for scientific and technological advantage between the world's main industrialised countries. R&D spending grows more slowly in Europe than in the USA or Japan. See Figure 5.26. Patent activity stagnates compared to the rest of the advanced economies (see Figure 5.26). About 18 million people or 11 percent of the work force is unemployed; this figure is expected to reach 20 million in 1995 (*Financial Times*, March 10, 1994). An OECD study of thirteen leading industrialised countries calculates that, over the past 20 years, manufacturing employment overall has fallen by 8 percent. But in Europe it has fallen 20 percent. In the USA it has barely changed, while in Japan it has risen by 2 percent (*Financial Times*, February 25, 1994). Europe's manufacturing output and productivity lag USA and Japan (see Figure 5.27).

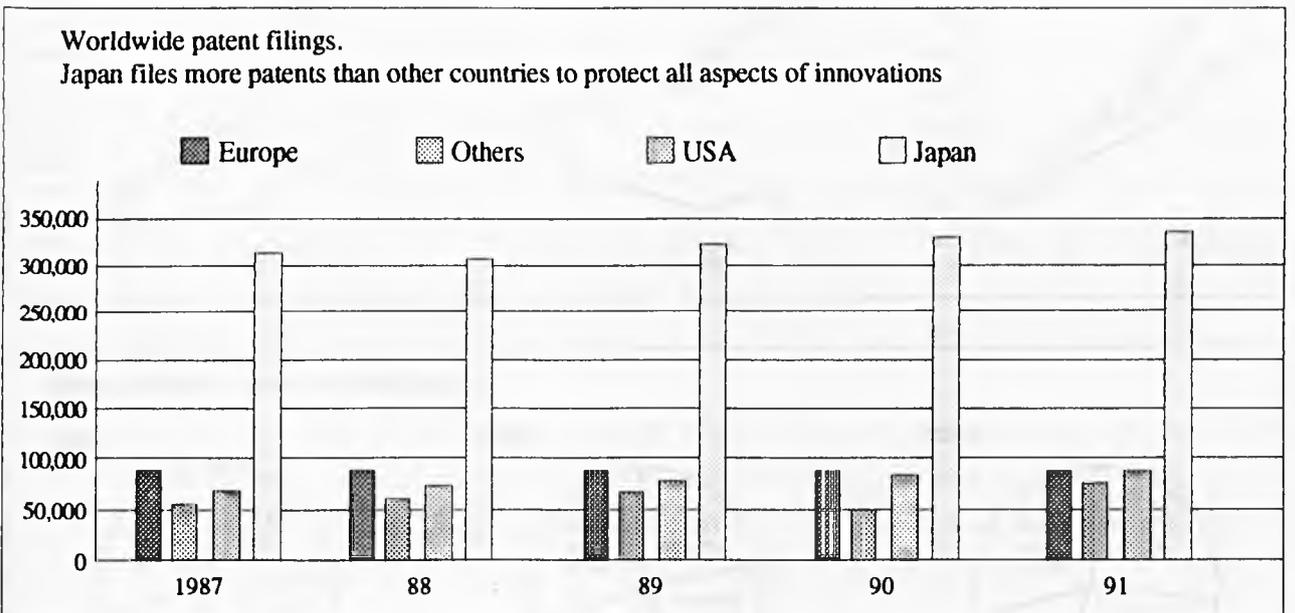
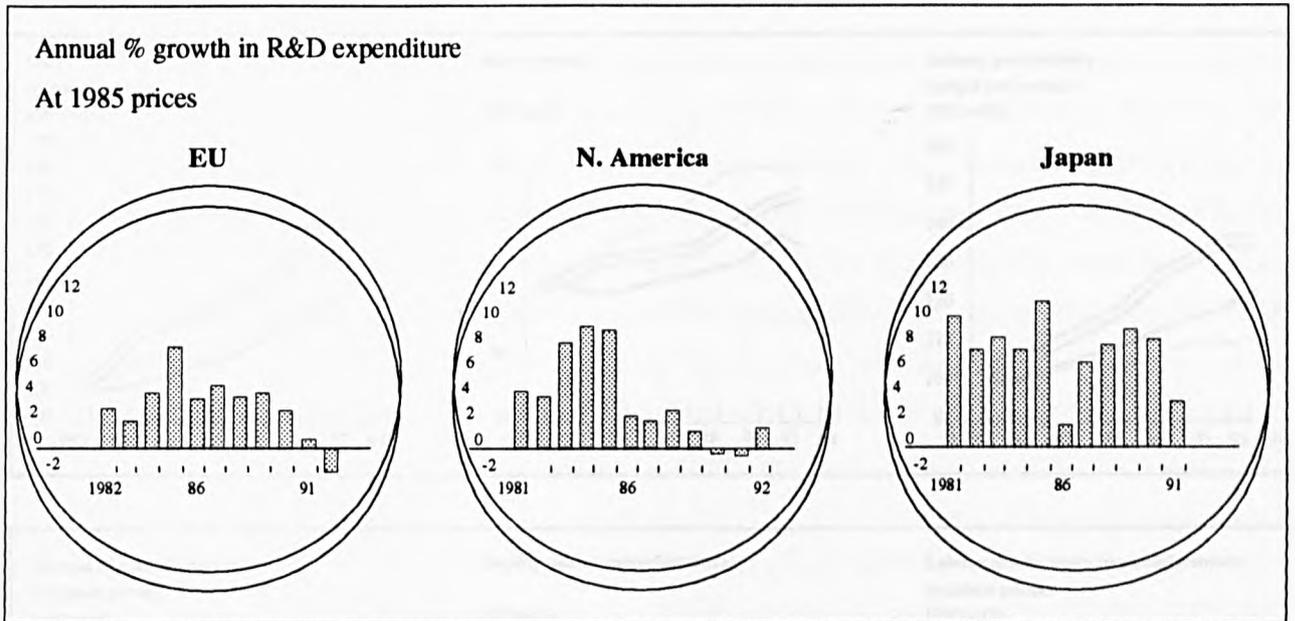
European economies are already uncompetitive in terms of costs (*Financial Times*, February 2, 1994). And, this is compounded by social welfare costs. A North American or European worker costs an average of about US\$20,000 a year, with another US\$10,000 or so of social welfare costs. (In most European countries, unemployment benefits are followed by

FIGURE 5.25 WESTERN AND ASIAN MANAGEMENT



Source: Silos, Leonardo (1994), "The Modern Traditional Enterprise", *The Asian Manager*. Vol. VII, No. 1, February, pp. 41.

FIGURE 5.26 R&D SPENDING AND PATENT ACTIVITY IN EUROPE, USA AND JAPAN

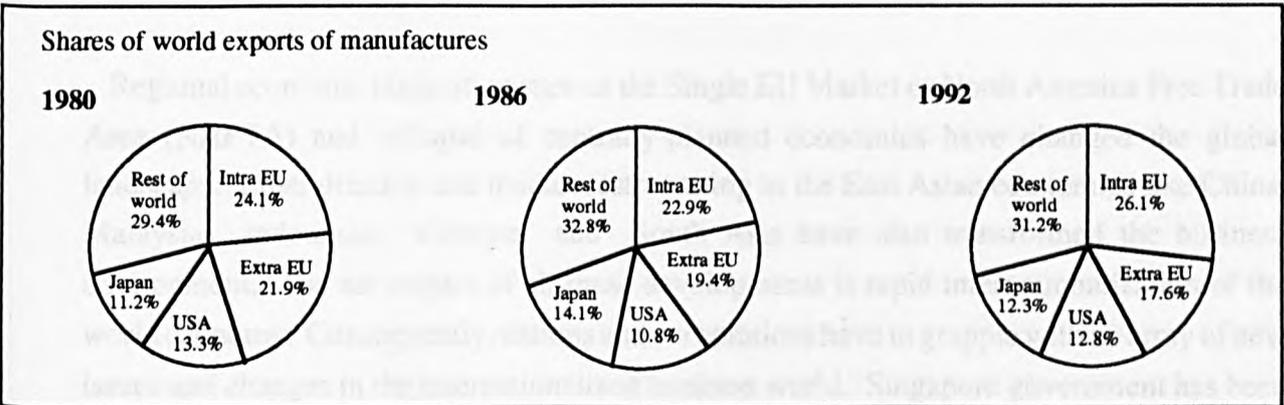
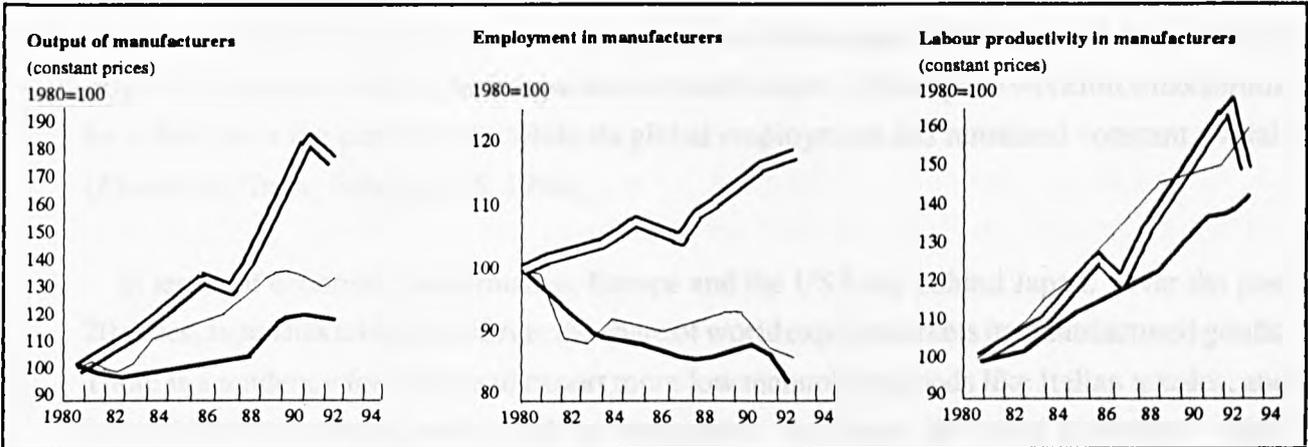
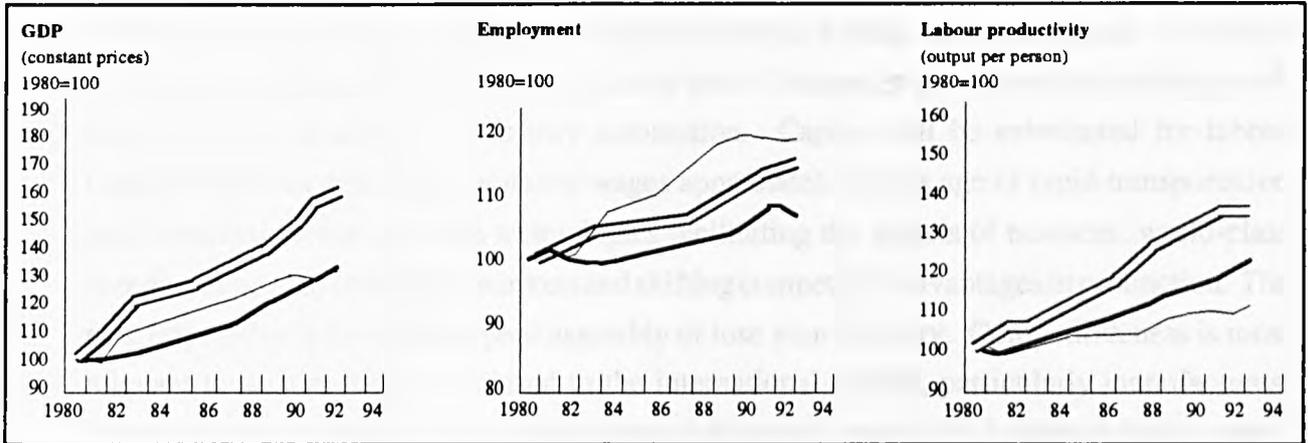


Footnote: R&D spending grows more slowly in Europe than in USA or Japan and patent activity stagnates compare to the rest of the world, but Europe has not given up on the key technologies of the future, ie gene splicing, magnetic resonance imaging, high-temperature superconductivity, personal computers, Neural networks, and communications satellites.

Source: *Financial Times* (1994), March 2, pp. 9.

FIGURE 5.27 COMPARATIVE ECONOMIC DATA AMONGST EU, USA AND JAPAN

KEY: — EU == Japan — USA



Footnote: European Union's GDP performs better than employment, but manufacturing output and productivity lag USA and Japan as its external exports lose global market share

Source: *Financial Times* (1994), February 24, pp. 11.

relatively generous welfare payments. Europeans who lose their jobs also get the keep their health-care coverage). In China, the comparable labour cost is about US\$1,000 a year (*Straits Times*, March 12, 1994).

The drive to restore industrial competitiveness is hostile to employment. Industrial restructuring will result in major destruction of jobs. Companies grow leaner by slashing work forces and introducing more factory automation. Capital will be substituted for labour (equipment costs depreciate, workers' wages appreciate). In this age of rapid transportation and communications and with technologies facilitating the wheels of business, world-class companies go in search of new markets and shifting competitive advantages in production. The new imperative is to transport your assembly or lose your industry. Competitiveness is most relevant to sectors that are exposed to the international market, particularly manufactures. Transferring production to lower wage parts of the world, especially Southeast Asia is a way for companies to become more competitive, but it will only worsen Europe's employment dilemma. Jobs are exported from the host countries. For example, Unilever (of Anglo-Dutch origins) has moved half its operating assets outside Europe. Its European workforce has shrunk by a third over the past decade, while its global employment has remained constant overall (*Financial Times*, February 25, 1994).

In terms of economic performance, Europe and the USA lag behind Japan. Over the past 20 years, Japan has taken the USA in the share of world export markets in manufactured goods. There is a tendency for Europe to export more low technology goods like Italian textiles, and fewer high technology goods, such as computers. In Japan, the trend is reverse - high technology sectors provide the fastest growth (*Financial Times*, February 2, 1994).

Regional economic integration such as the Single EU Market or North America Free Trade Area (NAFTA) and collapse of centrally-planned economies have changed the global landscape. Liberalization and market restructuring in the East Asian economies like China, Malaysia, Indonesia, Vietnam and South Asia have also transformed the business environment. The net impact of all these developments is rapid internationalization of the world economy. Consequently, nations and corporations have to grapple with an array of new issues and changes in the internationalized business world. Singapore government has been actively encouraging companies to go regional. Apart from the national perspectives of developing an external economy to complement the maturing domestic economy, the regionalization programme will encourage more Singapore companies to venture abroad to

exploit the new markets and leverage global and regional resources. The attraction of China and Vietnam for lower end manufacturing operations, economic deregulation in Indonesia and India and emergence of new markets like Myanmar, East Asia and South Asia are envisaged to propel greater regional activities for Singapore companies in the coming years.

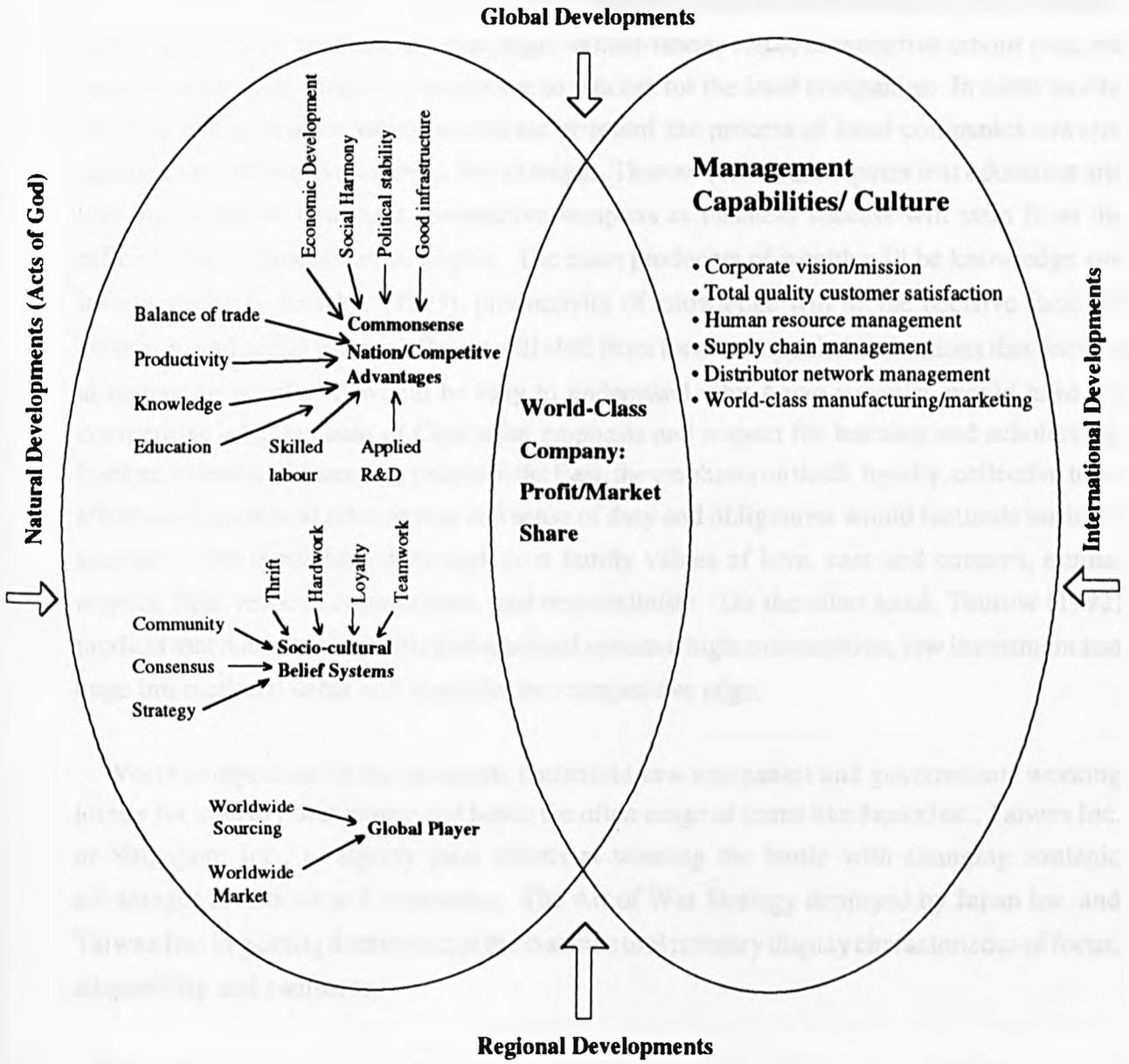
In anticipation of the possible loss of competitiveness of Singapore, the government has actively promoted an external wing to its economy and exhorted Singaporeans to "go regional". Raise in Confucian culture, having internalised the values of communitarianism and a belief in the greater good of the community, Singaporeans responded and are willing to sacrifice for the good of the family (Lee Kuan Yew, *Straits Times*, March 12, 1994).

The basic difference between Western and East Asian concepts of society is that Easterners believe the individual exists in the context of his family, and the ruler does not try to provide for a person what the family does best. So while the West believes that all problems can be solved by a good government, the East has focused on the basics, using the family to push economic growth, factoring the ambitions of a person and his family into their planning. East Asia succeeded because it puts emphasis on the family as a building block and not on government as a solver of all problems (Lee Kuan Yew, *Business Times*, March 11, 1994).

If there is any broadly felt sense of social malaise in the USA and other Western societies today, it has to do with the loss of community from the breakdown of the civic society (guns, drugs, vagrancy), disintegration of the family, the absence of any meaningful sense of local attachment and the fragmentation of natural purpose. This would have profound impact on industrial performance and international competitiveness.

In any explanation of industrial performance, there are many dimensions. The author posits that a multi-disciplinary and multi-level analysis is needed for a wholistic approach to understanding the competitiveness of European versus Asian businesses. The Wheel of Competition looks at the wider political, social and cultural context within which the company is embedded. Analysis at the company level is provided in *FIRMS*. Whilst company nurtures goal of profit/market share, that achievement or non-achievement has to be understood at the company level and the national level using the interrelated models of competitiveness in the Wheel of Competition (macro analysis) and in *FIRMS* (micro analysis). (See Figure 5.28).

FIGURE 5.28 INTERRELATED MODELS OF COMPETITIVENESS



Source: Author

In the Asian society, the spirit of community, values of Confucianism in people within the context of a commonsense nation actively seeking competitive advantages nurture and engender the competitive drive in the company with its business and management ethos reflecting the broader themes of the nation. National focus on infrastructure, R&D (applied rather than basic), productivity campaign, skilled labour force, competitive labour cost, etc would create an environment conducive to success for the local companies. In other words, national characteristics would accelerate or retard the process of local companies towards sustainable competitive success. For example, Thurow (1992) anticipates that education and training would be dominant competitive weapons as business success will stem from the efficient use of process technologies. The main producers of wealth will be knowledge and information. To Drucker (1993), productivity of knowledge will be the decisive factor in economic and social success. Power will shift from those companies and nations that are best at managing people. It would be easy to understand why Asian societies would have the competitive edge because of Confucian emphasis and respect for learning and scholarship. Further, in terms of managing people in the East, the emphasis on thrift, loyalty, collective team efforts and reciprocal relationship and sense of duty and obligations would facilitate business success. This is reinforced through core family values of love, care and concern, mutual respect, filial respect, commitment, and responsibility. On the other hand, Thurow (1992) predicts that American atrophied educational systems, high consumption, low investment and huge international debts will squander her competitive edge.

World competition in the economic battlefield saw companies and governments working jointly for industry dominance and hence the often usage of terms like Japan Inc., Taiwan Inc. or Singapore Inc., to signify joint efforts at winning the battle with changing strategic advantages to nations and companies. The Art of War Strategy deployed by Japan Inc. and Taiwan Inc. in gaining dominance of the machine tool industry display characteristics of focus, adaptability and swiftness.

The pressures to maintain and sustain competitive success are tremendous with the constant need to stay lean, trim work force and cut costs, resulting in the move to reduce manpower which will exacerbate the unemployment problem. Thus unemployment problem can only be partially resolved if workers move with their factories. But, only the best will be taken, those who are willing to undergo job training and retraining. The lethargic and slothful ones will be on the dole. Amongst the chosen ones, how many are willing to sacrifice for the sake of the family and the nation, take personal responsibility for the vicissitudes of life both in the

individual and business spheres? Hence, Chapter 3 highlights the changing business environment and focuses on the paramount importance of cultivating a breed of "international managers" with a global mindset because of the increasingly borderless nature of business where people move where opportunities beckon. Chapter 4 highlights the new formula for competitive success within which the international managers must perform. Chapter 5 suggests that the Wheel of Competition can explain the success stories of Asian machine tool builders by focusing on the national environment. Chapter 6 continues the success stories at the company level.

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