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Analysis of Telecommunication Markets of India, Singapore and Thailand and Research Their Global Competitiveness

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JU-HAN HUANG

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<th>Examiner</th>
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Ju-Han, Huang

Madrid, Spain

15 June 2011
Abstract

The objective of this paper is to investigate the telecommunication markets in India, Singapore and Thailand in order to find the potentiality of the markets which could be considered by the company to expand its business in telecommunication field and also to take a proper strategy. Michael Porter proposed a model that allows analyzing why some nations are more competitive than others are, and why some industries within nations are more competitive than others are. (Porter, 1990) Porter believed that there are four main determinants which can shape the nation’s competitiveness. In this paper “Diamond model” was practiced to analyze three considerable different telecom markets: India, Singapore and Thailand. The Indian telecom industry is the world’s fastest growing industry. Singapore is a miniscule nation with slight population and nature resource scarcity but Singapore has developed its national ICT industry successful ranks in 2nd place out of 138 countries in 2010-2011. Thailand’s mobile penetration rate has reached to 100% but its 3G service still could not move forward. The research found that Singapore’s telecom industry is highly competitive in the global environment. India’s telecom industry within its nation is more competitive than the other industries. On the contrary, Thailand’s telecom industry develops not as superior as other industries such as its manufacturing or trading. At the end, predictions for the short time and suggestions of these objective markets have been commented to contribute to telecom business development in Asian region for target audience.
Table of Content

Abstract ................................................................................................................................. 4

Content ................................................................................................................................. 5

List of Figure ......................................................................................................................... 13

List of Table .......................................................................................................................... 15

List of Acronyms ................................................................................................................. 16

1. Introduction ..................................................................................................................... 21

1.1. Research Background ................................................................................................. 21

1.2. Research Objective ..................................................................................................... 22

1.3. Target Audience ......................................................................................................... 22

1.4. Research Question & Limitation ............................................................................... 23

2. The Research Process and Methodology ..................................................................... 24

2.1. Research Process ...................................................................................................... 24

2.1.1. Analysis of Wholesale Business Model of Telecom Industry .............................. 25

2.1.2. Define Problem and Research Objective .............................................................. 25

2.1.3. The Development of Theory ................................................................................. 26

2.1.4. Choice of Country, and Market ............................................................................ 26

2.1.5. Search for Empirical Information, and Presentation of Data ................................. 27

2.1.6. Analysis National Telecom Industries .................................................................... 28

2.1.7. Comparison of Telecom Industry of India, Singapore, Thailand and Global Telecom Market 29

2.1.8. Comparison with the Networked Readiness Index 2010-2011 of World Economic Forum 29

2.1.9. Conclusion and Recommendation ........................................................................ 30

2.2. Methodology ............................................................................................................. 30

3. Theoretical Framework ................................................................................................. 37

3.1. Trade theories and international competitiveness of countries .............................. 37

3.2. National Diamond .................................................................................................... 45

3.2.1. Factor Conditions .................................................................................................. 48
3.2.2. Demand Conditions ................................................................. 51
3.2.3. Related and Supporting Industries ............................................. 52
3.2.4. Corporate strategy, Structure and Rivalry .................................... 54
3.2.5. Chance .................................................................................. 54
3.2.6. Government ............................................................................ 55

3.3. SWOT Analysis .......................................................................... 56

3.3.1. SWOT .................................................................................... 56
3.3.2. SWOT–CLPV ......................................................................... 58

3.3.2.1. Leverage effect (strengths + opportunities): .............................. 59
3.3.2.2. Inhibition (opportunities + weaknesses): ..................................... 59
3.3.2.3. Vulnerability (strengths + threats): ............................................ 60
3.3.2.4. Problematic (weaknesses + threats): ........................................ 60
3.3.3. SWOT Analysis Steps ............................................................... 60

4. Business Model of Spanish International Wholesale Telecommunication

4.1. Introduction ............................................................................... 61

4.2. Services of International Wholesale Services .................................. 62

4.3. Analysis of Business Model of IWS (International Wholesale Services) .... 63

4.3.1. Data Business .......................................................................... 63

4.3.1.1. SDH/SONET Services ............................................................. 64
4.3.1.2. DWDM Service ..................................................................... 65
4.3.1.3. The Network .......................................................................... 66

4.3.2. Voice Business .......................................................................... 71

4.3.2.1. Traditional business model of international voice ....................... 71
4.3.2.2. Bilateral Agreement ................................................................. 73
4.3.2.3. Hubbing Business ................................................................. 75
4.3.2.4. Tromboning ........................................................................... 76
4.3.2.5. Simbox ................................................................................ 77

4.4. IWS (Spanish International Wholesale Services) Dimension .................. 79

4.4.1. VOIP Evolution ........................................................................ 79
4.4.2. Sales Model ............................................................................ 79
4.4.3. NGN Model (Next Generation Network) ....................................... 80
5. Research Findings: India .............................................................. 81

5.1. The Country Overview .......................................................... 81
  5.1.1. Economic factors ............................................................... 81

5.2. Telecom market in India ......................................................... 81
  5.2.1. Fixed operators ................................................................. 82
  5.2.2. Fixed Line Market Share ................................................... 83
  5.2.3. Other Fixed Line Operators .............................................. 83
  5.2.4. Mobile Operators ............................................................. 84
  5.2.5. Mobile market share ....................................................... 84
  5.2.6. Mobile sector ................................................................. 85
  5.2.7. The circles/ service areas ............................................... 86

5.3. Licenses .............................................................................. 87

5.4. The market share of operators in India ..................................... 88

5.5. Major Telecom Operators in India .......................................... 89
  5.5.1. Bharti Airtel ...................................................................... 89
    5.5.1.1. Local infrastructure in India ........................................ 90
    5.5.1.2. Global transmission services of Bharti ....................... 90
    5.5.1.3. Services of Bharti ....................................................... 90
    5.5.1.4. MPLS Bharti Airtel ..................................................... 91
    5.5.1.5. Global IP Transit Services .......................................... 91
    5.5.1.6. Other Services of Bharti ............................................. 91
  5.5.2. Group Tata ..................................................................... 92
    5.5.2.1. Introduction of Group Tata ......................................... 92
    5.5.2.2. Tata Communications ................................................. 92
    5.5.2.3. Global Transmission Services of Tata ....................... 93
    5.5.2.4. Global Service MPLS of Tata .................................... 93
    5.5.2.5. Tata MPLS Network Coverage in Asia ...................... 94
    5.5.2.6. Features of MPLS Network Tata ................................ 94
    5.5.2.7. Value Added Services of Tata ................................... 95
    5.5.2.8. Other Services of Tata ............................................. 95
  5.5.3. Group Reliance ................................................................. 96
    5.5.3.1. Introduction of Group Reliance .................................. 96
6. **Research Findings: Singapore** ................................................................. 99

6.1. **The Country Overview** ........................................................................ 99

6.2. **The economy of Singapore** ................................................................. 99

6.3. **Telecom Market of Singapore** ............................................................. 99

6.4. **The Number of Telecom Providers in Singapore (till May 2011)** .......... 100

6.5. **Fixed Line Market in Singapore** .......................................................... 101

   6.5.1. Fixed Telephone Providers in Singapore ........................................... 101

   6.5.2. Fixed Line Market Share in Singapore ............................................. 101

   6.5.3. Statistics of Fixed Line of Singapore ................................................ 102

6.6. **Mobile Market in Singapore** .............................................................. 103

   6.6.1. The Mobile Market Share in Singapore ............................................ 103

   6.6.2. Statistics of Mobile Market of Singapore ......................................... 104

   6.6.3. International Telephone Calls .......................................................... 104

6.7. **Data Market in Singapore** .................................................................. 105

6.8. **Operators in Singapore** ...................................................................... 106

   6.8.1. Singapore Telecommunications Limited (SingTel) .......................... 106

      6.8.1.1. Network of SingTel .................................................................. 106

   6.8.2. StarHub Limited .............................................................................. 107

   6.8.3. M1 Limited ....................................................................................... 107

7. **Research Findings: Thailand** ................................................................. 108

7.1. **The Country Overview** ...................................................................... 108

7.2. **Economics of Thailand** ..................................................................... 108

7.3. **Telecom Market Overview of Thailand** ............................................ 108
7.4. Fixed Operators ................................................................. 109
   7.4.1. Thailand Fixed Line .......................................................... 109
   7.4.2. Fixed Line Market Share .................................................... 109

7.5. Mobile Operators .............................................................. 111
   7.5.1. Percentage of Mobile Users .............................................. 111
   7.5.2. Total Market Share of Mobile Service in Thailand from 2009 Q3 – 2010 Q3 .......... 113
   7.5.3. Mobile Sector in Thailand .................................................. 113
   7.5.4. Coverage and areas .......................................................... 114

7.6. Data Market in Thailand .................................................... 114

7.7. International telephone services market in Thailand ................. 114

7.8. Interconnection ................................................................. 115
   7.8.1. Interconnection Carriers ................................................... 115

7.9. International Internet Gateways .......................................... 116

7.10. Submarine Cables in Thailand ........................................... 116

7.11. BTO Network in Thailand (Build Transfer Operate) ............... 117

7.12. Telecom Operators in Thailand ........................................... 117
   7.12.1. AIS Introduction (Advanced Info Service) ............................ 117
   7.12.2. DTAC (Total Access Communication Public Company Limited) ...................... 118
   7.12.3. True (formerly Orange) .................................................... 118
      7.12.3.1. TIG (True International Gateway) .................................. 118
   7.12.4. Hutch ............................................................... 119
   7.12.5. TOT (TOT Public Company Limited) .................................... 119
   7.12.6. CAT ............................................................... 119

8. Analysis .............................................................................. 120

8.1. Diamond Theory Analysis of Telecom Industry of India ............ 120
   8.1.1. Factor conditions: ............................................................ 121
   8.1.2. Demand conditions: ...................................................... 123
   8.1.3. Related and supporting industries ..................................... 124
   8.1.4. Firm strategy, structure and rivalry: .................................. 126
   8.1.5. Government ............................................................... 128
8.1.5.1. DoT · Department of Telecom .......................................................... 128
8.1.5.2. WPC · Wireless Planning and Coordination Wing .......................... 128
8.1.5.3. TEC · Telecom Engineering Center ................................................ 129
8.1.5.4. TRAI · Telecom Regulatory Authority of India ............................. 130
8.1.6. Chance ................................................................................................. 130

8.2. Diamond Theory Analysis of Telecom Industry of Singapore ............ 131
8.2.1. Factors conditions .............................................................................. 132
8.2.2. Demand conditions ............................................................................ 134
8.2.3. Related and supporting industries ....................................................... 135
8.2.4. Firm strategy, structure and rivalry .................................................... 136
8.2.5. Government ....................................................................................... 137
8.2.6. Chance ............................................................................................... 137

8.3. Diamond Theory Analysis of Telecom Industry of Thailand ............. 138
8.3.1. Factor conditions ................................................................................ 139
8.3.2. Demand conditions ............................................................................ 140
8.3.3. Related and supporting industries ....................................................... 143
8.3.4. Firm strategy, structure and rivalry .................................................... 144
8.3.5. Government ....................................................................................... 145
8.3.6. Chance ............................................................................................... 147

8.4. SWOT Analysis of India Telecom Industry ........................................ 148
8.4.1. Strengths ............................................................................................ 148
8.4.2. Weaknesses ....................................................................................... 148
8.4.3. Opportunities ..................................................................................... 148
8.4.4. Threats ............................................................................................... 149

8.5. SWOT Analysis of Singapore Telecom Industry .................................. 150
8.5.1. Strengths ............................................................................................ 150
8.5.2. Weaknesses ....................................................................................... 150
8.5.3. Opportunities ..................................................................................... 151
8.5.4. Threats ............................................................................................... 151

8.6. SWOT Analysis of Thailand Telecom Industry ...................................... 153
8.6.1. Strengths ............................................................................................ 153
8.6.2. Weaknesses ....................................................................................... 153
8.6.3. Opportunities ........................................................................................................ 154
8.6.4. Threats .................................................................................................................. 154

8.7. The Comparison of India, Singapore and Thailand ............................................... 156

9. Conclusion and Recommendations ....................................................................... 166

9.1. India Telecom Market ......................................................................................... 166
9.1.1. Data Market Increases Substantial, but Voice Services Still the Main Foundation of Revenue: 166
9.1.2. Wireless Will Take the Leadership In the Network Business ............................. 167
9.1.3. Integrated Operators Show Up ......................................................................... 167
9.1.4. ... Digital Citizens and Service Driven Enterprises are the Keys Although They Are in a Small Amount ........................................................................................................... 169
9.1.5. The Driver of Dramatically Change – Economy Growth .................................. 169
9.1.6. The Market of Small and Medium Enterprises ................................................ 170
9.1.7. Three Orientations of the Enterprise Clients ..................................................... 170
9.1.8. Collaboration and Upgraded the Levels of Telecom Services with Indian Partners .... 172
9.1.9. Competitive in the Telecom Market of India. New Merges Will Be an Important Strategy 173
9.1.10. The Rate Should Be In a Stability In Indian Market ............................................ 173
9.1.11. Market Consolidation Situation ....................................................................... 173
9.1.12. 3G Launch ......................................................................................................... 174
9.1.13. Mobile Number of Portability Will Occur in Stages ......................................... 174

9.2. Singapore Telecom Market ............................................................................... 174
9.2.1. Sufficient Capital in Singapore: ......................................................................... 174
9.2.2. Mobile Integrated Services in the Emerging ...................................................... 175
9.2.3. Singapore is the 2nd at the Rank of Global Information Technology Report (GITR) .... 175
9.2.4. Next Generation Nationwide Broadband Network is the Main Point of Development of ICT of Singapore ......................................................................................................... 175
9.2.5. Expansion to Pacific Asia Fast ........................................................................... 176

9.3. Thailand Telecom Market ................................................................................... 176
9.3.1. To Invest in Broadband for Offsetting the Loss of Fixed Line Market of Thailand .... 176
9.3.2. ... To Increase the Capacity for Meeting the Needs of Internet Backbone and International Bandwidth ........................................................................................................... 177
9.3.3. ... To Increase the Stability and Quality of Telecom Services Through Submarine Cables in Thailand ........................................................................................................ 177
9.3.4. True Group Acquired Hutchison of Thailand Going to Change the Market Structure ........177
9.3.5. TOT Awarded the Contract of 3G Infrastructure ..............................................178
9.3.6. Positive Thai Telecom Reform – Mobile Number Portability (MNP) ......................179
9.3.7. 3G Could Re Shape the Thai Telecom Market ......................................................180
9.3.8. NBTC Starts to Running ......................................................................................180
9.3.9. Improve the Quality of Service .............................................................................181
9.3.10. Concluding Summary ........................................................................................183

Bibliography .................................................................................................................. 184

Appendix ....................................................................................................................... 192
List of Figure

Figure 1 Research Process .................................................................................................................. 24
Figure 2 Research Framework .............................................................................................................. 31
Figure 3 The Comparison of the Basic Among Countries ..................................................................... 32
Figure 4 The Comparison of the Knowledge Resource Among Countries .............................................. 33
Figure 5 The Comparison of the Human Resource Among Countries .................................................... 34
Figure 6 The Comparison of GDP, ICT trade, investment in Telecoms and ICT Revenue among countries ... 35
Figure 7 The Comparison of Telecom Markets of Objective Countries and Global Market .................... 36
Figure 8 National Diamond Theory Framework .................................................................................... 47
Figure 9 SWOT Analysis ....................................................................................................................... 57
Figure 10 Profile of Service of IWS ...................................................................................................... 62
Figure 11 Data Service of IWS ............................................................................................................. 63
Figure 12 DWDM Service ..................................................................................................................... 66
Figure 13 Network of IWS ..................................................................................................................... 66
Figure 14 Europe Network of IWS ......................................................................................................... 67
Figure 15 Consortium Cables of IWS .................................................................................................... 69
Figure 16 Transatlantic Region ............................................................................................................. 70
Figure 17 Voice Business Model of IWS .............................................................................................. 72
Figure 18 Inbound and Outbound Traffic of Voice Business ................................................................. 73
Figure 19 Bilateral Traffic of Voice Business ........................................................................................ 74
Figure 20 Hubbing Business ................................................................................................................ 75
Figure 21 Tromboning .......................................................................................................................... 76
Figure 22 Simbox ..................................................................................................................................... 78
Figure 23 Actual Situation and NGN Model ............................................................................................ 80
Figure 24 Fixed Market Share in India (35.96 million lines) .................................................................. 83
Figure 25 Market Share of Mobile Market in India (652.42 million lines) ............................................. 85
Figure 26 Circles or Telecommunications Service Area in India .......................................................... 87
Figure 27 The Fixed Line Market Share in Singapore ........................................................................... 102
Figure 28 The Mobile Market Share of Singapore ............................................................................... 103
Figure 29 Fixed Line Market Share Total in Thailand ............................................................................ 110
Figure 30 Fixed Line Market Share Metropolitan in Thailand .............................................................. 110
Figure 31 Fixed Line Market Share Provincial Area in Thailand ............................................................ 111
Figure 32 The Market Share of Pre-paid Mobile in Thailand .................................................................. 112
FIGURE 33 THE MARKET SHARE OF POST PAID MOBILE IN THAILAND .................................................. 112
FIGURE 34 THE RATIO OF THE REVENUE OF INTERCONNECTION OF CARRIERS ........................................ 115
FIGURE 35 ALLOCATION OF INDIAN RELEVANT AND SUPPORTING INDUSTRIES OF TELECOMMUNICATION .......... 125
FIGURE 36 EMPLOYEED INFOCOMM MANPOWER 2000-2010 IN SINGAPORE .................................................. 133
FIGURE 37 EMPLOYEED INFOCOMM MANPOWER BY QUALIFICATION, 1999-2010 ANNUAL, SINGAPORE ............. 133
FIGURE 38 REVENUE BY DOMESTIC AND EXPORT MARKET 1998-2009 ANNUAL SINGAPORE .......................... 135
FIGURE 39 TOTAL INFOCOMM REVENUE BY SEGMENT 2000-2009 ANNUAL, SINGAPORE ............................ 136
FIGURE 40 SWOT OF TELECOM INDUSTRY OF INDIA .................................................................................. 149
FIGURE 41 SWOT OF TELECOM INDUSTRY OF SINGAPORE ........................................................................ 151
FIGURE 42 SWOT OF TELECOM INDUSTRY OF THAILAND ........................................................................ 155
FIGURE 43 THE NETWORKED READINESS INDEX 2010-2011 OF INDIA .......................................................... 163
FIGURE 44 THE NETWORKED READINESS INDEX 2010-2011 OF SINGAPORE ................................................. 164
FIGURE 45 THE NETWORKED READINESS INDEX 2010-2011 OF THAILAND ................................................... 165
FIGURE 46 THAILAND MOBILE MARKET SHARE FROM 3Q2009 – 3Q2010 ..................................................... 193
FIGURE 47 AVERAGE RATES OF INTERNATIONAL TELEPHONE SERVICE IN THAILAND 1Q2009 – 2Q2010 .......... 194
FIGURE 48 DATA MARKET IN THAILAND 2002-2010 ..................................................................................... 195
List of Table

Table 1 Current Product Capacity of IWS ................................................................. 65
Table 2 Consequences and Initiatives of Tromboning .............................................. 77
Table 3 Consequences and Weaknesses of Simbox ................................................... 78
Table 4 The Market Share of Operators in India in Fixed, Mobile, and Data Business ........ 88
Table 5 Statistics of Number of Telecom Operators in the Market in Singapore .................. 101
Table 6 Fixed Line Market Share in Singapore ........................................................... 103
Table 7 The Mobile Market in Singapore .................................................................. 104
Table 8 The Telecom Data Market in Singapore ......................................................... 105
Table 9 Diamond Theory Analysis of Telecom Industry of India ................................. 121
Table 10 Diamond Theory Analysis of Telecom Industry of Singapore ......................... 132
Table 11 Diamond Theory Analysis of Telecom Industry of Thailand .......................... 138
Table 12 The Comparison of the Basic of India, Singapore and Thailand ....................... 156
Table 13 The Comparison of Knowledge Resource of India, Singapore and Thailand ........ 157
Table 14 The Comparison of Human Resource of India, Singapore and Thailand ............ 157
Table 15 The Comparison of Telecom Market of India, Singapore and Thailand ............... 159
Table 16 GDP and ICT Trade, Telecom Investment, ICT Revenue in 2010 of India, Singapore and Thailand 160
Table 17 Networked Readiness Index 2010-2011 ......................................................... 161
Table 18 The Comparison of Traditional Operators and Integrated Operators ............... 168
Table 19 Timeline of Indian Predicted Market Development ....................................... 172
Table 20 The Indian Telecom Services Performance Indicators (October - December 2010) .... 192
Table 21 The Mobile Market of SingTel ...................................................................... 193
Table 22 Fixed Line Subscribers in Thailand 2003-2010 .............................................. 194
Table 23 Mobile Growth Rate in Thailand 2002-2010 (%) ........................................... 194
Table 24 Mobile Market Revenue in Thailand from 1Q 2008 – 3Q 2010 ......................... 195
# List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
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<td>3G</td>
<td>Third Generation</td>
</tr>
<tr>
<td>AIS</td>
<td>Advanced Info Service</td>
</tr>
<tr>
<td>APCN 2</td>
<td>Asia-Pacific Cable Network 2</td>
</tr>
<tr>
<td>ARPU</td>
<td>Average Revenue Per User</td>
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<tr>
<td>BTO</td>
<td>Build Transfer Operate</td>
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<td>BSNL</td>
<td>Bharat Sanchar Nigam Ltd.</td>
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<td>CAT</td>
<td>CAT Telecom Public Company Limited</td>
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<td>CAPEX</td>
<td>Capital expenditures</td>
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<td>CBWFQ</td>
<td>Class Based Weighted Fair Queuing</td>
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<td>Content Delivery Network</td>
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<td>CE</td>
<td>Customer Edge</td>
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<td>CoS</td>
<td>Class of Service</td>
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<td>DLD</td>
<td>Domestic Long Distance</td>
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<td>DWDM</td>
<td>Dense Wavelength Division Multiplexing</td>
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<td>EAC-C2C</td>
<td>East Asia Crossing</td>
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<tr>
<td>eBGP</td>
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<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>GSM</td>
<td>Global System for Mobile Communications</td>
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<td>HDLC</td>
<td>High Level Data Link Control</td>
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<td>IC</td>
<td>Interconnection</td>
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<td>MGW</td>
<td>Media Gateway</td>
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<td>NLD</td>
<td>National Long Distance</td>
</tr>
<tr>
<td>NMS</td>
<td>Network Management Service</td>
</tr>
<tr>
<td>NNI</td>
<td>Network to Network Interconnection</td>
</tr>
<tr>
<td>NTC</td>
<td>National Telecommunications Commission</td>
</tr>
<tr>
<td>NTNL</td>
<td>Mahanagar Telephone Nigam Ltd.</td>
</tr>
<tr>
<td>OPEX</td>
<td>Operational expenditure</td>
</tr>
<tr>
<td>OTF</td>
<td>OpenType standard for Digital Typography</td>
</tr>
<tr>
<td>OTM</td>
<td>Optical Translation Management</td>
</tr>
<tr>
<td>POP</td>
<td>Point of Presence</td>
</tr>
<tr>
<td>PFE</td>
<td>Packet Forwarding Engine</td>
</tr>
<tr>
<td>PIC</td>
<td>Physical Interface Card</td>
</tr>
<tr>
<td>PoI</td>
<td>Point of Interconnection</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>PPP</td>
<td>Point to Point Protocol</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RD</td>
<td>Route Distinguisher</td>
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<tr>
<td>RT</td>
<td>Route Target</td>
</tr>
<tr>
<td>RIP</td>
<td>Routing Information Protocol</td>
</tr>
<tr>
<td>RSP</td>
<td>Roting Switch Porcessor</td>
</tr>
<tr>
<td>RT</td>
<td>Route Target</td>
</tr>
<tr>
<td>SAFE</td>
<td>South Africa Far East Cable</td>
</tr>
<tr>
<td>SAT-3</td>
<td>South Atlantic 3</td>
</tr>
<tr>
<td>SDH</td>
<td>Synchronous Digital Hierarchy</td>
</tr>
<tr>
<td>SIP</td>
<td>Session Initiation Portocal</td>
</tr>
<tr>
<td>SIPA</td>
<td>Software Industry Promote Agency</td>
</tr>
<tr>
<td>SBC</td>
<td>Session Border Controller</td>
</tr>
<tr>
<td>SJC</td>
<td>South-East Asia Japan Cable</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement</td>
</tr>
<tr>
<td>SONET</td>
<td>Synchronous Optical Network</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SMW3</td>
<td>South-East Asia – Middle East – Western Europe 3</td>
</tr>
<tr>
<td>SMW4</td>
<td>South-East Asia – Middle East – Western Europe 4</td>
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<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
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<tr>
<td>SS</td>
<td>Soft Switch</td>
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<tr>
<td>Tbps</td>
<td>TeraBytes Per Second</td>
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<tr>
<td>TDM</td>
<td>Time Division Multiplex</td>
</tr>
<tr>
<td>TEC</td>
<td>Telecom Engineering Center</td>
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<tr>
<td>TEN</td>
<td>Telefonica Empresas Nacional</td>
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<tr>
<td>TGN</td>
<td>Tyco Global Network</td>
</tr>
<tr>
<td>TOT</td>
<td>TOT Public Company Limited</td>
</tr>
<tr>
<td>VIP</td>
<td>Versatile Interface Processor</td>
</tr>
<tr>
<td>VLAN</td>
<td>Virtual LAN</td>
</tr>
<tr>
<td>VOIP</td>
<td>Voice over Internet Protocol</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
</tr>
<tr>
<td>VRF</td>
<td>VPN Routing and Forwarding</td>
</tr>
<tr>
<td>VSAT</td>
<td>Very Small Aperture Terminal</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WASC</td>
<td>West Africa Submarine Cable</td>
</tr>
<tr>
<td>WCDMA</td>
<td>Wideband Code Division Multiple Access</td>
</tr>
<tr>
<td>WiMAX</td>
<td>Worldwide Interoperability for Microwave Access</td>
</tr>
<tr>
<td>WLL-F</td>
<td>Wireless in Local Loop-Fixed</td>
</tr>
<tr>
<td>WPC</td>
<td>Wireless Power Consortium</td>
</tr>
<tr>
<td>WRED</td>
<td>Weighted Random Early Detect</td>
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</tbody>
</table>
1. Introduction

1.1. Research Background

The IWS Group is one of the most professional telecom operators in the world which has business in Europe, Latin America and Africa covered over 25 countries. By the end of December 2010, IWS has reached the number of customers 287.6 million due to its invincible business of the Latin America. However, Asia’s economy has rocketed in recent years which could not be disregard and the prosperity is continuing for the next thirty years. Since the economic boom makes the market growing fast, IWS group is ambitious to expand its business further into the Asian market.

The economy of Asia covers more than 4 billion people which is 60% of the population of the world. Annual growth of per capita GDP is 7.95% in 2010. Not only China, India, Japan, Singapore, South Korea have developed the strong economy in these days, but also other countries such as Thailand, Malaysia, Philippines, Vietnam, Pakistan, Laos, and Indonesia start to present the high potential of long-term growth. Asia is the fastest growing economy in the world currently.

To develop Asian telecom market is the major task for the telecommunication carriers currently. Indian Telecommunication is the world's fastest growing industry. India will have 1.159 billion mobile subscribers by 2013 by the projection. Singapore is building its nation to become an island with Wi-Fi.
service free everywhere. Thailand’s telecom sector seems stuck in a reform while the mobile penetration rate has passed 100%. Because these three countries have different factors which are interesting influenced the telecom economies, the competitiveness of the Information and Communication Technologies industry of India, Singapore and Thailand are interesting to analyze.

1.2. Research Objective

The objective of this paper is to investigate the telecommunication markets in India, Singapore and Thailand in order to find the potentiality of the markets which could be considered by the company to expand its business in telecommunication field and also to take a proper strategy. At meanwhile, the global competitiveness of telecommunication industry of these three countries will be discussed. The analysis is based on the relevant theory of competitiveness includes the Diamond theory (Porter, 1990) from Michael Porter and SWOT analysis. Practical information were collected accordingly.

1.3. Target Audience

The IWS Group is the main audience for this paper. From its view of wholesale business model, data were collected and analyzed to help IWS International Wholesale Services with the Asian business expansion.
1.4. Research Question & Limitation

Michael Porter proposed a model that allows analyzing why some nations are more competitive than others are, and why some industries within nations are more competitive than others are. (Porter, 1990) Porter believes that there are four main determinants which can shape the nation’s competitiveness.

By analyzing these determinants of telecommunication industry, there are many strengths and weaknesses presented from these research objects. We can compare these research objects with each other to examine in great detail in order to understand their competitiveness.

How are the effectiveness and competitiveness of telecom markets of these research objects. If a particular industry sector’s competitiveness could be determined by these factors Porter indicated in his theory and if the result we obtained reflects and represents this particular industry sector’s national competitiveness relatively in the practical environment.

The research limitation will be that some data could not be quantified in some topics from these research objects. For example, how to measure the determinant “Chance”. It could be analyzed in a general way and acquire concepts but It may be difficult to compare with each other among these research objects in a absolute standard such as a numerical comparison.
2. The Research Process and Methodology

2.1. Research Process

From the research background, the research objective has been defined clearly. The objective of this paper is to investigate the South East Asian telecommunication markets and the competitiveness of the research countries in order to find the potentiality of the markets. The research process is as follows. See below Figure 1 Research Process.

Figure 1 Research Process

- Analysis of Wholesale Business Model of Telecom Industry
- Define the Problem and Research Objective
- The Development of Theory
- Choice of Country, and Market
- Search for Empirical Information, and Presentation of Data
- Analysis National Telecom Industries
- Comparison of Research Objects and Global Telecom Market
- Comparison of the Result with the Global Index
- Conclusion and Recommendation
2.1.1. Analysis of Wholesale Business Model of Telecom Industry

It is essential to understand the business model of wholesale services of telecom industry. The business model of IWS (International Wholesale Services) will be studied in this paper which mainly is in two categories voice and data business.

2.1.2. Define Problem and Research Objective

The objective of this paper is to investigate the telecommunication markets in India, Singapore and Thailand in order to find the potentiality of the markets which could be considered by the company to expand its business in telecommunication field and also to take a proper strategy. IWS has the strong business in Latin American but it may be weak in the East. For the long run, IWS should take actions to expand to Asia. The largest telecom markets all over the world, China and India, are in Asia. At meanwhile, the global competitiveness of telecommunication industry of these three countries will be discussed. The analysis is based on the relevant theory of competitiveness includes the Diamond theory (Porter, 1990) from Michael Porter and SWOT analysis. Practical information will be collected accordingly.
2.1.3. The Development of Theory

This paper conducts the assessment of competitive advantages of Telecom markets of India, Singapore and Thailand by Porter's diamond theory framework. In this paper it will discuss the difference between the comparative advantages and Porter’s Diamond theory. It will also discover the International trade theories from different scholiasts. Trade theories have been developed and shaped in many different aspects in different time. There were few dramatic revolutions. Then, Porter proposed the National Competitive Advantages Theory. Porter believed that an industry’s competitive advantages are strong connected to the nation’s competitive advantages. Although trade theories keep in an evolution, Porter’s national diamond has summarized the important points for the current trade pattern in the global economy. Furthermore, we will discuss the advantages of using the SWOT analysis although some people have doubted that it may mislead judgments. The extended theory SWOT—CLPV is modified from the traditional SWOT theory. The SWOT --CLPV analysis is more objective and accurate on analysis of the reality of a business method.

2.1.4. Choice of Country, and Market

In IWS, the south east Asia business development unit covers business includes Bangladesh, China, Hong Kong, India, Pakistan, Singapore, Philippines, Thailand, and Taiwan. The Indian telecommunication industry is the world's fastest growing industry. Although China owns the world’s largest
fixed-line and mobile subscribers but it is dominated by three state-run businesses. Hence, the market is not liberalized and transparent. Therefore, India is more interesting to research. Singapore is a tiny country with small area, little population and scarcity of nature resource which is in the contrary to the large country India in every aspects. How Singapore develops its national Information and Telecommunication Technologies to compete with other countries is a considerable issue. Thailand’s mobile penetration rate has reached to 100% but its 3G service still could not move forward. These three countries have different factors and conditions. We will discuss how these factors influence their Information and Telecommunication industry. The research sequence will be in alphabetical order. The first will be India investigated followed by Singapore and Thailand.

2.1.5. Search for Empirical Information, and Presentation of Data

Data and information were collected from the internet, the library, statistic organizations, journals and research professional reports. Data presented by country primary includes the country overview, national economy, telecom market, fixed & mobile & data market share, International telephone services market, interconnection, telecom infrastructure, international internet Gateway, submarine cables, business model and major telecom suppliers and carriers. There are a lot of statistis which illustrate the practical market of the object countries. Data and information are latest and
most of them are from year 2010 or the first quarter of 2011. This paper also present a large number of diagrams, figures, tables for displaying the direction or the trend of research topics. These numbers and data are very help for analyzing and understanding the pragmatic markets.

2.1.6. Analysis National Telecom Industries

Diamond theory helps to analyze the competitiveness of telecom industry. Six key elements: “factors conditions”, “demand conditions”, “related and supporting industries” and “corporate strategy, structure and rivalry”, “government” and “opportunity” play important role in evaluation the telecom industry. (Porter, 1990) These factors are interlocked and mutual influenced. Diamond system could help to strengthen the system. Any factor will inevitably affect the others. When enterprises or industries obtain one of these diamond advantages, this factor would also help to create or enhance advantages of other factors.

SWOT analysis is the theory of business strategic planning which contains strengths, weaknesses, opportunities, and threats parts. By analyzing the industry, largely in consideration of the internal conditions as strengths and weaknesses, it is easier to see if the enterprises are competitive within the industry. By probing the opportunities and threats of the industry, it assists enterprises or industries to understand the external environment and further to predict the future of industry.
Final, At last, this paper will check the result we evaluated and compare it with the global rank of ICT competitiveness from the organization “World Economic Forum” for validating the reliability of the Porter’s theory.

2.1.7. Comparison of Telecom Industry of India, Singapore, Thailand and Global Telecom Market

After studying the empirical data and the entire telecom market of each country, this paper will precede the comparison of these three countries in many factors and to explore the strength of their competitive advantages. Further these three countries will be compared with the global telecom market and to measure their weights in the international environment. By using the same indexes for these objective countries, the difference and the rank will be presented from the comparison. The comparative advantages of each research country will be discovered.

2.1.8. Comparison with the Networked Readiness Index 2010-2011 of World Economic Forum

After analyzing the determinants of these research objects, we will have the result and the rank of the competitiveness of telecom industry of these countries we research. Then, we will compare the result with a global ranking: Networked Readiness Index 2010-2011 from World Economic Forum to
prove that if the result we analyzed matches the global ranking from the global research organization. Hence, we can validate that if the six determinants of Porter’s National Diamond Competitiveness of an industry sector’s can represent the capabilities of an industry’s competitiveness in the global environment.

2.1.9. Conclusion and Recommendation

By analyzing the telecommunication market of objective countries, results will present that if their national industries have the competitive advantages in the global environment. If the intensity of the factors analyzed in telecom industry could represent the intensity of the global competitiveness of the nation in telecom industry. Besides, there are some perdictions for the near future expressed and strategies suggested by concluding from the analysis for helping the main audience to develop the telecommunication market in India, Singapore and Thailand.

2.2. Methodology

The research framework of this paper applied to the methodology “interpreter” which use the induction. This paper adopts rich subjective quality and quantity data for validation the theory. By studying Porter’s National Diamond, we set up the research framework as follow figure
. See figure 2 Research framework. There are six categories: factor conditions, demand conditions, related and supporting industries, corporate strategy, structure and rivalry, government and chance. Under the six main classifications, there are sub classes. For factor conditions, it covers human resources, knowledge resources, capital resources, education investments and so on. For demand conditions, we will study the market of fixed line, mobile, data and international services. For related industries, we will research the proportion of ICT industry to the total GDP and so on. For the corporate strategy, structure and rivalry, policy, competitors, and incentive system will be discovered. As to government, we will indicate the organization, projects, supporting of the government. For chance, we will discuss the new opportunities and new projects and so on.

Figure 2 Research Framework
We will collect data of telecommunication industry of these research objects to precede analysis on these determinants. Then, we use SWOT tool to analyze the telecom industry of these countries to understand their strengths, weaknesses, opportunities and threats.

Next, we will compare these countries chosen by numerical index in many aspects with each other.

First, the indexes of the comparison of the basic of research countries chosen include “areas”, “populations” and “languages”. These indexes could display the nature resources of research countries. The official languages could indicate if the civilians of research countries have the competitiveness on international business. See the below figure.

Figure 3 The comparison of the basic among countries
Second, the indexed of the comparison of the knowledge resource of objective countries are into two categories “General Education” and “Education on Technology and Science”. The “General Education” covers the indexes of pupil/teacher ratio, literacy rate, and public expenditure on education (as % of GDP and as % of total government expenditure). This could indicate that the percentage of population of a country have education and the percentage that government have invested in education. The “Education on Technology and Science” covers indexes of researchers per million inhabitants, and expenditure on R&D as a % of GDP. The above illustrates that the knowledge resource a country owns. Please see the below figure 4 The comparison of the knowledge resource among countries.

Figure 4 The comparison of the knowledge resource among countries

<table>
<thead>
<tr>
<th>Knowledge Resource</th>
<th>General Education</th>
<th>Education on Technology and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pupil / teacher ratio (primary)</td>
<td>as % of GDP</td>
</tr>
<tr>
<td></td>
<td>Literacy rate</td>
<td>as % of total government expenditure</td>
</tr>
<tr>
<td></td>
<td>Public expenditure on education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Researchers per 1 million inhabitants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expenditure on R&amp;D as a % of GDP</td>
<td></td>
</tr>
</tbody>
</table>
Third, the comparison of the human resource of research countries includes the indexes of unemployment rate % of 2010 and number of people employed in overall IT industry. These could show the human resource of these objective countries. Please see the below figure 5.

Figure 5 The comparison of the human resource among countries

Further, the comparison of the GDP category of objective countries includes four primary categories: GDP, ICT trade, Investment in telecoms with private participation (Million USD$) and ICT revenue. The indexes of the class of GDP are: GDP(Million of USD$), GDP ranking, GDP (PPP) per capita (USD$), and GDP(PPP) ranking. The indexes of ICT trade are: ICT goods exports (% of total goods exports), ICT goods imports (% total goods imports), and ICT service exports (% of service exports, BoP). The indexes of ICT revenue are: ICT Revenues (Billion USD$), ICT Revenues Growth Rate, and Ratio of ICT Revenues and GDP. These indexes present the capability of creating income on ICT industry of these centuries. Moreover, these indicate that if a country put more weight on development of the ICT industry than other countries. Please see Figure 6 The comparison of GDP, ICT trade, Investment in telecoms and ICT revenue among countries.
After, the comparison between the telecom market of research countries and global telecom market of year 2010 includes indexes of: Fixed telephone lines (Million), Fixed line population penetration rate, Mobile cellular telephone subscriptions (Million), mobile population penetration rate, Broadband (Million), Internet users (Thousand), Internet penetration rate, and Household broadband penetration rate. From these indexes, we can see that the telecom market size and the penetration rate in fixed line, mobile, internet and international calls of each country. We can realize that if the telecom market of these countries have been developed or they still have the potentiality to grow. Please see Figure 7 The comparison of telecom markets of objective countries and global market.
Finally, after analyzing the telecom industry of these objective countries, we compare the result with the global rank of ICT industry: Networked Readiness Index 2010-2011 from World Economic Forum to prove if the result we analyzed matches the position of the Porter’s theory.
3. Theoretical Framework

3.1. Trade theories and international competitiveness of countries

Harvard Professor Michael Porter (Michel E. Porter) proposed “National competitive” theory (Porter, 1990) from micro-competition perspective to explain international trade theory to make up the weakness of comparative advantage (Wolff, Resnick, 1987). The initiator of trade theory was the British scholiast Adam Smith. He advocated “Theory of Absolute Advantage” which is also well known as “Theory of Absolute Cost” or “Theory of Territorial Division of Labor”. (Smith, 1776) He addressed that the different occupations within a country should be expanded to the concept of the “division of labor” between countries. Thus, the theory of the international division of labor was formed by him. “Absolute advantage theory” (Smith, 1776) is the earliest theory which advocated the liberalized trade. Adam Smith represented the requirements of the industrial class in that time. In 1776, he published his masterpiece “The Wealth of Nations “(Smith, 1776) which has attacked to the comments of mercantilism, and advocated libertarianism in his book. He believed that every country has its own favorable condition to produce certain products which has the “absolutely advantages”. (Smith, 1776) Hence, each country should specialize in its specific type of production and exchange with other countries. He considered that this consequence would be favorable to every country. However, if a country has absolute advantages in every aspect while another country has
absolute disadvantages in every aspect, how should they do? Smith's theory could not answer this question.

Another economic scholiast David Ricardo advocated “Theory of Comparative Cost” (Ricardo, 1817) after Adam Smith. He assumed that the international trade is based on the relative difference of production technology instead of absolute difference, and the difference of relative costs. Every country should export products with comparative advantage and import products with comparative weakness. (Wolff, Resnick, 1987). David Ricardo’s theory provided a solid theoretical basis on that only when the government does not intervene in the foreign trade, the effectiveness could be achieved. (Ricardo, 1817) Only under the liberated system, each country can allocate its capital and labor resource into its own best interest. David Ricardo is the liberalized trade theorist. The theory also assumed that "labor is homogeneous" (Salvatore, 2002). However, his labor theory of value has devalued after the rise of the “Neoclassical Economics”. The comparative advantages only depended on the production costs of goods between the two countries. If to compare with two countries with” 2 × 2 trade model” (Jones & Scheinkman, 1977) with highly abstract, there is no difference of the comparative cost of production of such a situation between the two countries. Then, the situation of equal advantages or equal disadvantages presented. That was the flaw of Ricardo’s theory.
Balassa further developed the theory of comparative advantages on the objectives of the developing countries. Balassa proposed the hypothesis of foreign trade advantage transfer based on the neo-classical trade theory. (Balassa, 1981). Hence, it was formed “the ladder of comparative advantages”. (Balassa, 1981) He expected that the commodity structure of import and export, and national comparative advantages would change by the accumulation of production factors. The difference between the traditional theory which categorized into developed and developing countries and his theory was that there were many escalating stages during the international subsidization and economic development. Divided by the development stages, the existence in today’s world economy roughly can be categorized into the following types regions: First level was the developed; the second level was the newly industrialized countries, such as the Asian Tigers and Latin America such as Brazil, Argentina and Mexico; The third level was a newly industrialized countries and sub-regions such as the ASEAN countries China and India except Singapore; Finally, the last level was the other developing countries and regions. The process of updating the development ladder was continuous but not interrupted. The development pattern of the ladder would show that the developed countries and newly industrialized countries would develop from their new industries, and transfer the industries which lost advantages to the lower level of countries. Dollar extended the previous theory and stressed that the source of comparative advantages of the developing countries was incentive system and technologies advance. (Dollar , 1993) If the system could support continuous, the country would increase the income for the community. To accumulate
the knowledge capital would bring the long-term advantages for developing countries.

Austen Chamberlain was one of important revolutionists of the classical economics. Chamberlain also proposed the "comparative advantages". Chamberlain abandoned the idea of that competition as a normal phenomenon and monopoly was regarded as an exception under that "perfect competition". He analyzed the cause of equilibrium, effects of welfare by using marginal analysis. (Chamberlain, 1993) Hence, "the theory of economics of imperfect" competition was formed. (Robinson, 1933) It indicated that "monopolistic competition". Moreover, another theorist, John Maynard Keynes, claimed that the economic crisis existed and it could be destructive to the economy. (Keynes, 1992).

The logical of "Expectation revolution" current had substantial influence on the economic variation. (Fazzari, 1985) On one hand, "money supply" could lead to the random change of the "money stock" which resulted in fluctuation of economy. On the other hand, money supply caused the variation of the total demand because the variation was completed through the "Aggregate Demand Curve". (Fazzari, 1985) From the point of view of monetary policy, the government tried to intervene the macro economic policy was ineffective. The "government failure" existed but "market failure" did not exist.
In the eighty of twenty century, Paul R. Krugman and Elhanan Helpman introduced the “Economies of scale” (HELPMAN & KRUGMAN, 1989) to analyze the comparative advantages. They developed “Monopolistic competition model” by free entry and average cost pricing. The number of diversified products was regarded as derivativeness of the interaction between the return of scale and size of market. In ninety, James R. Tybout further summarized the “increasing internal returns to scale” as the source of comparative advantages. (Eckel, 2008) However, the scholiast Dollar assumed that “Economies of scale” (Helpman & Krugman, 1989) could not explain sufficiently about the comparative advantages. Only for the developed countries which have the similar factors, the economies of scale could only explain the specialization of these countries. Nevertheless, the difference of the technology was the reasonable explanation of the specialization of these countries.

Paul R. Krugman and Elhanan Helpman further developed the theory of comparative advantages from the aspect of research. They developed Paul R. Krugman and Elhanan Helpman ‘s “Dynamic General Equilibrium Theory” (Helpman & Krugman, 1989) to research trans stages of global trade. “Dynamic Equilibrium Analysis” was not only further promoted but also more innovated. Their model explicitly addressed the requirement of private investment and research activities.
Yang Xiaokai expanded the theory of comparative advantages from the aspect of specialization and “division of labor”. (Yang, 2001) Derivative comparative advantages would increase with the degree of division of labor. He analyzed the comparative advantages from the interaction of transaction costs and division of labor and placed specialization and division in the core of analysis.

Eli F Heckscher and Bertil Gotthard Ohlin, the Swedish economists, have inherited the David Ricardo’s comparative cost theory and developed “factor endowment theory” which was also call Heckscher—Ohlin theory (H—O theory). (Jones, 1956) They explained the cause of the international trade from the abundance of production factors. Ohlin believed that the absolute difference of the price of products was caused by the absolute difference of the cost of products. The absolute difference of cost was caused by the difference of first production factor. The production factors were different from the different countries. Second, the proportion of production factors was different (different intensity) during the production process when the industry produced products. Although “factor endowment theory” has been questioned by the American Russian economist Wassily Leontief, it is quite important to the international trade theory. Ohlin theory helped us to analyze, judge and predict the global trade patterns, and to develop strategy.

In addition, the production factors of a country were variable. The quality, quantity and structure of production factors changed by increasing the
productivity, technological and educational developments. Modern technology revolution has changed the production elements, and promoted the human capital, technology innovation, capital, and other intangible and physical factors. Therefore, people should not only face the one-sided static comparative advantages of factor endowments but also hold the scientific attitude from Ohlin theory. (Jones, 1956)

The development of foreign trade of any country was constrained by the “national resource endowments” and “comparative costs”. The developing countries had weak positions of its factor endowments in the global economy. They owned production factors of the sunsetting industry but lacked of the core factors of knowledge economy.

International competitiveness was that a country compares its competitiveness which was the capability to create added value and national wealth with sustained growth with other countries under the worldwide economy. It was a quantitative concept which reflected the national competitiveness of the whole region under the process of economy globalization.

International competitiveness of a nation consisted of three parts: core competitiveness, basic competitiveness and environmental competitiveness. It included eight major elements: the national economic strength, internationalization, government, financial system, infrastructure, business
management, science and technology, quality of the citizens. General, these eight elements were relevant to the core competitiveness.

The development process of the international competitiveness was basic in four stages. It was essential to find out the competitive advantages of the nation. Each country no matter small or big had its own advantages. To sufficient develop its advantages and avoid its disadvantages was critical. To sufficient utilize capital was the next stage. The capital included tangible, intangible and human resources. The human resources was more important gradually. The process of competition was seeking for maximum of advantages of its industry value chain. It was difficult to advance to the higher lever if there was only capital competition but there was no process competition. Then, industries needed to adjust their structures and repositioned for adapting to the evolution of the information technology. The government played a critical role by regulating the favorable policies for guiding industries to adjustment themselves and developed the better connection between the infrastructure, science and technology, education and government. Last, to promote the value concept could maintain nation’s sustainment of competitiveness. The strategy for meeting the new challenges was to inspire and motivate people and let them realize their own value, hence human capital could be developed well.

Porter has mentioned five competitiveness (Porter, 1980) in his previous theory in 1980. After, he strengthened the point about competitiveness. He
described that an enterprise could select and implement a basic strategy to create and maintain its competitive advantage (Porter, 1985) with value chain analysis (Porter, 1985). Finally, Michael Porter proposed that the competitive advantage of a nation is the competitive advantage of its enterprises and industries. (Porter, 1990) It was the reason that a country’s bloom and decline which mainly lied in its capability of competitive advantage gaining in the international market. Porter practiced the trade theory by logical reasoning but not the mathematical methods from the traditional international trade theory. (Ketels, 2006).

The competitive advantage principal was formed from the advantage of the leading industry. The key factors of being more competitive were whether the labor productivity was able to increase, and whether its source was sufficient to innovate for the national innovation system.

3.2. National Diamond

Porter proposed four basic vital factors and another two auxiliary variables in “Competitive Advantage of Nations”. (Porter, 1990)

- “Factor conditions” - included the human resources, natural resources, knowledge resources, capital resources and infrastructure.

- “Demand conditions” - essentially referred to the demand of domestic market.
“Related and supporting industries” - these industries and related upstream industries shaped the competitiveness international.

“Corporate strategy, structure, and rivalry”. (Porter, 1990)

In addition to these four elements, there were two other variables: “Government” and “Chance”. (Porter, 1990) “Chance” was beyond the control. Government’s policy could cause significant impact and which could not be ignored.

Michael Porter believed that the roles of the four elements were in effect mutually and to form a diamond. (as shown by the below Figure 8 National Diamond Theory Framework).
Porter’s national diamond has been criticized by a few of researchers because they considered that small countries were not applicant for this theory. (Bellak & Weiss 1993; Cartwright 1993). Hence, “Double Diamond” has been proposed. (Dunning, 1992). However, this paper will discuss from the view in detail of these factors as follows:
3.2.1. Factor Conditions

From the point of view of economics, the types of production factors have developed from dual-elements, three-elements… to the six elements in the last. Early in the seventeenth centuries, “Williams Petty’s tax thought” has been proposed “Labor Theory of Value”. That theory is that the value of products was created from the abstract labors. (Zou, 1994) David Ricardo and Adam Smith also contributed this point a lot. (Ricardo, 1817). Williams Petty also stated that “Land is the mother of wealth; labor is the father of wealth, and dynamic factor”. That was both land and labor could create wealth and value so production factor was dual. In “The Wealth of Nations”, (Smith, 1776) he also proposed that "A nation's labor of each year is the source of the supply of the nation’s annual consumption of all the necessities and conveniences ". (Smith, 1776) Finally the price was broken down into labor, capital and land. In 1890, the famous British economist, Marshall, one of founders of the Cambridge school, presented in his book "Principles of Economics" that "organization" played an important role for the production so "organization" became the fourth element. (Alfred, 1920)

In fifty of twenty century, an American economist Simon Smith Kuznets used “Statistical Analysis” methods (Kuznets, 1995) to analyze the growth of national economic. After comparing capability of each country's economic growth, he found that the main factor of economic growth was to technology improvement, and the adjustments of its system. “Advanced technology” was one of features of economic growth. Robert Merton Solow also revealed that
from his research: “Technology development is a long-term vital cause behind the economic growth”. (Solow, 1956)

As science and technology was playing an important role in carrying out economic development, many economists agreed that technological development was the third element of economic growth in addition to capital and labors. At the same time, the rise of the “Knowledge Economy” and the “Information Super Highway”, (Collinge & Staines, 2009) information had more important position in the six elements. Then the six elements of production have been shaped. Production factors usually included capital, labor, technology, land, economical information and economical management.

Michael Porter classified the “factors conditions” into two categories as the primary production factors and secondary production factors. Primary factors of production referred to a country’s natural resources, climate, geographical location, non-skilled workers, capital and the other. Secondary production factors referred to the modern communications, information, transportation and other infrastructure and highly educated manpower, research institutes and so on.

Based on Porter’s national diamond (Porter, 1990), he regarded as that the level of the importance of the primary production factors was low but the
secondary production factors of competitive advantage were invincible crucial. To acquire secondary production factors was subjective to that if a country was able to obtain the substantial amount of the human and capital resources, if it could be sustainable on investments, and if it could have senior research and education. High level of production factors were difficult to obtain from the outside environment. A country should create its own competitive advantages.

From the other perspective, production factors are divided into general and specialized factors. Senior professionals, professional research institutions, specialized software and hardware facilities are classified as specialized factors of production. An industry which is more sophisticated needs more specialized production factors. These companies or industries also have more sophisticated competitive advantages.

If a country wants to establish the strong and sustained industrial production factors, it must develop secondary production factors and specialized production factors. These two production factors were fundamental determines of the level of the quality of competitive advantages.

Porter also pointed out that the rich resources or low cost factors often resulted in inefficient allocation of resources in the practical competition. On the other hand, labor shortages, inadequate resources, poor geographical
and climatic conditions, and other unfavorable factors would stimulate industries to innovate, promote or upgrade its competitive advantages.

In sum, industries with rich resources, low cost labor and labor-intensive should be developed. However, these industries would not be much helpful to increase the national income of the country. To rest merely on the primary production factors that would not have the critical breakthrough for acquiring the global competitiveness.

3.2.2. Demand Conditions

Demand from a domestic market was the motivation of the development of industries. The difference between the domestic market and international market was that domestic enterprises could discover the domestic demand in time superior than the foreign competitors. Therefore, Michael Porter argued that global competition did not lessen the importance of the domestic market.

Porter pointed out that the nature of domestic customers was substantial crucial, particularly who are proficient, experienced and choosy. If the domestic customers demanded with high criteria of products and services, it stimulated industries to be capable and that increased a country's competitive advantage. If an industry or an enterprise could satisfy with the most persnickety customer, the rest of customers for the industry or enterprise were almost trouble free.
For example, Japanese consumers famously were known as over picky in automotive industry. European automotive industry could offer world class energy saving cars because it had the strict standard of regulation of environmental protection. American consumption spoiled the automotive industry, resulting in distress of the automotive industry after the oil crisis in the United States.

“Expected demand” was important. If domestic customers needed high quality of products which was ahead of other countries, this could also be an advantage for domestic companies because sophisticate products need to be supported by the sophisticate needs. Sometimes the national policies could affect the projected demand such as the policies of environmental protection and vehicle safety, regulation of energy and policy of tax. (Porter, 1990)

3.2.3. Related and Supporting Industries

Industry Chain contained the value chain, business chain, supply chain and the concept of space chain. “Equal Mechanism” was formed when to balance the connection of the four dimensions. It was the objective mechanism liked an invisible hand to control the” industry chain”. (Han, 2009) Industry chain was a concept of industrial economy. It was a relationship based on a certain technical and economic relevance. The chain was mainly objective existed in regional differences in regions which focused on regional
comparative advantage to cooperate in region by specialization and multi-dimension.

On the point of formation of national competitive advantage (Porter, 1990), the factor “the relevant and supporting industries” had dependent relationship with the main industries. From Porter’s research, he proposed the phenomenon “industry clusters”. The dominant industry could not exist alone but it upsurges with other relevant industries. Some economists pointed out that some countries centralized the allocation of resources at only one preferable industry which had been given the priority for developing. This would scarify other industries and also make the industry alone without supporting. The result would be that the preferable industry fails to survive.

Local suppliers and industrial innovation were as well indispensable parts of competitive advantage. If there was a lack of world-class suppliers, the industries could not cooperate between the upstream and downstream industries. Relatively, competitive domestic industries usually would increase the competitiveness of the relevant industries.

Porter claimed that even if the downstream industries did not have the internationally competitiveness but as long as upstream suppliers had international competitive advantage, the impact on the industry remained positive. (Porter, 1990)
3.2.4. Corporate strategy, Structure and Rivalry

Porter considered that the motivation to drive enterprises to be international was a significant key. This force might come from international demand, or the pressure of local competitors. The strong domestic market competition was the most important factor of increasing the competitive advantage. Porter took account into this point was contradicted to some other traditional concepts. For example, over intensive domestic competition caused to consume excessive resources; it impeded the development of economies of scale. Porter mentioned that in his study at ten countries, generally, domestic competitors which were strong usually exist in the international market as well. Enterprises forced themselves to be more competitive in overseas markets by improvements themselves and innovations. A successful business frequently needed to be past the process of intensive conflicts in the business world. However, “the star industry” mostly was not competitive which did not have opponents in the international world under its government’s protection. (Porter, 1990)

3.2.5. Chance

Porter claimed that there were several possibilities for increasing opportunities: science and technology inventions, a breakthrough of traditional technologies; external factors causes increasing the production costs (such as the oil crisis), exchange rates floating, finance market substantial fluctuations, market demand surging, the government’s policy, a
war occurring and so on. The opportunity was normal in both-ways. It was often an advantage for the new competitors. At the same time, the original competitors might lose their advantages. Only those enterprises which could meet the needs had the new “opportunity.” (Porter, 1990)

3.2.6. Government

Only if the government played its role appropriately, the force of the diamond system could be expanded. The government could create new opportunities for enterprises. A government should invest fields which enterprises were not able to develop for their business. That was the external costs, such as infrastructure development, opening up capital channels or integration of information.

From the view of four elements, government procurement was the major factor which could impact on the demand of domestic market. There must be some strict procurement standards for playing the roles of the government to be a critical customer. Procurement should be favorable to the competition and innovation. Government should ensure that the competition is active in the domestic market and avoid the “Trust unfair” situation. (Porter, 1990)

Porter believed that the protections would be an obstacle of the formation of industrial competitiveness.
However, the government could only support and offer resources, or created the nice environment to enterprises but could not decide which industries should be developed or how to achieve the best of the competitive advantages for enterprises even the government had the best performance in the world.

3.3. SWOT Analysis

3.3.1. SWOT

The origin was unknown but the strategic master Igor Ansoff has promoted it for the past forty years and it became a popular strategically analysis tool. It was the theory of business management strategic planning contained the Strengths, Weaknesses, Opportunities, and Threats. (Kiplely, 2009) Generally, SWOT was used in analyzing the industry, mainly in consideration of the internal conditions of the strengths and weaknesses whether it was conducive to competition within the industry. Opportunities and threats were to explore the external environment for enterprises to explore the industry of the future evolution. This mode of thinking could help analysts to consider four-orientations to analysis the pros and cons. Then, SWOT helped to find exactly the problem and to design countermeasures to cope. Strategy was proposed based on the result of analysis. (Kiplely, 2009). Please see the below figure 9 SWOT analysis which had four aspects.
However, J. Scott Armstrong was against the SWOT analysis and claimed that SWOT would harm the performance so better” Don’t do SWOT”. (Armstrong, 2004) He mentioned that companies or industries should use the following Armstrong five steps for analysis:

- “set objectives”,
- “generate alternative strategies”,
- “evaluate alternative strategies”,
- “monitor results”, and
• “gain commitment among the stakeholders during each step of this process”. (Armstrong, 1982)

Armstrong expressed that SWOT restraint the generation of alternatives but his linear steps might not be applicable to the larger companies which had international trade business with complex and sophisticated environment. “Don’t do SWOT analysis” might lose the opportunity to understand a company or an industry’s advantages, disadvantages and external environment and opportunities. Therefore, SWOT analysis was still a useful tool for academic research. To do SWOT right was more important than only used it.

After the large amount of using SWOT tool, some people started to propose advanced or improved SWOT for reducing the constraints. Most of problems people encountered when used the SWOT analysis were the adaptability. This tool was not applicable to any occasions. Therefore, this could lead to the abnormal result. Hence, “Power SWOT” has been cited which included personal experience, order, weighting, emphasize detail, rank and prioritize.

3.3.2. SWOT--CLPV

“SWOT--CLPV Theory” was based on the SWOT model slightly modified. This analysis was more objective and accurate on analysis of
the reality of a business method. Using this method could find out advantage worth promoting, avoid disadvantages avoided, further to find problems and have solutions, and make clearly direction for the future. In the adaptive analysis process, an analyst should determine various internal and external variables, based on “leverage effect”, “inhibition”, “vulnerability” and “problematic” of this model.

3.3.2.1. Leverage effect (strengths + opportunities):

Leverage effect occurred when the internal strengths and external opportunities in the consistency. In this case, the industry could take advantage of the internal strength by itself for creating the external opportunities. The integration was for seeking the greater development for an industry.

3.3.2.2. Inhibition (opportunities + weaknesses):

Inhibition meant prevention, determent, influence and control. When the environment provided opportunities but the internal could not offer relative resources to fit, the industry would not obtain any advantages. In this case, an industry needed to provide some additional resources and to transfer its disadvantages to advantages for adapting to external opportunities.
3.3.2.3. Vulnerability (strengths + threats):

This meant that the degree of strengths decreased. When the external posed threats to an industry, the strengths could not be presented. In this case, an industry must overcome the threats.

3.3.2.4. Problematic (weaknesses + threats):

When the internal weaknesses and external threats met at the same time, the industry faced a challenge seriously. If this was not handled properly, it could be direct threaten survive of the industry.

3.3.3. SWOT Analysis Steps

There were few steps when did the SWOT analysis. First, it was to confirm the current strategy for an industry. To ensure the changes of the external environment was second step. To analyze the industry’s resources was the third step. To fill in the facts in the four categories in the SWOP form was the last.
4. Business Model of Spanish International Wholesale Telecommunication Company

4.1. Introduction

Spanish International Wholesale Services (abbreviated as IWS in follows) which is a subsidiary of the Spanish Telecommunication Group provides global telecommunication services for fixed and mobile carriers, ISPs and content providers. Most of telecommunication operators are primary IWS’s business partners.

IWS offers end-to-end connectivity with open and unrestricted access IWS’s self-healing fiber optic network. The network connects Latin America, United States, Africa and Europe with the ultimate standard of quality and reliability. IWS’s network is the state of the art technology which meets the broadband communication needs. The fiber optic cable is 45,000 Km long and up to 7.68 Tbps (TeraBytes Per Second) capacity (upgradeable to 10.8Tbps - protected) which is end to end open and unrestricted access.

Moreover, IWS takes the “strategic alliance” with China Unicom by a way to own 9.7% stake of the China Unicom by January 2011. IWS by market value has expanded aggressively abroad, from fast-growing Latin American states to promising economies such as China.
4.2. Services of International Wholesale Services

The services of IWS include IP connection, capacity, satellite services, corporate services, voice services and mobility services. IP connection covers internet transmit and IPX transport. Capacity includes SDH/SONET, wavelength and IPLC. Satellite services include VSAT IP, GSM Satellite, BGAN, single channel per carrier, and broadcasting services. Corporate services are categorized into two classes. One is VPNs which consists of clear channels, MPLS, and global LAN and the other is extended corporate services which consists of Telepresence, corporate Telephony, and integral LAN service. Voice business includes termination, hubbing, and value added services. Final, the mobility services covers MMS relays and roaming WLAN. See the below Figure 10 Profile of Services of IWS.

Figure 10 Profile of Service of IWS

Source: Spanish Telecommunication International Wholesale Services
4.3. Analysis of Business Model of IWS (International Wholesale Services)

International Wholesale Services of Spanish Telecommunication Company (abbreviated as IWS in the follows) is the global provider with 600 operators in more than 30 countries. Business is major divided into “data” and “voice” business.

4.3.1. Data Business

IWS provides multiplied data services mostly include DWDM Lambdas, SDH/SONET bandwidth services, co-location, IP transit, Managed co-location, VOIP, IP MPLS VPN and so on. IWS creates more advantages for clients by value added services or products. Please see the below Figure 11 Data Service of IWS.

Figure 11 Data Service of IWS

Source: Spanish Telecommunication International Wholesale Services
4.3.1.1. SDH/ SONET Services

Synchronous Digital Hierarchy (SDH) is the European standard and Synchronous Optical Network (SONET) is the American standard. Standards for synchronous transmission of optical signals to carry digital information at speeds from 45 Mbps (SONET) or 155 Mbps (SDH). It is meant to point to point solutions where the client has established its capacity needs and wishes to concentrate on developing other aspects of their communications resources, in contrast to solutions based on wavelength services that require greater commitment and network control by the customer.

Contributions can be distinguished “POP to POP” and “End to End” depending on client's interest in receiving it in the POP connectivity supplier delivery or in specific site or POP, in which case you must include the "local tail" as a cost. Project Direct. Backbone is that connectivity SDH / SONET between IWS POPs in different cities. Local Accesses offers customers access to IWS’ network through physically diverse routes between “Point of Presence” (POP) of the client and the “Points of Presence” (POP) in every city where IWS is presence. Co-location is that equipment and connections can be adapted to customer needs.

The major categories of IWS’ capacity products are E1, E3, DS3, SDH, STM-1, STM-4, STM-16, STM-64 and STM-256. Interfaces include Ethernet, Fast Ethernet, and Gigabit Ethernet. Please see the below Table 1 Current Product Capacity of IWS. It represents the relative different specification of each product.
# CURRENT PRODUCT CAPACITY PORTFOLIO

<table>
<thead>
<tr>
<th>BASIC SPEED UNITS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>1.5 Mbps</td>
</tr>
<tr>
<td>E1</td>
<td></td>
<td>2 Mbps</td>
</tr>
<tr>
<td>E3</td>
<td></td>
<td>34 Mbps</td>
</tr>
<tr>
<td>DS3</td>
<td>T3</td>
<td>45 Mbps</td>
</tr>
<tr>
<td>SDH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STM-1</td>
<td>OC-3</td>
<td>155 Mbps</td>
</tr>
<tr>
<td>STM-4</td>
<td>OC-12</td>
<td>622 Mbps</td>
</tr>
<tr>
<td>STM-16</td>
<td>OC-48</td>
<td>2.5 Gbps</td>
</tr>
<tr>
<td>STM-64</td>
<td>OC-192</td>
<td>10 Gbps</td>
</tr>
<tr>
<td>STM-256</td>
<td>OC-768</td>
<td>40 Gbps</td>
</tr>
</tbody>
</table>

|                   | Interfaces | Ethernet over SDH |
|                   |            | 40M | 600M |
| Ethernet (Eth) <=10M | 100M | 900M |
| FastEthernet (FE) <=100M | 300M | 1G |
| GigabitEthernet (GE) <=1000M | 500M | 10G |

Source: Spanish Telecommunication International Wholesale Services

## 4.3.1.2. DWDM Service

It is a service that provides links without optical level protection with speeds of 2.5 or 10 Gbps DWDM technology-based (by Dense Wavelength Division Multiplexing). DWDM is a technology which multiplexes several optical communications wavelengths (lambdas) on a single optical fibre. It is meant to facilitate point to point optical connections as singular solution or as a constituent of more complex structures in which the client after setting their capacity needs are responsible for the development of that structure. That is, the client hires the wavelength of the optical transmission elements associated with assuming the design, planning and control of additional elements of its network.

It should be noted that in any case is a solution that does not include self healing property for what has to be the customer who need to provide it.
Please see the below Figure 12 DWDM Service.

Figure 12 DWDM Service

Source: Spanish Telecommunication International Wholesale Services

4.3.1.3. The Network

IWS’ network covers chiefly in Europe, America and Africa. In Latin America, fiber cables spread all over link at the important point Miami, the USA, with the North America. Extended fibers connect the continents of Europe and America. IWS owns territory in most of Latin America, North America Europe and North Africa. The rest of Arica is the territory of non-direct routes. IWS has implemented the strong network in the world. Please see the below Figure 13 Network of IWS.

Figure 13 Network of IWS
In Europe, IWS has arranged the complicated network for large needs. Spain is the main base and also the UK. The IP/MPLS POPS are in 31 cities including Madrid, Barcelona, Rome, Milan, Brussels, Paris, London, Amsterdam, Frankfurt, Munich, Düsseldorf, Prague, Lisbon, Porto, Libubiana, Budapest, Oslo, Helsinki, Bratislava, Zurich, Riga, Warsaw, and constantly increasing cities. They are presented in 19 countries as Spain, Italy, Belgium, France, United Kingdom, Netherlands, Germany, Chez Republic, Russia, Poland, Norway, Sweden, Romania, Norway, and Finland. Intensive network intends to meet the demand of the large traffic. Please see the below Figure 14 Europe network of IWS for the routes in detail.
4.3.1.3.1. **ATLANTIS-2**

The major consortium cables are ATLANTIS-2 which connect with Brazil, Chile, Argentina and other countries in Latin America and stretch to the western Africa end to Portugal. It is 13,100 kilometers long.

4.3.1.3.2. **COLUMBUS-3**

Another fiber optical named as COLUMBUS-3 which connects the south end of the North America and south Europe as city Palermo. COLUMBUS-3 has landing points in Hollywood, (Florida, USA), Ponta Delgada (Azores Islands, Portugal), Lisbon (Portugal), Conil(Spain), Mazzara del Vallo(Sicily, Italy).
is upgradeable between Mazzara and Conil. At this point IWS would be able to connect with Atlantis-2 or SAT-3 Cable System.

4.3.1.3.3. SAT-3

Landing points of SAT-3 are Portugal, two points of Spain, Senegal, Ghana, Nigeria, Cameroon, Gabon, Angola, South Africa, then further to India and Malaysia.

4.3.1.3.4. MAYA

MAYA is another consortium fiber connects among countries in center America far to the north coast of Latin America. Florida, the USA, is the main point of MAYA. It has landing points in Hollywood (Florida, USA), Cancun(Mexico), Grand Cayman Island, Puerto Cortes(Honduras), Puerto Limon(Costa Rica), Maria Chiquita(Panama), and Tolu(Colombia). Please see the follow Figure 15 Consortium Cables of IWS.
IWS manages transatlantic capacities over 25 lambdas distributed through different submarine cables. From points of Spain, west Europe, and Africa transverse the Atlantic sea to America. Please see the below Figure 16 Transatlantic region.

Figure 16 Transatlantic Region
4.3.2. Voice Business

4.3.2.1. Traditional business model of international voice

International telecommunications were generally controlled by monopoly companies in the past that developed international interconnection capacity. The companies were paid for calls made through bilaterally negotiated billing rates. The billing rates represented the total costs which transport calls through the international facilities to the destination network. Please see the below Figure 17 Voice business model of IWS.
Telecommunication companies purchase certain amount of minutes of international voice from the operators which are in the destination countries and charge fees from the end users who use the international call services in the original country. It is a bilateral business general including fixed line and mobile. On one hand, the traffic is sent from the original country to the foreign country refers to the outbound traffic. On the other hand, the traffic is sent by the cooperated carrier from foreign country to the national country refers to the inbound traffic. Operators could agree with each other to exchange traffic of voice and negotiate the rate in a certain period. Therefore, both operators could be favorable mutually by creating revenues to each other.

Source: Spanish Telecommunication International Wholesale Services
4.3.2.2. Bilateral Agreement

Bilateral agreement is a binding contract between the two operators that have agreed to mutually acceptable terms, general, which cover the destinations, rates, and volumes on voice business in a specific period. The agreement is reciprocal since two parties normally agree to trade with the equal amount (sale or purchase) to each other.

We take the IWS as an example based on the above figure. Inbound and Outbound Traffic of Voice Business.

Inbound traffic to the network of IWS Group from other international operators.

Outbound traffic from the network of IWS group to international operators' networks.
The price of termination will vary depending on the traffic in fixed or mobile network. The price of fixed termination is determined by the operator according to fixed interconnection costs. The price of mobile termination is set by the cost of mobile network interconnection in some countries, the period, and the duration of a call. Please see the below Figure 19 Bilateral Traffic of Voice business.

Figure 19 Bilateral Traffic of Voice Business

The outbound international traffic sent by an operator is leveled with the inbound international traffic of another operator. The higher of outbound traffic will relatively create the higher of inbound traffic. On the contrary, the smaller of outbound traffic will create the smaller of inbound traffic.

In general, operators agree to exchange traffic at a certain volume by the bilateral trade. In this way, payments from the outbound traffic are offset by revenues from the inbound traffic. For the amount of imbalanced traffic, it
will be negotiated with the "incremental price" or that to be sent by other routes with the lower costs. Thereby, to maximize the trade balance (revenue of traffic influx – payments of output traffic) or to minimize the cost of completion of the outbound traffic (payments of outbound traffic - revenue of traffic influx) is essential. Exchanged as operators seek the largest possible volume of traffic for the net cost of completion is zero.

4.3.2.3. Hubbing Business

Hubbing traffic offers to operators to terminate international traffic in remote networks of the destinations. The traffic to the many different destinations is via a country or an operator which is like a transport transfer point. This is call non-direct route. Particularly, the hubbing occurs when an operator needs to send traffic to some small or remote countries which there are no direct routes between the operator and these countries or under the circumstance that the fares to these destinations are expensive. For example, China carrier wants to send traffic to Andorra, a small country in Europe. The traffic can be sent from China through IWS’ (International Wholesale Services) Network in Spain to Andorra since the agreement with IWS offers the competitive rate. It could save cost by contracting with another operator with extensive network. Please see the below Figure 20 Hubbing Business.

Figure 20 Hubbing Business
4.3.2.4. Tromboning

It is the practice that a country generates traffic terminated to the domestic mobile network which the route is changed to via international operator in the other end. IWS has the agreement with the price on these international destinations. See Figure 21 Tromboning.

Figure 21 Tromboning
The below table 2 explains that the situation of Tromboning and its consequences. When the interconnection cost PEAK national schedule below to the international termination rates, domestic traffic destination deviates national mobile network via international termination. Therefore, it triggers inbound traffic which increases gross and increases the percentage of Peak in inbound international traffic to national mobile networks but decreases the margin, net income per minute.

Table 2 Consequences and Initiatives of Tromboning

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>TROMBONING</th>
<th>CONSEQUENCES</th>
<th>INITIATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interconnection cost PEAK national schedule</td>
<td>Domestic traffic destination</td>
<td>* Trigger inbound traffic =&gt; increased gross</td>
<td>* Trigger inbound traffic =&gt; increases gross</td>
</tr>
<tr>
<td>&gt; International termination rates</td>
<td>deviates national mobile network</td>
<td>* Increase % of Peak in inbound international traffic to national mobile networks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>via international termination</td>
<td>* Decreased margin =&gt; decreases net income per minute</td>
<td>* Control inbound traffic profile at target mobile network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Unfair penalty for excess PEAK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Negotiate &quot;OFF PEAK&quot; extra to compensate for the excess PEAK</td>
</tr>
<tr>
<td>Interconnection cost national schedule OFF-</td>
<td>Does not occur</td>
<td>Inconsequential</td>
<td></td>
</tr>
<tr>
<td>PEAK&lt; International termination rates</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3.2.5. Simbox

There is another practice call as Simbox. When the rates of mobile termination below to the costs of mobile Interconnection Costs, International traffic of mobile networks is diverted and terminated via SIMBOX. Terminal international traffic enters originated from national mobile network will be the loss. The disadvantages of Simbox is the capacity is limited, the quality is
poor and there is no minimum standards guaranteed required by mobile operators.

Figure 22 Simbox

Source: Spanish Telecommunication International Wholesale Services

The below table 3 also explains the situation of Simbox and its consequences.

Table 3 Consequences and Weaknesses of Simbox

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>SIMBOX</th>
<th>CONSEQUENCES</th>
<th>WEAKNESSES OF SIMBOX</th>
<th>INITIATIVES</th>
</tr>
</thead>
</table>
| Mobile Termination Rates < Mobile Interconnection Costs | International traffic of mobile networks is directed and terminated via SIMBOX | Terminal international traffic enter originated from national mobile network => Loss of income | * Available capacity  
* Poor quality => no guaranteed minimum standards required by mobile operators | * Competing with quality (SLA ensuring the required quality parameters)  
* Agreements Mobile to Mobile  
* It closes in countries where the practice is illegal |
4.4. IWS (Spanish International Wholesale Services) Dimension

4.4.1. VOIP Evolution

In 2007, TDM traffic grew 10% while the VoIP traffic grew 28% which reached 78,000 billion minutes of IWS. Latin America is the region where has the most impact of the VoIP.

There are some new market players. A new type of international network client generates which requires the service for international traffic (Skype, Yahoo Communications, Microsoft ...)

4.4.2. Sales Model

A unique international network that handles all of the traffic group to minimize the investment and meet all demands for the varied companies.

IWS synergies in investments and becomes OPEX operators and local flexibility. Also, it devotes to implement new services over IP fast and capture new business from other operators who are weak due to lacking of management tools.

The model was presented in different areas of the Company. (Tlatam, TE, etc.). Currently model is operating in LATAM and Spain.
4.4.3. NGN Model (Next Generation Network)

The international voice wholesale business is a mature business with the trend of declining prices and increasing in volume. Therefore, the objective should be on maximizing traffic and minimizing CAPEX (Capital expenditures) and OPEX (Operational expenditure). IWS considers the current international model which presents opportunities for improvement for primary the fact that it lacks of capacity in the PSTN, avoids to have the strategy to invest in VOIP PSTN, and is to centralize the new investments to minimize CAPEX IWS.

There are many benefits to have Next Generation Network. The variability of the model is 100%. It can help to save the cost of idle capacity which exists in the current model of direct routes. Call line identification will be ensured when having the roaming services. Also, it can improve delivery times of new and expanding equipments in the existing routes. It can control the routes or destinations, and have the statistics of traffic. Please see the below Figure 23 Actual Situation and NGN Model

Figure 23 Actual Situation and NGN Model

Source: Spanish Telecommunication International Wholesale Services
5. Research Findings: India

5.1. The Country Overview

India is the second most populous country in the world with 1,166 million inhabitants and the seventh in area with 3,287,590 km². The republic comprises 28 states and 7 territories. It is a pluralistic, multilingual, and multiethnic society. (CIA, 2011)

5.1.1. Economic factors

India is the 12th largest economy in the world with the GDP (1,237 million) and fourth in terms of the purchasing power. (CIA, 2011) The serious problems are poverty, illiteracy, pandemics, and malnutrition.

5.2. Telecom market in India

The telecom market in India is the second largest telecom market in the world after China. (ITU, 2010) It is one of the most competitive and fastest growing markets. The number of telecommunications customers in the country is 688.38 million (652.42 million, 35.96 million for mobile and fixed, respectively). The penetration of telephone services is 59.31%. (ITU, 2010) In Banda Ancha, it has 9.77 million users. Despite of the fast growth of the number of customers, it is a very competitive market and revenue increased very slowly. Among the top 30 of world income of MNOs (Mobile Network Operator), Indian has none. The voice business increases, and the broadband business expands. With the development of 3G network, and
expansion and extension of broadband, the investment in this sector will

Major operations in India in 2010:

- Merger of Reliance Communication Infrastructure Ltd and GTL Ltd.
- Bharti’s acquisition of 15 African operators of Zain Group.
- Acquisition by Reliance Industries of Infotel Broadband.
- Telenor has acquired additional 7% of Unitech Wireless.

BSNL and MTNL, operators with public participation, they have 90% market
share of the fixed lines. (TRAI, 2009) The number of fixed line continues to
fall. The demand for voice increases by the number of customers at 8 million
per month. For meeting this demand, thirteen mobile operators in India
expect to invest more in their networks in 2010, and expand to new regions.
New players (Datacom, Loop Telecom, S Tel, Swa Communications, Unitec)
have input in much capital into the market. Over 50% of India’s international
traffic has destinations in other countries in Asia. The main destination is the
United States, Asia, and Saudi Arabia. (TRAI, 2009)

5.2.1. Fixed operators

Seven operators share the Indian market fixed: (TRAI, 2009)

- BSNL (81%)
- MTNL (9%)
- Bharti Airtel (6%)
- Reliance Communications (2%)
5.2.2. Fixed Line Market Share

BSNL has the largest market share 81% followed by MTNL 9%, Bharti Airtel 6%, Reliance Communication 2%, TATA teleservices 2%, Shyam Telelink 0.15% and HFCL Infotel 0.15%. See Figure 24 Fixed market share in India (35.96 million lines). See the below figure 24 Fixed Market Share in India of 2010. (TRAI, 2009)

Figure 24 Fixed Market Share in India (35.96 million lines)

Source: TRAI India

5.2.3. Other Fixed Line Operators

Also, the followed are licensed to offer domestic long distance fixed line service: Aircel, AT & T, Bharti Airtel, BSNL, BT Group, Cable &Wireless, HCL infiNET, Rail Tel Corporation of India, Sify Technologies, Tata Communicat-ions, Tulip ITServices, Verizon Business and Vodafone Essar .There
are three network operators (AKSh Optifibre Ltd., IOL Netcom and Time Broadband Services Group) to offer IPTV. (TRAI, 2009)

5.2.4. Mobile Operators

Mobile Operators in India and their market share are: (TRAI, 2009)

- Bharti Airtel (24%)
- Vodafone Assar (17%)
- BSNL (16%)
- Reliance Communications (15.3%)
- Tata Teleservices (9%)
- Idea Cellular (9%)
- Aircel (4%)
- Reliance Telecom (2%)
- Spice Telecom (1.6%)
- MTNL (1.3%)
- BPL Mobile (0.5%)
- HFCL Infotel (0.2%)
- Shyam Telelink (0.1%)

5.2.5. Mobile market share

The first place is Bharti Airtel which has 24% mobile market share of India. The second is Vodafone Assar accounting for 17%. The third large is Reliance Communications 15.3% followed by TATA Teleservices 9%. The other eight operators’ market shares are below to 5% of the total market share. See the
5.2.6. Mobile sector

Major thirteen mobile operators capture about 8 million users per month. It is one of the world's telecommunication markets with the high potential due to its rapid growth. However, profit margins are quite small. The high cost of covering the spacious country of 3.3 million km2 led these companies to cooperate in infrastructure between operators by agreements. (DoT, 2011)
5.2.7. The circles/ service areas

The Indian domestic market is divided into 23 circles or service areas (circles) which are grouped into four categories:

- **Metro**: major cities (New Delhi, Mumbai, Chennai and Kolkata). (DoT, 2011)
- **A**: The region is with other major cities (Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu) (DoT, 2011)
- **B** circles: The region is with small cities (Haryana, Kerala, Punjab, Uttar Pradesh W., Uttar Pradesh E., Rajasthan, Madhya Pradesh, W. Bengal). (DoT, 2011)
- **C** circles: It is the rural area (Jammu & Kashmir, Himachal Pradesh, Bihar, Bihar, Orissa, Assam and NE) (DoT, 2011)
- **Metro**: This area has 5% of the population, but account for 18 % of total mobile customers. (DoT, 2011)
5.3. Licenses

There are three types of licenses for operators for the individual area: (DoT, 2011)

- "Basic" fixed
- "Cellular Mobile Telephone Service (CMTS) phones".
- "Unified Access Service (UAS)”: fixed and mobile services.
- "National Long Distance (NLD) ": covers all areas or circles
Additional spectrum for mobile number is given according to customers and efficiency. The restrictions of frequency cause long wait for the new licensed operators to begin the operations. Operators have different coverage from 1 to 23 areas or "circles". Major integrated suppliers are Bharti Airtel, Tata and Reliance.

5.4. The market share of operators in India

For the fixed line market, BSNL has the leadership in the Indian market. Bharti Airtel has the third position followed by Reliance and TATA telecom. As to the mobile market, Bharti Airtel achieves the first place followed by Vodafone, BSNL, Reliance and TATA. Except to Vodafone, all of the above mentioned operators provide data services.

Table 4 The Market Share of Operators in India in Fixed, Mobile, and Data Business

<table>
<thead>
<tr>
<th></th>
<th>Fixed</th>
<th>Mobile</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHARTI AIRTEL</td>
<td>3</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>TATA</td>
<td>5</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>RELIANCE</td>
<td>4</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>BSNL</td>
<td>1</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>VODAFONE</td>
<td>NO</td>
<td>2</td>
<td>NO</td>
</tr>
</tbody>
</table>
5.5. Major Telecom Operators in India

5.5.1. Bharti Airtel

Bharti Airtel is the fifth mobile operators worldwide. It has 139.2 million customers (8 million new per three months), and 180 million total including Zain. It is also the worldwide leader of India covers mobile, broadband, fixed telephone, NLD, ILD and business solutions. Bharti has US $ 12,400 million revenues and USD $ 4,700 million of EBITDA. It has more than 600 Carrier Partners. Four strategic business units are Mobile Services, Telemedia Services, Enterprise and Digital TV Services. Bharti offers services under the brand Airtel, except to countries Bangladesh and Africa. (Airtel, 2011)

International Air PoPs: India, New York, London, HK, Singapore and LA.

PoPs are in planning in areas such as Paris, Dallas, Chicago, Dubai, Sri Lanka, Thailand, Malaysia, Japan and Sydney.

At least there are three lanes in each route:

- India-Middle East and Europe: SMW4, IMEWE, EIG
- Atlantic, TAT 14, Hibernia, Appollo
- India-Singapore: SMW4, i2i, i2i backup
- Singapore-Japan: AAG, APCN2, EAC, SJC
- Japan-US.: Unity, JUS, TGN
5.5.1.1. Local infrastructure in India

- 105,000 kilometers of fiber, SDH + MPLS PoPs 1,500
- 94 local access of cities, Global Exit 8 routes
- Full Portfolio: NLD, ILD, VSAT, IP (Airtel, 2011)

5.5.1.2. Global transmission services of Bharti

Bharti has the new network covers the global coverage E-to-E in over 50 countries. Its capacity includes from E1 to 10G, SDH and Ethernet, short-term IRU contracts. It has the diversity backhaul network in Singapore, Europe, HK, U.S., Japan. Moreover, it has the multi Service Platform includes Transmission, MPLS, IP, and Ethernet. The next generation equipment will be fully redundant. (Airtel, 2011)

5.5.1.3. Services of Bharti

Bharti provides services E-to-E to corporate clients and DLD and ILD carriers. It also offers global MPLS, managed services, MPLS Carrier. For the global IP service includes global transit, regional transit, transit AS, Internet.

International Leased Lines:

- Point to point connection worldwide.
- Flexibility and availability of alternative routes to East and West
- Catering facilities in multiple cables.
- SLA E-to-E and 24x7 support. (Airtel, 2011)
5.5.1.4. MPLS Bharti Airtel

- 125 POPs. Global coverage through NNI agreements.
- Cisco MPLS network, 64K to STM-1, F-Ethernet, Gig Ethernet.
- Diversity in last mile providers.
- CoS, SLA's, Carrier-grade platforms, Core redundant.
- Managed service, online reports in "near real time, 24x7x365 support."
  (Airtel, 2011)

5.5.1.5. Global IP Transit Services

- Direct connection with service providers, content and CDNs Tier 1.
- SLA E-to-E and 24x7 support.
- Route diversity and flexibility in route selection and billing.

5.5.1.6. Other Services of Bharti

- National Leased Lines: Connectivity of E-to-E is in 400 cities with 4000 SDH nodes, and the diversity of capillary network: 24x7 support, Ethernet over SDH, and dedicated bandwidth and so on.
- VSAT: VSAT provided only in India, Satellite IPLC circuits.
- Data Center: "co location", "shared web hosting, management and monitoring and so on."
• Telemedia Services: Broadband, IPTV and telephone services in 89 Indian cities.

• Digital TV Services: DTH services across India. (Airtel, 2011)

5.5.2. Group Tata

5.5.2.1. Introduction of Group Tata

Group Tata was founded in 1868 comprises a cluster of companies in different sectors (telecommunications, science, technology, engineering, energy, marketing, consulting and so on). There are 50,000 employees worldwide. It creates more than USD $ 70,000 million revenues per year and 61% of it comes from outside India. The main business of Tata group is Tata Steel, Tata Motors, Tata Consultancy Services, Tata Power, Tata Chemicals, Tata Tea, Indian Hotels and Tata Communications. (Tata, 2010)

In 2002, Tata group acquired 45% shares of VSNL, the incumbent operator in India for international services. In 2005, VSNL acquired Tyco Global Network and in 2006, VSNL acquired Teleglobe, the incumbent operators in Canada. In2008, VSNL, VSNL international, Teleglobe is integrated in Tata Communications.

5.5.2.2. Tata Communications

Tata Communications is a global provider, the industry- leading telecom company, which provides data services to companies in India and voice services for over the world. It has strategic investments in South Africa (Neotel, the
second largest operator in South Arica), Sri Lanka (Tata Communications Lanka Limited) and Nepal (United Telecom Limited).

The services provided include transmission, IP, Voice, Mobile Services, Network Management, Data Center and Enterprise communication solutions.

5.5.2.3. Global Transmission Services of Tata

- Tata operates a global network of widespread transmission. Properties are in TGN Atlantic, Western Europe, Northern Europe, Pacific, Intra-Asia and ICT.
- Consortium SMW3, SMW4, SAFE / SAT 3 and APCN 2.
- Cable redundancy in India: SMW4 and SMW3 & SAFE.
- There is 40,000 km of network in 300 cities in India, with 170 PoPs.

5.5.2.4. Global Service MPLS of Tata

- MPLS network is in 65 countries extended IPSec over 150 countries which is up to 155Mbps
- CoS.
- Hits: SDH, Ethernet, Broadband Local Loop, Wireless.
- Flexible options for the last mile access.
- Services: VPN, VoIP, IP and CDN, Telepresence, Hostage and Storage.
- SLA E-to-E. (Tata, 2010)
• Managed service option
• Reports of real-time service.
• Multiple VPN in a single access line.

5.5.2.5.  Tata MPLS Network Coverage in Asia

• China, India, Indonesia, Japan, Korea, Malaysia, Nepal, Philippines, Singapore, Sri Lanka, Taiwan, Thialnd, EAU, Vietnam, Bahrein, Jordan, Kuwait.
• Pops on net MPLS: Belegium, France, Germany, Holland, Poland, Romania, Spain, Sweden, Swizeland, Unite Kindom, China, India, Japan, Malaysia, Philippines, Sigapore, EAU, South Africa, and Australia.
• Partners of MPLS PoPs: Austria, Bulgaria, Czech Republic, Demark, Hungury, Finland, Italy, Luxemburg, Norway, Romania, Thialand, Indonesia, Bahrein, Jordan, Kuwait, Egype, Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Panama, Peru, Uruguay and Venezuela.
• PoPs MPLS in 130 cities in India. (Tata, 2010)

5.5.2.6.  Features of MPLS Network Tata

• Global Tier 1 Carrier.
• 100% Cisco. Tata and Cisco jointly offer managed services market by Cisco Managed Services Channel Program.
- Submarine cables owned by multiple routes and redundancy.
- Metro-Ethernet network in major cities of India.
- Routing flexibility and speed.
- 24x7 E-to-E. (Tata, 2010)

5.5.2.7. Value Added Services of Tata

Global VPN Extended Access Service: IPSec access option for sites without dedicated links or of areas of difficult access.

MPLS IPSec Backup service if the main circuit is inoperative. Managed Security Services: Firewall, intrusion detection and prevention (IDS / IPS), and antivirus.

5.5.2.8. Other Services of Tata

- IP Services: Tier-1 IP network, with 400 PoPs (80 global PoPs).
- Access from Ethernet to 10Gig-E and E1 to OC-192.
- IPLC: flexible SLA management and E-to-E.
- CDN.
- Global Media and Entertainment solutions.
- Data Center: “Co-location”, “Hosting” and “Storage.”
- Telepresence (Tata, 2010)
5.5.3. Group Reliance

5.5.3.1. Introduction of Group Reliance

The Reliance Group began with a small textile company. Now covers more than 100 companies in various sectors in India: energy, material, sand, textiles, petrochemicals, telecommunications and so on. Total revenues of Group Reliance is more than USD 44,000 million. Major Companies of Group Reliance are Reliance Industries Limited and Reliance Industrial Infrastructure Limited. In 2003, it acquired FLAG Telecom submarine cable company. Reliance Communication is the telecommunication subsidiary of Reliance Energy, formerly known as Reliance Infocomm. Reliance Communication is an integrated provider of telecommunication services. There are 2,100 corporations and multinational customers. (Reliance Group, 2011)

5.5.3.2. Reliance Globalcom

Reliance Globalcom Data is a subsidiary of Reliance Communications. The system has the largest private undersea cable in the world. It has the coverage in 230 countries and territories in total. There is 65,000 km of submarine cable and 22,000 km of fiber. It provides the flexibility and tailored solutions. (RelianceGlobalcom, 2011)

5.5.3.3. Services of Reliance Globalcom

WAN managed services, remote access services and security, voice and hosting or placement. WAN management solutions: MPLS Matrix (MPLS multi carrier solution), Secure IP (Internet VPN solution) and Committed Ethernet
(Ethernet solution multi carriers). SLA tailored to customer needs. Data Centre and the CRC. Web Portal and proactively. (RelianceGlobalcom, 2011)

5.5.4. BSNL

It is the leading operator in fixed telephone in India, publicly owned, which has created by the Department of Telecommunications Services and the Department of Telecommunications Operations in 2000. It also offers mobile, broadband, Internet, MPLS VPN, VSAT and so on. It has the great coverage in India. (BSNL)

5.5.5. IDEA CELLULAR LTD.

It is the 6th mobile operator in India and the member of Axiata Group based in Malaysia, which owns 14.99% of Idea Cellular Ltd. It is the mobile operator but does not have data business. (Ideacellular, 2011)

5.5.6. VODAFONE ESSAR

Vodafone Essar is the subsidiary of Vodafone Group. It entered in the Indian market in 2007. Currently, it is at the position between 2nd and 3rd position. It has the strong growth in service revenues (14.7%) and has 32 million customers. Vodafone Essar is the mobile operator and does not have data business. (Vodafone India, 2011)

5.5.7. AIRCEL

Aircel is the joint venture with Maxis (74%) and Sindy. It began the mobile
operation in 1999 and is a leader in Tamil Nadu. Aircel has the licensed in 21 areas or "circles". Aircel is the mobile operator but does not have data business. (Aircel, 2011)
6. Research Findings: Singapore

6.1. The Country Overview

The population is 5.07 millions includes 36% foreigners. The 75.2% of population is Chinese, 13.6% is Malays, 8.8% is Indians, and 2.4% is Eurasians and other groups. There is 50% of labors which are foreigners. It is a small country of which surface areas is only 710.2 Km2. (CIA, 2011)

6.2. The economy of Singapore

The GDP of Singapore is SGD$ 309,400 million in 2010. The GDP(PPP) per-capita is USD $ 49,800 ranks 8th in the world with the annual growth 14.5%. (CIA, 2011) Singapore is one of the most important center of finance, services and transportation in Asia. Singapore government has encouraged private and foreign companies to invest in Singapore and Singapore becomes one of the most liberal trading regimes in the world. The unemployment rate is 1.9% of the 1st season 2011. (CIA, 2011)

6.3. Telecom Market of Singapore

Singapore telecom market is very competitive. The number of fixed line subscriptions is 1.99M, population penetration rate is 40%. The number of mobile of subscriptions is 7.38 M, mobile population penetration rate is 145.5%. Singaporean has very high penetration rate of mobile. 3G subscribers currently is account for 66% of total mobile subscribers. International telephone call is 12,405 M minutes total in the year 2010. (IDA
Singapore, 2011) Singapore’s international telephone services market has grown considerably both in the diversity of such services available as well as in the number of operators offering these services. Singapore continues to develop as a hub for international voice traffic. In 2006, Singaporean government starts to offer free Wi-Fi service over the whole country. Household broadband penetration rate is 136.4%, wireless broadband population penetration rate is 195.3%. (IDA Singapore, 2011)

In 2006, the government acted the “Intelligent Nation 2015 (iN2015)” plan last for 10 years to develop national information and communication. Objectives are to achieve 90 % broadband usage in all homes to achieve 100 % computer ownership in homes with school-going children, to increase in infocomm export revenue to SGD$60 billion and so on. (IDA Singapore, 2011) This plan makes the revenue boosts substantial of ICT industry. The subsidiary plan, “Next Generation National Infocomm Infrastructure (Next Gen NII)”, contributes Singapore to have good environment of optic network with the capacity of 100Mbps ~ 1Gbps for its nation. (IDA Singapore, 2011)

6.4. The Number of Telecom Providers in Singapore (till May 2011)

The below table 5 show the number of telecom operators in Singaporean market. There are two fixed line operators and five mobile telephone providers. There are 95 internet services providers, 436 voice services providers and 40 IP telephone providers in Singapore. The telecom market in Singapore is very competitive. (IDA Singapore, 2011)
Table 5 Statistics of Number of Telecom Operators in the Market in Singapore

<table>
<thead>
<tr>
<th>Number of operators in Singapore 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Line Telephony Providers</td>
</tr>
<tr>
<td>Mobile Telephony Providers</td>
</tr>
<tr>
<td>Internet Services Providers</td>
</tr>
<tr>
<td>Fixed Line Market Share in Singapore</td>
</tr>
</tbody>
</table>

6.5. Fixed Line Market in Singapore

6.5.1. Fixed Telephone Providers in Singapore

Two fixed telephone operators in Singapore are Singtel and Starhub. Fixed Line Market Share in Singapore

Operators provide VoIP services utilising Level "3" or Level "6" E.164 telephone numbers.

Voice services excludes fixed line telephony services, mobile telephony services, and IP telephony services, but includes all other voice-related services such as call-back services, international simple resale services, Internet-based voice and data services and international calling card services.
6.5.3. Statistics of Fixed Line of Singapore

The below table 6 shows that the fixed line market of Singapore updated to March 2011. The total fixed line subscriptions is 1,996,100 in Singapore includes 1,220600 residential line subscriptions, and 775,500 corporate line subscription. The fixed line population penetration rate is 40%. (IDA Singapore, 2011)

Source: IDA
Table 6 Fixed Line Market Share in Singapore

<table>
<thead>
<tr>
<th>Fixed Line</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fixed Line Subscriptions</td>
<td>1,996,100</td>
</tr>
<tr>
<td>Total Residential Line Subscriptions</td>
<td>1,220,600</td>
</tr>
<tr>
<td>Total Corporate Line Subscriptions</td>
<td>775,500</td>
</tr>
<tr>
<td>Fixed Line Population Penetration Rate</td>
<td>40.0%</td>
</tr>
<tr>
<td>Fixed Line Household Penetration Rate</td>
<td>104.9%</td>
</tr>
</tbody>
</table>

*Source: IDA Singapore, March 2011*

6.6. Mobile Market in Singapore

There are three operators in Singapore as SingTel, StarHub and M1 known as Mobile one.

6.6.1. The Mobile Market Share in Singapore

The SingTel has the leadership in the mobile market in Singapore which takes 42% of the total market share. The second place is the StarHub 29%. M1 has almost the same size of Starhub which is account for 27%. The other operators only have 2% of market share. See the below Figure The Mobile Market Share of Singapore

Figure 28 The Mobile Market Share of Singapore
6.6.2. Statistics of Mobile Market of Singapore

The total mobile subscriptions of Singapore include 2G and 3G services is 7,384,600 in March 2011. The mobile penetration rate is substantial high as 145.5%. From the below table 7, it describes in details. (IDA Singapore, 2011)

Table 7 The Mobile Market in Singapore

<table>
<thead>
<tr>
<th>Mobile Market</th>
<th>March 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Mobile Subscriptions (2G+3G)</td>
<td>7,384,600</td>
</tr>
<tr>
<td>Total Post-paid Subscriptions (2G)</td>
<td>265,200</td>
</tr>
<tr>
<td>Total Pre-paid Subscriptions (2G)</td>
<td>2,123,400</td>
</tr>
<tr>
<td>Total Post-paid Subscriptions (3G)</td>
<td>3,557,200</td>
</tr>
<tr>
<td>Total Pre-paid Subscriptions (3G)</td>
<td>1,438,800</td>
</tr>
<tr>
<td>Total SMS Messages (2G+3G)</td>
<td>2,443.9m</td>
</tr>
<tr>
<td>Total Ported Subscriptions</td>
<td>6,900</td>
</tr>
<tr>
<td>Mobile Population Penetration Rate</td>
<td>145.5%</td>
</tr>
</tbody>
</table>

Source: IDA Singapore, March 2011

6.6.3. International Telephone Calls

Total number of outgoing retail international telephone call minutes is 698,625,300 and total number of outgoing retail international telephone call minutes including transit is 1,056,901,800. (IDA Singapore, 2011)
6.7. Data Market in Singapore

The total broadband market is 8,192,300 in Singapore till March 2011. The household broadband penetration rate is high to 195.3%. Total Wireless Broadband is 6,923,100. Wireless broadband population penetration rate is also high at 136.4%. (IDA Singapore, 2011) See Table 8 The Telecom Data Market in Singapore.

Table 8 The Telecom Data Market in Singapore

<table>
<thead>
<tr>
<th>Broadband Internet Subscribers</th>
<th>Feb'11</th>
<th>Mar'11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Broadband</td>
<td></td>
<td>8,192,300</td>
</tr>
<tr>
<td>Total Residential Broadband</td>
<td>2,284,300</td>
<td></td>
</tr>
<tr>
<td>Total Residential Wired Broadband</td>
<td>1,190,700</td>
<td></td>
</tr>
<tr>
<td>Total Corporate Broadband</td>
<td>223,700</td>
<td></td>
</tr>
<tr>
<td>Total Corporate Wired Broadband</td>
<td>78,500</td>
<td></td>
</tr>
<tr>
<td>Total xDS</td>
<td>564,100</td>
<td></td>
</tr>
<tr>
<td>Total Cable Modem</td>
<td>681,000</td>
<td></td>
</tr>
<tr>
<td>Total Wireless Broadband</td>
<td>6,923,100</td>
<td></td>
</tr>
<tr>
<td>Total Subscribers using other Broadband Internet Access Platforms</td>
<td>24,200</td>
<td></td>
</tr>
<tr>
<td>Household Broadband Penetration Rate</td>
<td>195.3%</td>
<td></td>
</tr>
<tr>
<td>Residential Wired Broadband Household Penetration Rate</td>
<td>101.8%</td>
<td></td>
</tr>
<tr>
<td>Wireless Broadband Population Penetration Rate</td>
<td>136.4%</td>
<td></td>
</tr>
</tbody>
</table>

Source: IDA Singapore, March 2011
6.8. Operators in Singapore

6.8.1. Singapore Telecommunications Limited (SingTel)

It is founded in 1879. The chairman is Lee Hsien Yang who is the brother of Prime Minister Lee Hsien Loong, and the second son of Lee Kuan Jew. The group revenue is SGD 18,071 million (around USD$ 14,507 million) in year 2010. Total employees is 4,000 in year 2010. (SingTel, 2011) The Products are mobile, internet, fixed network, IPTV and IT services. SingTel is the largest mobile network operator in the world with users at 400 millions in May 2011. Due to its government policy and its expanding strategy, Singtel expand business fast oversea and is competitive. The customer base of SingTel spreads all over the world, praticular in Asia. SingTel has a large mobile market in Austraila at 8,877 thousand. In India, the customer base is 187,708 thousand under the brand of Bharti. Telkomsel operator in Indonesia is also the part of SingTel with 91,136 thousand customers. SingTel has mobile customers of 30,502 thousand from AIS of Thailand, 25,403 thousand from Globel of Philippines, 17,165 thousand Warid of Pakistan, and 1,908 thousand from PBTL of Bangladesh. (SingTel, 2011)

6.8.1.1. Network of SingTel

SingTel has an extensive communications network and infrastructure in Singapore and Australia. It is a major investor in many of the world's most sophisticated submarine cable systems, such as SEA-ME-WE 3, SEA-ME-WE 4, APCN, APCN 2, China-US, Japan-US, C2C, i2i and Southern Cross. SingTel has the largest market share of IP VPN in Asia
market. (SingTel, 2011) SingTel(62%) cooperates with CHT-I(38%) to launch a new satellite ST-2 into the orbit on 21 May 2011 in French Guiana to replace the old satellite ST-1, and two additional launches by 2013. (SingTel, 2011)

6.8.2. StarHub Limited

It is founded in 7 May 1998. The revenue is SGD$2,338 million (around USD$ 1,877 million) in year 2010. The profit is SGD$ 263M (around USD$ 211 million) in 2010. The mmemployees is 2,702. (StarHub, 2011) The products are mobile, digital cable, internet and fixed network. It is the second largest mobile operator in Singapore with customers base 2,145,000. StarHub has the market share as Fixed line 8%, mobile 29%, Broadband 45%, paid-TV 90%, respectively. Takes strategy of bundling service which offers free shows of EPL(The Premier League ). (StarHub, 2011) For the member of Conexus Mobile Alliance, can use roaming service for free in the alliance countries.

6.8.3. M1 Limited

It is founded in 1994. The products are mobile, Data, and Internet. The revenue is SGD$ 782 million (around USD$ 628 million) in 2009. M1 is the third largest operator in Singapore. The network covers 2G/3G/3.5G, including international-call services. Vodafone is M1’s Singaporean partner at mobile. In 2010, M1 has now joined in as one of the major RSP to provide Singapore’s Next Gen Fibre Optics (M1, 2011)
7. Research Findings: Thailand

7.1. The Country Overview

A surface area of Thailand is total 513,000 km$^2$ and Thailand is the 21 most-populous country, with 64 million people. The country is a kingdom influenced by many different countries. Thailand has a most big population of Buddhists in the world. (CIA, 2011)

7.2. Economics of Thailand

The 2010 GDP of Thailand is total US $584 billion makes it the 24th largest economy in the world. The per capita is US $ 4,620(89th). (CIA, 2011) Thailand is a considerable export-dependent country. The economy starts to recover from 2010 and it appears the excellent performance after the Asian economic crisis. (CIA, 2011)

7.3. Telecom Market Overview of Thailand

For the Thailand market, the fixed telephone line gradually slows down but the mobile sector has the potential growth in the future. The indexes of internet users, availability of the latest technologies, and FDI and technologies transfers are decreasing in these years and stay low. General, the global competitiveness index is unfortunately dropping.
7.4. Fixed Operators

There are mainly three telecommunication operators in Thailand on fixed line business as followed:

- TOT (TOT Public Company Limited (ทีโอที))
- True (True Corporation Public Company Limited)
- TT&T

7.4.1. Thailand Fixed Line

Thailand fixed line subscribers static from ICT shows that there were 3,643,296 subscribers of metropolitan and 3,365,607 subscribers of provincial area. Total 7,008,903 subscribed the fixed line in 2010. (NTC, 2011) It is lower than the 7,394,349 and 7,204,936 subscribers in 2008 and 2009 in fixed line. (NTC, 2011) The sign shows that the fixed market in Thailand decreases year by year.

7.4.2. Fixed Line Market Share

The major telecommunication operators for the fixed line are TOT, True and TT&T. In metropolitan area, TOT and True have the larger market shares at 44.83% and 55.17%, respectively. In other provinces, TOT and TT&T have the larger market shares at 70.91% and 29.09%, respectively. Total market share of Thailand fixed line are TOT 57.35%, True 28.68% and TT&T 13.97%, respectively. (NTC, 2011)
In Bangkok metropolitan area, the main operators are TOT and True. In other provinces, operators are TOT and TT&T. See the below Table 29 Fixed Line Market Share in Thailand. TOT has the largest market share of total fixed line at 57.35% in Thailand followed by True 28.68% and T&T 13.97%. As to the metropolitan area, TOT has 44.83% and True has 55.17% market share in Thailand. For the provincial area, TOT has 70.91% and T&T has 29.09% in Thailand. (NTC, 2011)

Source: NTC 2010
7.5. Mobile Operators

The main mobile operators in Thailand as followed: AIS, DTAC, True Move, Hutch, CAT, Thai Mobile 1900 and TOT 3G.

7.5.1. Percentage of Mobile Users

These operators have different mobile market shares of pre-paid or post-paid markets. The mobile market of Thailand is growing, particularly in pre-paid market.

Different operators have different market shares of pre-paid and post-paid markets. AIS has the leadership in pre-paid mobile market account for 43.99% followed by DTAC, True Move and CAT&Hutch, at 29.79%, 24.44% and 1.66% in the Thailand pre paid mobile market, respectively. (NTC, 2011)
For the post paid mobile market in Thailand, AIS still has the largest share account for 40.8% followed by DTAC, True Move and CAT&Hutch, respectively, account for 32.22%, 17.56% and 7.9% in Thai post paid mobile market. (NTC, 2011)
7.5.2. Total Market Share of Mobile Service in Thailand from 2009 Q3 – 2010 Q3

Overall, AIS has the largest mobile market share in Thailand which is followed by DTAC, True move, CAT& Hutch , and Thai Move, respectively, at 43.66%, 30.04%, 23.73%, 2.03%, 0.11% and 0.15% in 3Q 2010. (NTC, 2011)

7.5.3. Mobile Sector in Thailand

Six companies have the market of 7 million subscribers per year but only three mobile network operators mainly dominate the mobile market. AIS maintains a leadership position in the market. As to the pre-paid market, each service provider is focusing on marketing strategies currently trying to maintain their customer base as much as possible.

By the end of 2010, the mobile penetration rate was 104.16%. In particular, the pre-paid mobile penetration grows fast. From 2002 till 2010, the mobile market still grows although it gradually slows down in these years. Around 70% of mobile market revenue is from voice business instead of the non-voice and other business which are about 13% and 15% of the total mobile revenues. Larger mobile operator has network coverage to almost 90 percent of population. Smaller mobile operator has developed its network coverage covers only the urban area of every province. Recently, the debatable regulation in Thailand is the implementation of mobile number portability (MNP). To reduce consumer switching costs since the MNP gives
mobile subscribers to remain use the same mobile telephone number while changing mobile operator.

Thai mobile operators work hard to retain their own mobile subscribers as well as steal rival's mobile customers. All of mobile operators use the price strategy to compete with each others, but the quality of service of each remains unequal. In the future, to raise competition in both price and quality of services will be a trend.

7.5.4. Coverage and areas

The largest mobile operator of Thailand has better network coverage in most of regions in Thailand.

7.6. Data Market in Thailand

The trend for the data market in Thailand presents that the number of subscribers of the board band increases instead of internet leased line in these years. In 2010, the subscribers of XDSL in Thailand reaches 72.70 % of total data market. (NTC, 2011)

7.7. International telephone services market in Thailand

The price is competitive in IDD (International Direct Dialing). Customers are attracted to promotion offers of customer service telephone services. International calling card: The price is lower than IDD. The advantage of
using international calling cards is that cards are never expired and can be used easily without changing SIM cards.

### 7.8. Interconnection

There are 14 operators have licenses on the Internet division to provide telecommunication network 2. There are 19 operators received IIG licenses to provide telecommunication network 3. 3-15 NIX licenses on Internet Service Network 3. (NTC, 2011)

#### 7.8.1. Interconnection Carriers

The below figure is the ratio of the revenue of interconnection of carriers. AIS has the leadership position which is 40.77% of total interconnection revenue in Thailand and followed by DTAC account for 37.90%, TMV account for 20.59%, DPC account for 0.70% and TTTBB account for 0.04% of the total revenue of interconnection of Thailand.

![Figure 34 The Ratio of the Revenue of Interconnection of Carriers](source.png)

Source: NTC 2010
7.9. International Internet Gateways

There are seven International Internet Gateway operators in Thailand.

True Corporation and Shin Corporation were granted Type II International Internet Gateway and Internet Exchange Service License from the NTC (National Telecommunication Committee) in 2005. CAT Telecom holds the largest share of the market. CAT has a lot of gates for international Internet than other operators.

7.10. Submarine Cables in Thailand

There are five submarine cables used for communications landing in Thailand. Thailand has cable landing points in Satun, Petchaburi and Chonburi.

- SEA-ME-WE-3, SEA-ME-WE-4 linking South East Asia to the Middle East and Western Europe. SEA-ME-WE 4 was operational since 2006.
- Thailand-Indonesia-Singapore (TIS) operational since December 2003.
- APCN linking Thailand, Malaysia, Singapore, Indonesia, Hong Kong, Philippines, Taiwan, Korea and Japan. The cable is operational since 1996.
- Thailand-Vietnam-Hong Kong (T-V-H) operational since February 1996.
● Flag Europe-Asia (FEA) operational since mid-1990s.

Currently there are some new gateways which are building. The Asia-America Gateway (AAG) is under construction and is expected to be operational in Q2 2009. The Asia Pacific Gateway (APG), a new submarine cable, is under planning stage and is expected to be operational in Q3 2011. (NTC, 2011)

7.11. BTO Network in Thailand (Build Transfer Operate)

BTO (Build Transfer Operate) is a very common way of Thai telecom operators to cooperate with other carriers to expand their networks. They have agreements based on the revenue sharing.

7.12. Telecom Operators in Thailand

7.12.1. AIS Introduction (Advanced Info Service)

Advanced Info Service PCL is Thailand’s largest GSM mobile phone operator which was founded on April 24, 1986 in Thailand. It has reached 28.8 million customers by the end of February 2010. (AIS, 2011) AIS owns technology as GSM, EDGE, UMTS, HSDPA and WCDMA900. The revenue was 81.59 billion baths of 2010 and the profit was 14.74 billion baths of 2010. (AIS, 2011) Singapore Telecommunications holds 19.15% of the stake of the company.
7.12.2. DTAC (Total Access Communication Public Company Limited)

Total Access Communication Public Company Limited (DTAC) which is founded in 1989. It is the second largest GSM mobile phone in Thailand. Telecom company Telenor owns part of it. DTAC operating 800 MHz and 1800 MHz frequency bands has the BTO contract with CAT for twenty seven years long which is based on the revenues sharing basis. (DTAC, 2011)

7.12.3. True (formerly Orange)

True Corporation Public Company Limited (TRUE) which is founded on November 13, 1990 controls Thailand’s largest cable TV provider True Visions in Thailand. Its another subsidiary “True Move” owns third largest market and operates ISP True Internet extensively. It has the technology as GSM, EDGE, UMTS and HSDPA. (True, 2011)

7.12.3.1. TIG (True International Gateway)

It is 100% owned by True Corporation. Countries present in Cambodia, Hong Kong, Laos, Singapore, and Thailand. It provides long-haul and metro services include bandwidth, IP transit, MPLS, Ethernet, co-location, virtual node services, local loops. Mainly technology: is Ethernet, DWDM, IP and Sonet / SDH. TIG has obtained the first international gateway license to provide both terrestrial and submarine connectivity services from the NTC( National Telecommunication Commission of Thailand). (TIG, 2011)
7.12.4. Hutch

Hutch – CAT and TOT alliance, Thai Mobile and Hutch, for offering a GSM mobile service, and both a CDMA2000 1X mobile service in twenty five central provinces and a CDMA2000 1xEV-DO service in fifty one other regional provinces. Mainly technology is Cdma One and CDMA2000 EV-DO. (Hutch, 2011)

7.12.5. TOT (TOT Public Company Limited)

TOT Public Company Limited is a Thai state-owned telecommunications company which is founded in 1954 and corporatized in 2002. The finance is controlled by the Ministry of Finance of Thailand. It has technology as UMTS, HSDPA (Available on April 2011). (TOT, 2011)

7.12.6. CAT

CAT Telecom Public Company Limited is also a state owned company. Its infrastructure includes the international gateways, satellite and submarine cable networks connections. Countries present in Hong Kong, Laos, Singapore, and Thailand. It provides long-haul and metro service including Bandwidth, IP transit, voice, MPLS, Ethernet, and mobile. The technology is Ethernet, DWDM, IP, cable, fibre, wireless, satellite, and Sonet/SDH. CAT is the first international telecom service provider. Services provided include internet service, network services, international calls, e business, CDMA and IT security. (CAT, 2011)
8. Analysis

This chapter will discussed and analyzed the telecom industries of India, Singapore, and Thailand by Michael Porter’s Diamond theory and SWOT analysis.

8.1. Diamond Theory Analysis of Telecom Industry of India

The below table showed the abstract of the result of the diamond theory analysis of Indian telecom market. Further, it would be discussed in the follows in detail.
Table 9 Diamond Theory Analysis of Telecom Industry of India

<table>
<thead>
<tr>
<th>Diamond Theory Analysis of ICT in India</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factors Conditions</strong></td>
</tr>
<tr>
<td>◆ Good ability at mathematics, English, many study abroad, young</td>
</tr>
<tr>
<td>◆ 2.1 millions employed in ICT, 90 million graduated student in ICT</td>
</tr>
<tr>
<td>◆ Salary level is one fifth of western standard</td>
</tr>
<tr>
<td>◆ Infrastructure is poor, rural telephone penetration 25%</td>
</tr>
<tr>
<td>◆ Area is so big to cover by base stations and costly</td>
</tr>
<tr>
<td><strong>Demand Conditions</strong></td>
</tr>
<tr>
<td>◆ Telephone users reaches 601,220 million</td>
</tr>
<tr>
<td>◆ Output value 15.4% of GDP</td>
</tr>
<tr>
<td>◆ Has attracted enterprises invest in R&amp;D centers</td>
</tr>
<tr>
<td>◆ Bangalore – Silicon Valley of India</td>
</tr>
<tr>
<td><strong>Related and supporting industries</strong></td>
</tr>
<tr>
<td>◆ Development of IC, software, hardware flourish</td>
</tr>
<tr>
<td>◆ Research institutions set up (III-b)</td>
</tr>
<tr>
<td><strong>Firm strategy, structure and rivalry</strong></td>
</tr>
<tr>
<td>◆ Private operators are allowed from 1991</td>
</tr>
<tr>
<td>◆ Blue print of 3G</td>
</tr>
<tr>
<td>◆ Broadband Policy 2004</td>
</tr>
<tr>
<td><strong>Government</strong></td>
</tr>
<tr>
<td>◆ DoT: Department of Telecommunication</td>
</tr>
<tr>
<td>◆ WPC</td>
</tr>
<tr>
<td>◆ TEC</td>
</tr>
<tr>
<td>◆ TRAI</td>
</tr>
<tr>
<td><strong>Chance</strong></td>
</tr>
<tr>
<td>◆ Set up R&amp;D centers and promote Indian IT industry international</td>
</tr>
<tr>
<td>◆ The fast growing industry in the world</td>
</tr>
<tr>
<td>◆ NMP</td>
</tr>
</tbody>
</table>

8.1.1. Factor conditions:

India’s labor force is up to 478.3 million in 2nd place of the world (CIA, 2011) behinds China but the rural employment accounts for 60% of the total labor force of India. Technical or semi-skilled labors are not sufficient in India. Due to ineffective implementation of national education, the illiterate population is high and most of them are in provinces UP and Bihar which have the worst infrastructure. Accounting to the statistics, the illiteracy rate of people is 25% in India. (CIA, 2011) However, India’s education started to nurture more engineers after fifty.
There are around 2.1 million of Indians employed in ICT industry every year. (ITU, 2010) It becomes the biggest ICT jobs creator over the world. India now is one of the countries which power the information and technology industry in the world. Nearly 90 million graduated students (ITU, 2010) are into the field of research and development of ICT every year. The human resource is more abundant in ICT industry than other countries. Generally, Indians have well training at mathematics and English which are favorable to foster IT manpower. There are also many Indians have studied abroad and come back to India for working in the ICT industry. Most of manpower is young people. The average age is around 28 years old in IT industry. (ITU, 2010) Then, the salary level of employees is one fifth of western employees. Obviously they have competitive advantages than people from the developed countries. The large operators set up their own training institutions for developing their own human resources.

In 1987, India government has legislated National Policy on Education which promoted the technology and information educations. Furthermore, India and European Union have agreed that to cooperate on Information and Telecommunication Technologies. They built a research & development center in Bangalore to foster the area of software or information. Overall, the general education of India still has the big problem, such as the high ratio of pupil and teacher, high rate of dropping out study, or high illiterate rate. Nevertheless, the government performs better in the area of developing
technology manpower. The knowledge resource in ICT part is developing fast.

The infrastructure in India is still poor. Among 66,822 rural areas, there are still 14,480 villages have not laid telephone lines. (TRAI, 2009)

India’s 11th – 5 years economic plan during the year 2007-2012 (Planning Commission, 2011) is enhancing the rural telephone connection to 200 million by 2012. By continuous reducing in tariffs of mobile phone and introducing preferential rates program, the demand of the coverage of tower and other infrastructure increase and operators have set up 30 million base stations. (Planning Commission, 2011) India has expanded its communication network fast based on its economic plan.

8.1.2. Demand conditions:

India is the fast-growing telecommunication market all over the world. According to Telecom Regulatory Authority of India (TRAI) statistics, by the end of March 2010, the number of telephone users reached 601,220 million includes 507,550 mobile phone users and 6,660 million fixed line users.

Indian mobile market still has high potentiality for growth. In March 2009, the average time of Indian mobile usage of GSM is 484 minutes. The average
consumption is US $ 4.1. The average time of usage of CDMA mobile is 357 minutes. The average consumption is US $ 1.98. (TRAI, 2009) Frost & Sullivan is expected that wireless mobile users will reach USD 39.8 billion in 2012. Amount for fixed line telephone users will reach USD12.2 billion. (Frost & Sullivan, 2010)

Indian state-owned telecom company BSNL provides 3G services at 318 cities throughout India which has 85,6 million subscribers. (BSNL, 2010) BSNL also provides 3G services more than 760 cities in India. Tata Tele services (Tata, 2010) already completed the radio telephone communication network all over the India.

Overall, communication industry is the most successful industry in India since the economy becomes liberated and open. Not only the growing number of wired or wireless telephone, but also the number of usage of broadband grows dramatically.

8.1.3. Related and supporting industries

IC, hardware, software...industries flourish in India. Related and supporting industries develop well in genera in India. There are also many research centers set up in India such as IIIT-b (International Institute of Information Technology in Bangalore).
The below figure 35 shows that the allocation of related and supporting industries of telecommunication in India. There are three key ICT cities: New Delhi, Mumbai and Bangalore. The major device suppliers in New Delhi are Tera Telcom, Elitecore Technologies and Telsima. In Mumbai, Adino Telecom is the major suppliers of Telecom devices. Also, GTL, L&T Infotech, Mindtree are system integration companies. In the south of India, Bangalore is an important telecommunication and information technologies city. Wipro, HCL, TATA Elxis are software and hardware suppliers. Telsima, Sloka Telecom Pointred, Elitecore Technologies are device suppliers.

Figure 35 Allocation of Indian Relevant and Supporting Industries of Telecommunication

Source: MIC 2009 July
8.1.4. Firm strategy, structure and rivalry:

Since 1991, the India Government conducted a series of reforms of telecommunication. DoT allowed private operators to enter the telecommunications market at the first time in 1991. It released two mobile licenses of metropolitan areas in 1995. In 1994, DoT acted NTP-94 (DoT, 2011) which promote the popularization of fixed lines business and encourage foreign companies to invest in Indian telecom industries. In 1999, DoT further acted NTP-99 (DoT, 2011) continuing reforming the telecommunication market includes expansion of private telecommunication services of providing international long distance calls, authorizing DoT functions of issuing licenses and making policy, having interconnections between the different fixed-line operators, permitting BSNL and MTNL, state-owned telecommunication, to access to mobile communications services. In 2008, Indian government opened to the use of wireless communication. "Crossover spectrum" policy is allowed operators to access CDMA or GSM.

The Indian government has drawn up a blueprint to provide 3G services. According to the schedule of the blueprint, 3G services will cover all urban and rural areas in the country with more than 10 million users in 2012 by the State Department of Telecommunications of India. In order to meet the needs of the spectrum, the Indian government is trying to find unused frequency bands from the areas of defense and aerospace.
Broadband network business of India is considered to an important factor to enhance long-term economic development. Indian government announced Broadband Policy “Broadband Policy 2004” in 2004. Since 2004, India had a lower penetration rate regardless of Internet, broadband, and personal computers, respectively, only 0.02%, 0.2% and 0.8% compared to other Asian centuries. By "Broadband Policy 2004", BSNL and MTNL launched a series of projects of fibers (HFC, FTTC, FTTH), DSL network. (DoT, 2011) This policy also encouraged ISP operators to deploy Cable, Satellite and Wi-Fi network to increase the penetration of broadband. Fibers and ADSL networks were deployed in the metropolitan areas and its surrounding areas, and satellite communication networks were deployed in remote rural areas to make up the insufficiency. Although "Broadband Policy 2004" (DoT, 2011) has not clearly specified WiMAX technology, but it has asked DoT to plan of radio spectrum of wireless broadband technology for the future.

The WPC already published service policy "Guidelines for Broadband Wireless Access Service" in 2007. (WPC, 2011) WiMAX services has been regarded as the key technology of India. India’s current WiMAX 2.3GHz and 2.5GHz spectrum are going to auction and also include 3.3-3.4GHz spectrum and the 5.8GHz which have been used by Fixed WiMAX. DoT and TRAI have initiated the spectrum planning of 700MHz ,2.6-2 .7 GHz ,and 3.4-3 .7 GHz. (WPC, 2011)
8.1.5. Government

8.1.5.1. DoT, Department of Telecom

Department of Telecom (referred to as DoT in the follows) is responsible for overall planning and development of information and communication policies to improve telecommunications services, improve industrial growth, permit telecommunication business licenses, manage radio communication frequency, regulate related specifications of radio usage and supervise the telecommunications market. There are two state-owned national telecommunication operators under the jurisdiction of DoT: Telecom BSNL (Bharat Sanchar Nigam Limited), MTNL (Mahanagar Telephone Nigam Limited) and telecommunications consulting firm TCIL (Telecommunications Consultants India Limited); spectrum management agencies WPC (Wireless Planning & Coordination Wing), Telecom Engineering Center TEC (Telecom Engineering Center), and telecommunications technology research and development unit of C-DoT (Center for development of Telematics) and other institutions. “WPC, Wireless Planning and Coordination Wing “and “TEC, Telecom Engineering Center”, respectively, will be described their responsibilities as follows. (DoT, 2011)

8.1.5.2. WPC, Wireless Planning and Coordination Wing

WPC was established in 1952, under the DoT. It is responsible for issuing licenses, allocating of spectrum and telecommunication licenses approval.
WPC is divided into several major departments, including the radio spectrum licensing and specification of units of LR (Licensing and Regulation), wireless technology research group NTG (New Technology Group) and the Radio Spectrum Allocation Advisory Committee SACFA (Standing Advisory Committee on Radio Frequency Allocation). (WPC, 2011) SACFA provides management advice of spectrum allocation and also proposes spectrum planning proposals to the International Telecommunication Union ITU (International Telecom Union).

8.1.5.3. TEC, Telecom Engineering Center

TEC is under DoT which is responsible for telecommunication technology planning and network development. Business scope includes parts that to build common level of quality to secure function between equipment and services, to plan standards of the interface of services and networks, to provide the standardization of telecommunication, to have technical cooperation with international telecommunication organizations such as APT, ETSI and ITU, to provide consult services of telecom research and development to private telecommunication sector, and to plan the future development policy of telecom with DoT.
8.1.5.4. TRAI, Telecom Regulatory Authority of India

TRAI was established in 1997, reorganized in 2000. TRAI is responsible for managing the industry of telecommunication for operators which want to enter the telecommunications industry to ensure license issuing, and operators which conduct regular surveys of quality in order to protect users’ interests. Government of India has authorized jobs to TRAI includes: development the fair and reasonable fees of telecommunication, to ensure the interoperability of network, to analyze of the Indian WiMAX policy development, and to be the coordinated unit between DoT and operators.

Overall the politician of India, it with features religion, multi race, caste based, and local political developments is implicit a lot of conflicts in the whole nation while India’s economy rise.

8.1.6. Chance:

India had planned in late 2008 in Delhi, Mumbai, Kolkata and Chennai city for a mobile phone number for portable business that allows mobile phone users to retain the replacement of the original number of carriers. This new service brings an opportunity for mobile service. It will force telecom operators to improve their service of quality.

In the early of 2011, 3G finally starts in India after many years delay. The authority needs to plan to the divide this country into several service areas. If
there is only a small percentage of person using 3G services, it still is a large market. However, the 3G service has different average price of spectrum per subscriber in different regions. In metro circles, it could be USD 5-6 but the rest circles is charged at USD0.5-1. The 3G technology may not be utilized fully in India.

Nevertheless, the fast growing telecom market and the government’s support make the ICT industry has good prospect for the long run.

8.2. Diamond Theory Analysis of Telecom Industry of Singapore

The below Table 12 indicated the abstract of the result of diamond theory analysis of the telecom market in Singapore.
### Diamond Theory Analysis of ICT in Singapore

<table>
<thead>
<tr>
<th>Factors Conditions</th>
<th>0.14 million ICT manpower, create jobs 17,000 more by 2015. attract foreign workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capital resource is rich</td>
</tr>
<tr>
<td></td>
<td>English speakers, high education</td>
</tr>
<tr>
<td></td>
<td>Infrastructure well developed</td>
</tr>
<tr>
<td>Demand Conditions</td>
<td>Fixed line 1.99 m, mobile 7.38 m, 3G 66%, mobile penetration rate 145.5%</td>
</tr>
<tr>
<td></td>
<td>Domestic market saturated, expand to foreign markets</td>
</tr>
<tr>
<td></td>
<td>IN2015 plan to build brand band in over Singapore</td>
</tr>
<tr>
<td>Related and supporting industries</td>
<td>GDP ICT revenue $1 Billion, hardware 55%, software 16%</td>
</tr>
<tr>
<td>Firm strategy, structure and rivalry</td>
<td>IN2015 master plan</td>
</tr>
<tr>
<td></td>
<td>Shared IT service hubs</td>
</tr>
<tr>
<td></td>
<td>Infocomm Singapore Brand</td>
</tr>
<tr>
<td></td>
<td>SingTel with strong network, optical cables. Starhub, M1</td>
</tr>
<tr>
<td>Government</td>
<td>IDA</td>
</tr>
<tr>
<td></td>
<td>Well plan to develop ICT industry of Singapore</td>
</tr>
<tr>
<td>Chance</td>
<td>Rich capital resource, contribute to invest in other countries</td>
</tr>
<tr>
<td></td>
<td>Develop its brand</td>
</tr>
<tr>
<td></td>
<td>One of the most liberated environment for invest in the world</td>
</tr>
</tbody>
</table>

### 8.2.1. Factors conditions

One of Singapore’s weaknesses is the shortage of workforce. Due to it has a small amount of population in the world, it could not meet the demand of a large number of enterprises. Singapore has opened to enterprises to employ foreigners. There is 50% of workforce are foreigners. Because of this, Singapore becomes international but it may have some problems about the foreign workers.

Workforce currently is 141,300 in ICT industry and will increase to 170,000 by 2015. Singapore plans to create more jobs of ICT industry till 2015.
Singapore nurtures globally competitive workforce to drive national economic competitiveness. See the below figure 36 for ICT manpower form 2000-2010. (IDA Singapore, 2011)

Figure 36 Employed Infocomm Manpower 2000-2010 in Singapore

From the below structure of ICT employees, over 50% of ICT manpower are acquired bachelors and above.

Figure 37 Employed Infocomm Manpower by Qualification, 1999-2010 Annual, Singapore

Singapore has transformed itself to an advance communication environment these years. The government conducts “IT 2000 Master plan” to build high
speed national broadband network all over the country. Besides, government develop infrastructure by “iN2015 master plan” (IDA Singapore, 2011) and expect Singapore to be the telecom hub of Asia. Overall, it has well developed infrastructure in its land.

8.2.2. Demand conditions

Total population of Singapore is around 5 million. The number of fixed line subscriptions is 1.99M. The number of mobile of subscriptions is 7.38 M. 3G subscribers currently accounts for 66% of total mobile subscribers. Total Broadband is 8,192,300. (IDA Singapore, 2011) The enterprise customers account for a large part of Singapore’s total customers. The penetration rate of mobile is already high at 145.5%. The domestic market is quite small and almost saturated. However, Singapore’s ICT sector continues to extend its business to the overseas markets.

The percentage of revenues from Singapore’s ICT export increases gradually year by year. The revenue from the domestic market is even smaller than the foreign market.
8.2.3. Related and supporting industries

Due to the policy of the Singaporean government, it develops the ICT industries well and also these contribute to the telecommunication industries. From the below figure, hardware accounts for 55%, software accounts for 16%, IT services accounts for 13% and content services account for 2% in the total ICT revenues SGD62.7 billion in 2009. Telecommunication service accounts for 14% of the total. (IDA Singapore, 2011)
8.2.4. Firm strategy, structure and rivalry

Singapore has some policies for develop the ICT industry. The below polices mentioned are adopted from the IDA Singapore authority.

- **“Infocomm Start-Ups Development Programmes” (IDA Singapore, 2011)**: The government aims to support the start up business of ICT.

- **“Infocomm Singapore Brand” (IDA Singapore, 2011)**
  
  Due to Singapore has the big amount of ICT exports in external markets, the government encouraged enterprise to build their own Brands.

- **“Shared IT Services Hub” (IDA Singapore, 2011)**

- **“The Singaporean government aims to develop Singapore as a hub of high end IT country.” (IDA Singapore, 2011)**

- **“Infocomm Local Industry Upgrading Programme (iLIUP)” (IDA Singapore, 2011)**

- **“Overseas Development Programme (ODP)” (IDA Singapore, 2011)**
The Infocomm Local Industry Upgrading Programme (iLIUP) and Overseas Development Programme (ODP) promote strategic and mutually beneficial partnerships between iLEs and infocomm MNCs.

8.2.5. Government

The government is strong, efficient and stable. The problems of corruption, bribes, crime, and foreign currencies control seldom happen in Singapore. Singaporean government has the excellent performance and governance. It set up many departments for development Information and Communication Industry. There are many programs running.

8.2.6. Chance

There is sufficient capital for Singapore to invest in more business. It has foreign exchange reserves USD 2,233 billion till January 2011 in 8th place in the world. The government encourages investments and it has the liberalized environment.

Since it is a very small country, Singaporeans have the vision for expanding business to outside of its country instead of concentrating to its small domestic market. Singaporeans are willing to learn more, speak English, and ambitious to take more market share of external market.
To develop its own brand could be contribute to expand its business globally.

For example, SingTel has expanded its telecom business to many region of Asia such as Australia, India, and Malaysia and so on.

### 8.3. Diamond Theory Analysis of Telecom Industry of Thailand

The below table 11 indicated the abstract of the result of diamond theory analysis of the telecom market in Thailand.

#### Table 11 Diamond Theory Analysis of Telecom Industry of Thailand

<table>
<thead>
<tr>
<th>Factors Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Low 3.4% of total labor force, is developing 6,000 jobs of ICT</td>
<td></td>
</tr>
<tr>
<td>◆ 0.37 million employed in ICT</td>
<td></td>
</tr>
<tr>
<td>◆ Infrastructure in rural area is limited</td>
<td></td>
</tr>
<tr>
<td>◆ Bangkok is located in the heart of transportation, business, finance of South East Asia</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Demand Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Fixed line 7 m, mobile 69.7 m, mobile penetration rate 103%, (2010)</td>
<td></td>
</tr>
<tr>
<td>◆ Fixed line market decreases but mobile market increases. 3G and MNP new markets</td>
<td></td>
</tr>
<tr>
<td>◆ The rate of phone or mobile is fairly low, price competition intensely</td>
<td></td>
</tr>
<tr>
<td>◆ Market size USD 186 billion; communication 65.1%; hardware 14.6%; software 11.6%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related and supporting industries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ ICT manufacturing developed. Export a lot of computers and electrical appliances</td>
<td></td>
</tr>
<tr>
<td>◆ SPA promotes software industry and fund enterprises</td>
<td></td>
</tr>
<tr>
<td>◆ Projects in electronics and electrical were 89 in 2010</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm strategy, structure and rivalry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ The National Economic and Social Development No. 10</td>
<td></td>
</tr>
<tr>
<td>◆ Convert BTO model into licenses</td>
<td></td>
</tr>
<tr>
<td>◆ BOI promotes foreign investments</td>
<td></td>
</tr>
<tr>
<td>◆ ASEAN free duty, facilitate the cooperation with ASEAN countries</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Government</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ NTC</td>
<td></td>
</tr>
<tr>
<td>◆ The legislation is not transparent and not liberated enough. 3G audition is hold back</td>
<td></td>
</tr>
<tr>
<td>◆ Political risk is high and unstable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ MVNO</td>
<td></td>
</tr>
<tr>
<td>◆ 3G</td>
<td></td>
</tr>
<tr>
<td>◆ Booming business could bring more value of phone market</td>
<td></td>
</tr>
</tbody>
</table>
8.3.1. Factor conditions

There are only 0.37 million employed in ICT industry in Thailand (ITU, 2010) although it only has 0.9 percentage of unemployment. (CIA, 2011) The personnel number of information and telecommunication industry is relatively low accounts for 3.4% of labor force although the number of knowledgeable personnel is growing in Thailand. Noticeably, Thailand is trying to develop more high skilled personnel in ICT industry. According to NTC Thailand authority, Thai information and telecommunication industry is expected to employ about 6,000 people to the positions as programmers, software engineers and so on. (NTC, 2011)

Infrastructure of information and communication of Thailand is not well constructed and developed in the rural areas compared to other countries. The metropolitan areas such as city Bangkok and rural areas are extremely unbalanced. In countryside, the number of internet access is small and the quality should be enhanced.

For the geographical condition, Thailand locates in the center of the south east peninsula. It is the transportation hub and one of the biggest financial centers in Asia. There are many multinational companies and world or regional organizations set up headquarters of Asia Pacific in Bangkok metropolitan. Due to its open strategy at trade, it becomes the very international business city and investment point in Asia.
8.3.2. Demand conditions

Thailand’s fixed-line market had 7.0 million subscribers and it appears that -3% annual growth rate. The estimated subscribers of fixed line remains the same number around 7.0 million in Thailand and the annual growth rate is close to zero. Pessimistically, it is no sign for revival. The fixed-line market tends to slow down gradually and it even will be dropped in the future. There is no room for growing up of the fixed-line market.

Thailand’s mobile market had reached 69.7 million subscribers by the end of 2010, for an overall penetration of 103%. Estimated subscribers in 2011 are about 98.0 million and the estimated penetration is 117% totally. The growth rate of Thailand’s mobile market is 6% and 15% (estimated), respectively in 2010 and 2011. (NTC, 2011) The static number of the mobile market in Thailand has the positive result and it grows continuously. Although the mobile market seems to climb, the annual increase in the mobile subscriber numbers had eased considerably in 2009 and 2010 as the national economy slowed. The penetration rate of Thailand mobile has reached almost the world’s average. To be more competitive in the subsequent periods, mobile carriers focus on improving the quality of services, and maintaining the stability and increasing the comprehensive of the telecom network.

The progress of 3G mobile is slow. It may be the slowest country of the South East Asia. Since the 3G auction plan could not be fairly to Thai major operators,
the 3G auction unfortunately could not be moved forward successful which is still on hold although the National Telecommunications Commission is trying to revise and improve the auction plan. It would take months, a year or more time to conclude the process of 3G licences issuing. Since the unstable politician and the coming election, the variables make this more complicated.

The broadband Internet market in Thailand was strong subscriber growth in 2009 and 2010. The expansion at an annual rate was about 30%. (NTC, 2011) The broadband market optimistically projected to have a substantial growth in the next few years. However, the demand of broadband services has the certain increase in Thailand; the broadband penetration still remains low relatively at 4% in 2010. (NTC, 2011) The penetration rate of broadband has a large gap to the average of world’s standard.

The competition of telecom market is intense and final most of telecom operators take the cut-throat price strategy to attract customers. IDD (International Direct Calls) in Thailand has the lowest price which is about 8 baht / minute, the lowest price of VoIP calls which is about 4 baht / min, and the lowest price of internet phone calls without accessing which is about 0.25 baht / minute in the world. In addition to the pricing strategy, the telecom operators have taken the advertising strategies to attract customers and stimulate the consumption of internet telephone services. Its sales increases, particularly in VoIP, which of the market share is up to about 40%, closes to the percentage of International Direct
Dialing 55%. The international phone cards, only 5% market share, because most consumers still use international direct dial telephone and Internet telephone. The companies which sell international phone cards are far too many and cause the intense competition. Nowadays, the internet gateway market has been opened up and more telecom hardware has been constructed.

In addition, the increasingly popular social network expansion will also increase Thailand's mobile phone sales in 2011. Thai Research Center expects mobile phone sales in Thailand in 2011 will reach 9.5 million to 1,000 million units. (ITU, 2010)

Moreover, according to the data from Thailand's software industry promotion offices in 2009, Thailand ICT market size is up to USD 175 billion, expanding by 6% compared to 2008. (SIPA, 2009) The forecast of the growth rate of ICT market size is 7.2% at the total market expansion of 186 million. (ITU, 2010) Thailand's ICT market can be classified into the followed groups: total USD11.3 billion at communications industry, the proportion 65.1% of total; followed by computer hardware, amounted to USD 2.53 billion, the proportion reaches to 14.6%; computer software amounted to USD 20 billion, the proportion is 11.6%; computer services amounted to USD 1.5 billion, accounting for 8.7%. (ITU, 2010) Among them, the software industry grows slightly, mainly due to software developers of the domestic industry in Thailand transforming to the services providers.
8.3.3. Related and supporting industries

ICT manufacturing industry covers electronic components, computer and peripheral equipments, consuming electronics, and so on. GDP of Hardware in 2009 accounted for 6.39%. (BOI Thailand, 2011) The current investment environment is proficient and it attracts foreign investments including in high-tech investment. The output value of Thailand's electronics industry has rapid growth annual rate 30% in average. (SIPA, 2009) The electronics product has become the largest export of Thai products.

The latest mobile technologies, modern design and improved features, such as higher resolution cameras and memory card capacity, will also make the mobile phone market more active.

The software also increases substantially since the SIPA (Software Industry Promote Agency) promote it hard which fund to enterprises and also develop the manpower of ICT. It particular put the effort on the practical applications such as the assistance of tourism, food industry, jewelry industry and so on.
8.3.4. Firm strategy, structure and rivalry

The policy “The Tenth National Economic and Social Development Plan” from National Economic and Social Development Board of Thailand (NESDB, 2006) covers strategies to instruct the direction of being competitiveness in the global environment.

It has mentioned that the importance to construct the ICT infrastructure to assist manufacturing industries. Also, the government encourages people to use internet services for proceeding administration jobs. At meantime, the e-government has been promoted to the public. In the plan 10th, “Strategies for development of human quality towards a knowledge based and learning society”. (NESDB, 2006) indicates that to advance the quality of knowledge is one of points for development. The authority expects to achieve that “Improving research and development in science and technology”. (NESDB, 2011) Technology transfer from the research organizations or academic units to enterprises is an important step to execute the plan.

In Thailand, it is a common way to have the BTO, build transfer operation, model between operators. Operators have the BTO concessions and contract with each other to provide services and share the reverences. This made the monopoly telecom economy in Thailand. For reforming the telecom industry to be liberalized, the regulators should put more effort on converting the system into licenses. In addition, the privatization of TOT and CAT is the big step for Thai telecom industry to be liberated.
Thailand has encouraged foreign enterprises to invest in projects in its nation. From the statistics from BOI Thailand, total number of projects reached 1,338 cases; total investment was at 448 billion baths, total registered capital was 44.1 billion baths in 2010. (BOI Thailand, 2011) Electronic and electrical sector has been invested in 138 projects in 2007; 234 projects in 2008; 80 projects in 2009; and 85 projects in 2010. (BOI Thailand, 2011) Since the open strategy of business, there are a lot of multinational or international large enterprises located in Thailand and these helps the economy of Thailand. Hence, Thailand exports a lot of amount of electronic products.

Thailand is one original member of AFTA, ASEAN free trade area, set up from 2010 includes six countries Thailand, Singapore, Malaysia, Indonesia, Philippines, and Brunei. In 2015, there are another four Asian centuries Vietnam, Lao, Cambodia, and Myanmar will join the organization. The duty is free in this AFTA and this could stimulate the trade and the growth of economy. The export value to ASEAN is high at 22.3% of total export in the first quarter of 2011. (NESDB, 2011) The policy emphasis on accelerating a regional cooperation and building transportation facilitate.

8.3.5. Government:

Thai telecom authority is trying to reform the rules and regulations of Telecom industry. Unfortunately, the authority still constructs constraints to the operators and this becomes an obstacle for development of Telecom
industry. In addition, the regulators are not independent to the government. To change Thai telecom environment into efficient and fair system is an important issue.

Master Plan for Telecommunications Development was set in 1995. The topics of the master plan of Telecommunications Development are: “Liberalization”, “Increasing Private Participation”, “Establishment of Independent Regulatory Body”, “Privatization of TOT and CAT”, “Separation of Postal Service from Telecommunications Service”, “Consumer Protection”, “R & D and Industrial Development”, “Personnel Development”, “Support to IT Development”, “Laws Revision”, “Pricing Structure”, and “Regional Center”. (NTC, 2011) The “Privatization of TOT and CAT” is an important step for Thai telecom industry. TOT and CAT have monopolized the telecom market of Thailand for a long time. Although TOT and CAT still have shade of state owned culture, this change indeed push the Thai telecom industry forward to be more competitive. Some other operators could enter the markets for compete liberally.

The long delayed of 3G auction still is hold up since the process of auction is not transparent. Some operators have suited the bided operators for the unfair procedure.

Moreover, the politician of Thailand is extremely unstable. In 2006, the military get power while the Prime Minister Thaksin was outside of Thailand. In 2008, the political crisis almost crashed down the Thailand. During 2008 to 2010,
“Red Shirt” army protested and demonstrated in a large scale in Thailand. These turmoil may bring negative impact to Thailand’s economy.

8.3.6. Chance

The forecast of the telecom industry in Thailand shows that the overall economy in Thailand starts to recover from 2010 will drive the telecom service market of Thailand once grow again. The mobile communications market accounts for 65% of the total telecom service market, particularly in mobile value-added services which has a substantial growth. However, competition will be more intense because state-owned telecom companies will strengthen their market positions and increase revenue for making up for the incoming losses of market shares in the future while the private enterprises are going to obtain 3G licenses, and five companies can have mobile virtual network of furniture (MVNO) business licenses of 3G operators which will grab some of the state-owned telecom companies’ current customers. In addition, expected to open in August 2010 the "mobile number portability service " may have an impact on the market share to the operators because the service of 3G telecommunications service providers still have significant difference among them.
8.4. SWOT Analysis of India Telecom Industry

8.4.1. Strengths

One of its strengths is that India owns a large population so the market is huge. It is predicted that the Indian telecom industry will be the fastest growing industry in the world in the following years. Currently the government regulates policies to support ICT industry. The environment is liberated. Then, the software industry is strong and it could strength the development of Telecom industry.

8.4.2. Weaknesses

As to the weaknesses, one of them is that the competition is intense among operators in India. There are many operators enter the market and attempt to take a part of market share. Also, there is a flaw exists in the supervision of the government. Then, the basic infrastructure is weak in the rural area. There is a big difference of development between the metropolitan and rural areas. Last, the profit is low caused by the low tariff and it is difficult for operators to gain the invest return in a short term.

8.4.3. Opportunities

For opportunities, the favorable one is that the broadband market is large and has not saturated. The rural network will expand in large scale. Next, it is
liberated for operators to enter the market. Moreover, the 3G market just launches and will bring a fortune.

8.4.4. Threats

One of its threats is that the politician status is unstable and some policies are enforced. Domestic disturbances are getting serious and those would produce problems and risks. The threat from new telecom market substitution is easy to be seen.

Figure 40 SWOT of Telecom Industry of India
8.5. SWOT Analysis of Singapore Telecom Industry

8.5.1. Strengths

One of its strengths of telecom industry of Singapore is that it has strong market position in Asia and has expanded the business in many regions in Asia. It is very successful in Australia. Then, Singapore owns a lot of capitals and keeps seeking opportunities to invest in telecom industry. It has interested in many projects of implementation of optical cables or satellites over all world. Next, it has the efficient government which acts many policies for supporting the ICT industry. Singapore also has put efforts on developing their work force for ICT. Generally, they can offer high class of services and advanced technologies. Moreover, Singapore is in the important position in Asia and now it is the substantial financial and trade center in Pacific Asia.

8.5.2. Weaknesses

One of the its weaknesses is that high dependence on other countries. The GDP could be serious influenced by the business of other regions outside of Singapore. The variables are risky and not easy to be controlled. The penetration rate of mobile market has reached to 145%. (IDA Singapore, 2011) It is too mature to grow in the future. Nevertheless, the competition is quite intense. Another weakness is that Singapore has insufficient work force of ICT industry. It needs to attract foreigners to work in Singapore or
outsource. The policies in Singapore seem strong and there may be risky to invest there.

8.5.3. Opportunities

One of its opportunities is that alliance with global wireless. The government acts the plan "iN2015" for developing the high speed network in Singapore. Its infrastructure could be developed well. Since the telecom industry is strong in Singapore, it could cooperate with the international organization for invest some projects to develop the ICT or with international carriers.

8.5.4. Threats

One of its threats is that it highly depended on the markets in other regions in Asia and even these are larger than its domestic market. It has the potential risks. The other Asian countries grow very fast and those countries may have the chance to lead the Asia such as China, India, Korea and so on. They are also developing their ICT industries hard. These countries could be threats to Singapore. Singapore has the problem of the inflation. It offers the liberalized environment and it leads many international large telecom companies enter the market for sharing the market. Singapore still does not have enough experiences on developing the mature markets such as the region Europe.

Figure 41 SWOT of Telecom Industry of Singapore
**Strength**
1. Strong market position in Asia
2. Efficient government and effective policies
3. Knowledge resource is sufficient
4. Well Infrastructure
5. Singapore is the Asian finance center and trade hub
6. Owns a lot of capital, good for investment in ICT industry
7. World class server level
8. Owns a lot of investments

**Weakness**
1. High dependence on other countries of their business
2. Domestic labor force is not sufficient, needs to employ foreign workers
3. Mature mobile market
4. Lack of manufacturing ability. Depends on importing a lot.
5. Intense competition inside the Singapore
6. Regulatory risks

**Opportunity**
1. Alliance with global wireless
2. Asian markets grow fast. There are a lot of new markets could be expended.
3. IN2015 plan
4. Cooperated with other international operators for investments.
5. United with official telecom organization to develop ICT industry global

**Threat**
1. Easy to be influenced by the global economy. Highly depends on markets outside or Singapore
2. The other Asian developing countries grow fast such as China and India
3. Outsourcing much
4. Inflation risks
5. Liberated environment attracts many international companies enter the market
6. Difficult for it to expand business to the mature markets such as Europe
8.6. SWOT Analysis of Thailand Telecom Industry

8.6.1. Strengths

One of its strengths is that the government policies to promote ICT. In these years, the government plan to develop the ICT industry and to be more competitive in the global environment. It nurtures more technology professionals and graduates. In the urban area, the infrastructure developed very well such as the city Bangkok which is very international and capable to connect to other networks. The official telecommunication authority releases licenses to some small scale operators. Hence, those carriers could have the chance to develop.

8.6.2. Weaknesses

One of the Thai telecom industry’s weaknesses is that the budget allocation of education is unbalance in different regions. Particularly, scarcity of the knowledge resource exists in the remote areas include hardware or teachers. The manpower of ICT industry is not sufficient. Moreover, the language skill is a weakness for Thailand to be competitive in the international environment. One serious weakness may high damage its development of telecommunication industry is that the process of audition of new licenses is not very transparent. There are still a lot of power behind manipulate the operation unfairly to the public.
8.6.3. Opportunities

One of Thai telecom industry’s opportunities is that MNP just launched and also 3G is going to be realized in the near future. The market share will be relocated and this may bring some big change of the Thai telecom market. In these years, many foreign companies invest in Thailand and Thailand has produced and exported high percentage of its GDP. The electronic industry has importance position in its national industrial structure. Then, Thailand highly depends on international trade business. For the need of being competitive, the ICT demand such as video conference, VoIP phone, and broadband network increased for assisting the other industries’ development. The tourism is also helpful for developing the ICT industry because it needs the well equipped network for communicating with the external. Moreover, the free trade agreements expedite the trade in Asian area.

8.6.4. Threats

One of its threats is that other neighbor Asian countries have developed faster than Thailand. Thailand is one of latest Asian countries to develop its telecom technologies. Due to its unstable politician status and also the coming election, there is almost no progress of telecommunication because these operators or regulators know the coming election is a variable. The
“Red Shirt” event also considerably influenced every aspect of Thailand’s system. Thailand mainly emphasizes on the traditional industries such as food, furniture, textile, shoes and so on. This leads the enterprises lack of experiences in ICT industry. Also, Thailand belongs to the clusters which is the labor concentration instead of technology concentration. The largest industry in Thailand, tourism, cause people are willing to employee in tourist industry but not ICT industry.

Figure 42 SWOT of Telecom Industry of Thailand

- **Strength**
  1. The government policies to promote ICT
  2. Nurturing more technology professionals and graduates
  3. Private sectors can have opportunities to develop
  4. In urban areas the telecom infrastructure developed well
  5. Small operators can achieve licenses for entering the market

- **Weakness**
  1. Education budget allocation is unbalance
  2. A shortage of high-qualified personnel
  3. Infrastructure in rural areas still limited
  4. Shortage of the technical manpower
  5. Lack of English language skills in communication or learning
  6. The government’s audition is not transparent

- **Opportunity**
  1. MNP/ 3G market just opened
  2. Exporting and manufacturing IT products substantial global
  3. Its tourism, trade or food industries can help to create more values
  4. Free trade agreements of Asian Pacific areas could create more business

- **Threat**
  1. Competitor countries in Asia have more rapid development of ICT
  2. Most foreign investors still put the weight on traditional industries
  3. The politician is unstable and the coming election brings risks
  4. Tourism is main industry and ICT industry could not be regarded as importance as it
  5. SMEs lack experience in technology
8.7. The Comparison of India, Singapore and Thailand

In this section, the comparison of the above three countries present by the basic, knowledge recourse, human resource, and so on.

The comparison of the basic of the three countries is as the below table 12. India has the largest areas and population among them. India has more resource innate than the other two countries. Moreover, English as one of the official languages of India and Singapore. It is one of competitive advantages to be international.

Table 12 The Comparison of the basic of India, Singapore and Thailand

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areas(Km²)</td>
<td>3,287.590</td>
<td>710.2</td>
<td>513,120</td>
</tr>
<tr>
<td>Population (Million)</td>
<td>1,016.00</td>
<td>5.07</td>
<td>63.87</td>
</tr>
<tr>
<td>Official Language</td>
<td>Hindi, English</td>
<td>English, Malay, Chinese and Tamil.</td>
<td>Thai</td>
</tr>
</tbody>
</table>

As to the knowledge resource, Thailand has the lowest ratio of pupil and teacher as 16. That means every 16 students can be instructed by one teacher in average. At literature rate, Singapore has the highest rate 100%. That presents that Singaporeans over 15 years old can read. India has some
problem of the literature rate and it is only at 81%. Thailand is at 3.8% and 20.5% of public expenditure on education as percentage of GDP and percentage of total government expenditure. Education on Technology and Science of the statistics of 2007 shows that Singapore has 6,088 per 1 million inhabitants as researchers and 2.52% of expenditure on R&D of its GDP, follow by Thailand as 311, 0.25% and India 137, 0.8%. Singapore invest the more in research and development among these three countries. See Table 13 The comparison of knowledge resource of India, Singapore and Thailand.

Table 13 The Comparison of Knowledge Resource of India, Singapore and Thailand

<table>
<thead>
<tr>
<th>Item</th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education: Pupil / teacher ratio (primary)</td>
<td>40</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>Literacy rate, adult total (% of people ages 15 and above)</td>
<td>81</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>Public expenditure on education :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- as % of GDP</td>
<td>3.1</td>
<td>2.6</td>
<td>3.8</td>
</tr>
<tr>
<td>- as % of total government expenditure</td>
<td>10.7</td>
<td>15.3</td>
<td>20.5</td>
</tr>
<tr>
<td>Education on Technology and Science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researchers per 1 million inhabitants (FTE)(2007)</td>
<td>137</td>
<td>6088</td>
<td>311</td>
</tr>
<tr>
<td>Expenditure on R&amp;D as a % of GDP(2007)</td>
<td>0.8</td>
<td>2.52</td>
<td>0.25</td>
</tr>
</tbody>
</table>

From the next table, we can see that human resources of ICT in these three countries, India has the largest population at 2.1 million in ICT industry follow by Thailand 0.37 million and Singapore 0.14 million. Thailand and Singapore have low unemployment rate at 1.2% and 1.9%, respectively. Table 14 The comparison of human resource of India, Singapore and Thailand.

Table 14 The Comparison of Human Resource of India, Singapore and Thailand
We will see the global telecom market and compare with these three countries.

The world total fixed telephone lines in 2010 is 1,197 million. India, Singapore and Thailand are account for 34.73, 1.99, 7.00 million, respectively. Fixed line population penetration rate of the world, India, Singapore and Thailand are 19%, 2.3%, 40%, and 10.4%. India has the biggest fixed telephone lines due to it has the nature large population but the penetration rate is the lowest among these three countries. Singapore has the highest penetration rate at fixed line population penetration rate as 40% over the average of the world 19%. The global subscribers of mobile is 5,282 million in 2010. The India owns 811.59 million the largest in these three countries follow by Thailand 69.7 million and Singapore 7.38 million. The penetration rate of Singapore is highest at 145.5%. Also, Thailand is high at 103%. That means each person of those two countries has at least one mobile number. It is fairly high than the global average of the mobile penetration rate 65%. As to the broadband subscription, the number of India is 11.87 million which is the highest among the three countries. Singapore has the highest internet penetration rate at 72.4%, follow by Thailand at 23% and India only at 8.4% which is lower than the world average 26.6%. Singapore has the outstanding household broadband penetration rate high at 136.4% which is far high than the India

<table>
<thead>
<tr>
<th>Human Resource 2010</th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate( %) 2010</td>
<td>9.4</td>
<td>1.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Number of people employed in overall IT industry (million)</td>
<td>2.1m</td>
<td>0.14m</td>
<td>0.37m</td>
</tr>
</tbody>
</table>
5%, and Thailand 3.4%. From this analysis, it is not easy to find out that although Singapore does not have the largest population but the penetration of the telecommunication of the nation is quite high.

Table 15 The Comparison of Telecom Market of India, Singapore and Thailand

<table>
<thead>
<tr>
<th></th>
<th>World 2010</th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed telephone lines</td>
<td>1,197.00</td>
<td>34.73</td>
<td>1.99</td>
<td>7.00</td>
</tr>
<tr>
<td>Fixed line population penetration rate</td>
<td>19%</td>
<td>3.2%</td>
<td>40%</td>
<td>10.40%</td>
</tr>
<tr>
<td>Mobile cellular telephone subscriptions (Million)</td>
<td>5,282.00</td>
<td>811.59</td>
<td>7.38</td>
<td>69.70</td>
</tr>
<tr>
<td>Mobile population penetration rate</td>
<td>65%</td>
<td>64.7%</td>
<td>145.50%</td>
<td>103.00%</td>
</tr>
<tr>
<td>Broadband subscription (Million)</td>
<td>466.95</td>
<td>11.87</td>
<td>8.19</td>
<td>1.1</td>
</tr>
<tr>
<td>Internet users (Thousand)</td>
<td>2,084,000</td>
<td>100,001</td>
<td>3,558</td>
<td>17,486</td>
</tr>
<tr>
<td>Internet penetration rate</td>
<td>26.6%</td>
<td>8.4%</td>
<td>72.4%</td>
<td>23%</td>
</tr>
<tr>
<td>Household broadband penetration rate</td>
<td>4.5%</td>
<td>5.0%</td>
<td>136.40%</td>
<td>3.40%</td>
</tr>
</tbody>
</table>

Next, to analyze the ratio of ICT industry of the nation GDP is to see if the ICT industry is important industry in its nation. In the below table 16, GDP and GDP(PPP) per capita have been described. Due to the large population of India, it could produce USD$ 1,537,966 million per year but Singapore has the highest GDP(PPP) per capita as USD$56,522 ranks 3rd in the world. Singapore has the high portion of exports and imports of ICT goods as 35.4% and 28.2% of total goods exports and imports. ICT industry is fair developed in Singapore. Thailand has 19.8% and 18.1% of exports and imports of ICT goods to the total goods of exports and imports. India has only 3.8% and...
8.8% of exports and imports of ICT goods to the total goods of exports and imports. However, India exports 53.1% of ICT service of the total service exports.

Singapore takes the leadership of the revenues of ICT in these three countries which is account for USD$50.16 million follow by USD$40.4 million of India and USD$13.8 million of Thailand. Ratio of the ICT revenues and GDP is 7.7% for Singapore, 5.5% for India and 4.33% of Thailand which is the last.

Table 16 GDP and ICT Trade, Telecom Investment, ICT Revenue in 2010 of India, Singapore and Thailand

<table>
<thead>
<tr>
<th>Year 2010</th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP(Million of USD$)</td>
<td>1,537,966</td>
<td>222,699</td>
<td>318,850</td>
</tr>
<tr>
<td>Rank : GDP</td>
<td>10</td>
<td>39</td>
<td>30</td>
</tr>
<tr>
<td>GDP (PPP) per capita (USD$)</td>
<td>3,339</td>
<td>56,522</td>
<td>9,187</td>
</tr>
<tr>
<td>Rank: GDP (PPP) per capita</td>
<td>129</td>
<td>3</td>
<td>86</td>
</tr>
<tr>
<td>ICT goods exports (% of total goods exports)</td>
<td>3.8</td>
<td>35.4</td>
<td>19.8</td>
</tr>
<tr>
<td>ICT goods imports (% total goods imports)</td>
<td>8.8</td>
<td>28.8</td>
<td>18.1</td>
</tr>
<tr>
<td>ICT service exports (% of service exports, BoP)</td>
<td>53.1</td>
<td>2.9</td>
<td>N/A</td>
</tr>
<tr>
<td>Investment in telecoms with private participation (Million USD$)</td>
<td>9,531</td>
<td>N/A</td>
<td>539</td>
</tr>
<tr>
<td>ICT Revenues (Billion USD$)</td>
<td>40.40</td>
<td>50.16</td>
<td>13.80</td>
</tr>
<tr>
<td>ICT Revenues Growth Rate</td>
<td>8%</td>
<td>9.2%</td>
<td></td>
</tr>
<tr>
<td>Ratio of ICT Revenues and GDP</td>
<td>5.5%</td>
<td>7.7%</td>
<td>4.33%</td>
</tr>
</tbody>
</table>

As we can see, Singapore seems have the high level of development of ICT industry from the ratio of ICT part and its GDP. That means ICT industry is an
important industry for Singapore. If its telecom industry is competitive in the
global telecom market is the next issue we need to discuss.

Then, we can find the competitive index of the telecom industry from the
global information and technology report 2010-2011 from World Economic
Forum.

Table 17 Networked Readiness Index 2010-2011

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networked Readiness Index 2010-2011</td>
<td>48</td>
<td>2</td>
<td>59</td>
</tr>
<tr>
<td>Global Competitiveness Index 2010-2011</td>
<td>51</td>
<td>3</td>
<td>38</td>
</tr>
</tbody>
</table>

Source: World Economic Forum

As the below figure, the “Global Competitiveness Index 2010–2011” of India
ranks 51(out of 139 countries). “The Networked Readiness Index 2010-2011”
of India ranks 48 out of 138 countries. For Singapore, its “Global
Competitiveness Index 2010–2011” is 3rd place and its “The Networked
Readiness Index 2010-2011” is 2nd in the world. For Thailand, its “Global
Competitiveness Index 2010–2011” is 38 place and its “The Networked
Readiness Index 2010-2011” is 59 in the world.

We can see that the rank of Networked Readiness Index 2010-2011 of World
Economic Forum have matched the result of our analysis of our objectives.
Singapore has a strong telecom industry and also its telecom industry is
competitive in the world. India has a worst rank of global competitiveness
index 2010-2011 as 51th which behinds to Thailand ranks as 38th of these
objective countries we research. However, the “Networked Readiness Index 2010-2011” of India ranks 48th exceeds Thailand ranks 59th. That means although Thailand has high percentage of trade but it has not focus on telecom industry as its main industry. From the structure of industries of Thailand, the main industry is the tourism instead of telecom. On the contrary, India has bad performance of its trade but it has put more weights on development of ICT industry. We can see that from the above analysis. From this, we can conduct that the competitiveness of an industry of a nation is related to the competitiveness of the industry’s global competitiveness. If it is strong in its own country, it can devolve the competitiveness ability in the global environment.
Figure 43 The Networked Readiness Index 2010-2011 of India

Source: World Economic Forum
Figure 44 The Networked Readiness Index 2010-2011 of Singapore

Source: World Economic Forum
Figure 45 The Networked Readiness Index 2010-2011 of Thailand

Source: World Economic Forum
9. Conclusion and Recommendations

In this paper it has presented extensive the fact of the telecom markets of India, Singapore and Thailand. It also has analyzed the markets by the SWOT and diamond theory to understand conditions of countries at six determinants include factors, demands, related supporting industries, strategies and rivalry, government and chance, and their strengthens, weaknesses, opportunities and threats. In this chapter it will conclude the results found and to make a few suggested strategies to the main audience. This part will describe the forecast of these three telecom markets and give recommendations.

9.1. India Telecom Market

9.1.1. Data Market Increases Substantial, but Voice Services Still the Main Foundation of Revenue:

In the future, the data business leads the telecom industry to grow fast. Besides this, the video service occupies a part of market. When the wireless or broadband expands to the enough degree, operators could offer users in a way of economical and large scaled.

Although the voice business will decrease to the second third of total revenues of telecom industry in 2020, voice business still take the biggest share of telecom revenues. The decrease is due to the increase of the
revenues of data and content service, and also the decrease of the telephone or mobile rate per minute. Video telecom continues developing but it still remains small portion of the total.

Even if the fixed or mobile data provide the business of internet voice telephone which is going to take more market share in the future, the mobile voice service still lead the telecom market.

9.1.2. Wireless Will Take the Leadership In the Network Business

The network market will depend on the wireless a lot in the future. It is dominated by 3G or 4G technology in the cities, and combined with FTTx and DSL or cable TV. In the rural region, it will depend on wireless including 2G and 3G but not 4G more than fixed line. The capacity of the core network could be advance by the upgrade of IP and optical cable.

9.1.3. Integrated Operators Show Up

The data operators still exist in the market in the future. However, the roles of participants in the telecom market would be re-positioned follows by the situation of dramatically increasing of data, content, and applications. Integrated operators are necessary for the whole telecom industry. Integrated
operators principally are focus on the bundle service packages of offering equipments, allocating and managing, linking and applying contents and so on. In India, the leader data operators and equipment offers will be integrated in the future.

Many low cost enablers of agnostic networkers may lose their positions in the future if they could not offer the integrated services. See the below Table Comparison of traditional operators and integrated operators.

Table 18 The Comparison of Traditional Operators and Integrated Operators

<table>
<thead>
<tr>
<th></th>
<th>Traditional operators</th>
<th>Integrated operators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Users</strong></td>
<td>◆MVONs</td>
<td>◆Digital citizens</td>
</tr>
<tr>
<td></td>
<td>◆Retail brands</td>
<td>◆Service driven SME</td>
</tr>
<tr>
<td></td>
<td>◆Low end users</td>
<td></td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td>◆High efficient network operators</td>
<td>◆High end brand and customer relationship</td>
</tr>
<tr>
<td></td>
<td>◆Reliable partnership</td>
<td>◆High end equipment and service</td>
</tr>
<tr>
<td><strong>Service Portfolio</strong></td>
<td>◆Competitive price</td>
<td>◆Abundant portfolio: equipment management, application and service</td>
</tr>
<tr>
<td></td>
<td>◆Basic content and service</td>
<td></td>
</tr>
<tr>
<td><strong>Investment Strategies</strong></td>
<td>◆Offer speed and functional products</td>
<td>◆In customer service, develop application and content service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>◆In hardware, invest</td>
</tr>
<tr>
<td><strong>Return/ Risk</strong></td>
<td>◆Low-medium</td>
<td>◆Medium-High</td>
</tr>
</tbody>
</table>

*Source: ovum*
9.1.4. Digital Citizens and Service Driven Enterprises are the Keys Although They Are in a Small Amount

Digital citizens will build a relationship in ways of safe, easy, and cost predictable with integration telecom operators. Operators are going to offer the bundle packages to these digital citizens.

Part of service driven enterprises are going to cooperate with telecom operators by offering service driven business. Those dedicate on expanding the scale of ICT industry. Ovum predicts that digital citizens merely are in account of 20% of total users in 2002. (Ovum, 2011)

9.1.5. The Driver of Dramatically Change – Economy Growth

In the next few years, the real GDP of India will be close to 8%. (CIA, 2011) In around 2020 or following ten years, India could almost catch up with the mature markets such as markets of Europe or North America at economy growth.

The main presentation of economical growth is on middle class of India. However, the most of the bottom levels of pyramid are satisfied with the basic services.
9.1.6. The Market of Small and Medium Enterprises

The market for the small and medium enterprises will form 3 types: “consolidated”, “mobile only”, and “price focus”.

It is around 20% of the small and medium enterprises whish will integrate the IT and telecom services in 2020. (Ovum, 2011) For telecom operators, the market of “consolidated” type is the most attractive market. Because these enterprises will take more advanced technology and give more and more business to the telecom operators.

The biggest portion about 50% of Indian SME (Small and Medium Enterprises) (Ovum, 2011) are get used to work by facilities of mobile service. Those do not like to purchase the fixed telecom services.

It is about 30% of SME (Ovum, 2011) which is in the category of price focus. Those are keeping search the lowest cost of telecom system. Part of them would choose the “over the top” solution such as “Skype”.

9.1.7. Three Orientations of the Enterprise Clients

There are three groups of companies formed in the future by the demand and purchase model: “service driven”, “commodity buyers” and “mavericks”.

Ovum, 2011
In India, around 25% of bigger companies will be in the category of service driven. For operators, those are the most attractive business clients since they generally contract with service driven model. Those companies put on the importance on the reliability and scale of providers. This type of business will stimulate the growth of the market of sub contract business.

The 40% of companies are “commodity buyers”. Those companies choose the low cost technologies although they may have the relationship with the sub contract providers. Cost is the priority for them to choose the telecom solution.

The 35% of companies belong to “mavericks”. Those companies choose the non assigned service. Although the quality of these services is limited, they still use that.
### Table 19 Timeline of Indian Predicted Market Development

<table>
<thead>
<tr>
<th></th>
<th>2010-2012</th>
<th>2013-2016</th>
<th>2017-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Board band</strong></td>
<td>* It grows at areas of commerce and high consumption * Fixed wireless broadband service is popular to SME and city consumers * It develops well in the cities * Bundle packages model start to present</td>
<td>* Users of mobile broadband increase. But the price decrease the revenue grow steadily. * Due to the pressure of capacity, operators start to differentiate price and manage traffic. * Bundle packages service grows fast.</td>
<td>* Mobile broadband grows slow. * Price goes down and number of users grows slow. * Bundle package services grows continuos.</td>
</tr>
<tr>
<td><strong>Content and Application</strong></td>
<td>* In cities, cable TV, satellite TV(DTH), IPTV grow fast. * Mobile bank business grows fast. * Programs and contents of mobile application steady grow.</td>
<td>* Video and TV integrated. Advertisement support. * Due to board band increase, the operators have more resources to non-voice service and application. mobile contents and programs grow fast in this phrase.</td>
<td>* Video and TV grows continuos. * Users choose mobile service to conduct the services go the bank, payment, travel, education and medication.</td>
</tr>
</tbody>
</table>

### 9.1.8. Collaboration and Upgraded the Levels of Telecom Services with Indian Partners

As to India, to find opportunities within the Indian market which is more liberalized is the opportunities for wholesale telecom companies. By collaboration and upgraded the levels with these partners with the wholesale sector, the market could be expanded in the developed market. As to the voice business, telecom companies should identify the long-term strategy.
The low fare of rate could be the point to take more market share. Enhancing global network-service quality and customer satisfaction will be more important than the low price.

9.1.9. Competitive in the Telecom Market of India. New Merges Will Be an Important Strategy

The intense competition in India has forced these operators to reduce tariffs to be sustainable in the industry. Therefore, operators need to seek new opportunities for creating income now. New merging is an important strategy.

9.1.10. The Rate Should Be In a Stability In Indian Market

The rate should be stable, with the current ARPU below US $2 dollar, (TRAI, 2011) which is not expected to be further cuts in mobile tariffs by the operators in the future.

9.1.11. Market Consolidation Situation

The current saturation will lead to further mergers in 2011. A candidate of merging is Idea Cellular.
9.1.12. 3G Launch:

Operators have not been launched until the end of 2010. The government has warned spectrum blocks released in stages causing dissatisfaction in any new players.


Voice & Data Packages: In 2010, it could be ended by the first voice and data packets by 5 major operators.

Bringing global coverage and international services to market, and also expanding infrastructure, connectivity and access will be important strategy for the telecom market expansion in the future.

9.2. Singapore Telecom Market

9.2.1. Sufficient Capital in Singapore:

Singapore has a large of capital for investment. A country could seek for Singapore’s investment and aim to develop its industry by cooperation.
9.2.2. Mobile Integrated Services in the Emerging

The 3G subscription accounts for 66% of the total. Singapore develops fast and it could step in to the mobile banking sector faster than most of countries in the world.

9.2.3. Singapore is the 2nd at the Rank of Global Information Technology Report (GITR) 2010-2011

The Networked Readiness Index 2010–2011 of Singapore ranks 2nd in the world (World Economic Forum, 2011) which is only behind Sweden. The Network Readiness Index has been measuring the degree leverage information and communication technologies (ICT) for enhanced competitiveness. The overall environment for ICT, including innovation, market conditions, regulatory framework, and infrastructure are developed quite well.

9.2.4. Next Generation Nationwide Broadband Network is the Main Point of Development of ICT of Singapore.

“N2015 “ plan (IDA Singapore, 2011): Singapore expects to have the coverage of Fiber-to-the-Premises — FTTP of 100% in 2013. Singapore has the strong political and regulatory environment. It is quite efficient to develop the ICT industry than other countries. Also, the good education system and training programs contribute to this industry.
9.2.5. Expansion to Pacific Asia Fast

Singaporean domestic market is small but SingTel expands its business to pacific Asia very fast. 19% of revenues is from Australia. Bharti Airtel had the bad performance in 2010 drag SingTel's total revenues 2.3% down. (SingTel, 2011) SingTel's performance is substantial dependent on its external markets. It is risky if markets with instability. However, SingTel could lead the telecom industry and control other regions in this field in Asia in the near future.

9.3. Thailand Telecom Market

9.3.1. To Invest in Broadband for Offsetting the Loss of Fixed Line Market of Thailand

From the previous overview of telecom market of Thailand, the market of fixed line presents gradually slow down in these years and this situation could be worse in the future. At this point, telecom companies should overcome the fact of that the decrease of revenue or margin. The voice market has grown to a certain level and there is no much room for continuous growing. However, we can see that from the above research the data market shows the strong potential growth. For making up the loss of revenues of voice business, telecom companies could put weight on the investment of data business instead of voice business for acquiring more revenue in the future.
9.3.2. To Increase the Capacity for Meeting the Needs of Internet Backbone and International Bandwidth

Internet demand increases noticeably in the telecom market of Thailand. Besides, there is also a large demand of international bandwidth. For this, the telecom companies should devote in expanding the capacity for these requirements.

9.3.3. To Increase the Stability and Quality of Telecom Services Through Submarine Cables in Thailand

To increase the stability and quality of telecom services is very essential for the wholesale business for the current competitive environment. Submarine cables are made of optical transmit signals of telephone and internet and their price of transmission are higher than the satellites transmission but the level of security and privacy is relative strong. International telecom transmission business through submarine networks has been increased and the volume is more than which is through satellites.

9.3.4. True Group Acquired Hutchison of Thailand Going to Change the Market Structure

The True group’s acquisition of Hutch in Thailand in 2011 will change the
telecom market structure and expand its mobile user base. Buying 73.92% of Hutchison CAT Wireless Multimedia (True, 2011) will make True an indirect stakeholder of Hutchison with 800,000 customer base. Total True’s mobile users will increase to five percentages. The concession of True and CAT which the license of CAT is expire in 2 years with the True’s two bigger rivals, Advanced Info Service PCL and Total Access Communication PCL, are due to expire in 2015 and 2018, respectively, is unsecure. This acquisition came under the condition that True has proposed to CAT that if True buys Hutchison, CAT will terminate the Hutchison existing contract and enter a new contract with True. If the cash flow of Hutchison could turn in positive, it would influence the status of True and how could True solve it effectively.

Since of this deal, True turns into a nationwide 3G service provider. Also if the True MOVE remains the same brand in the market as its marketing strategy is another point after acquisition. The telecom market of Thailand would be changed because of this new deal and operators should have appropriate strategies to face this change.

9.3.5. TOT Awarded the Contract of 3G Infrastructure

Meanwhile, fellow state entity TOT also took a step forward after the firm opened the sale of bidding documents for the e-auction of a 3G infrastructure contract in December 2010. (TOT, 2011) TOT successfully awarded the contract to a Samart-led consortium in January 2011 amid complaints of discrimination from Ericsson and ZTE after they were excluded.
9.3.6. Positive Thai Telecom Reform – Mobile Number Portability (MNP)

The Thai telecoms regulatory framework also saw some positive developments in its reform progress. The first phase of the long-awaited mobile number portability was successfully implemented in Bangkok on December 5, 2010. Five mobile operators in Thailand including AIS, DTAC, True Move, CAT, and TOT provide mobile number portability services after the National Telecommunications Commission (NTC) issue this newly approved. Thailand has 69 million mobile phone subscribers, 91% of whom are prepaid users. Mobile Number Portability (MNP) allows customers to retain their numbers when changing from one operator to another. Expected market will be 1.2 million per year to use this service. (NTC, 2011) After the launch of MNP, the number of users who request to change the network is far under the estimated number. It only around 40,000 users in Thailand are willing to use this service and most of the other customers are not interested in having the same numbers in different network. The promotion of MNP will be another issue of operators. Probably this service is contradicted to 3G service in this time and it may be confused for customers to tell the difference. However, this development is an big opportunity to increase their share in the highly competitive market. MNP is the positive reform of Thailand telecom industry.
9.3.7. 3G Could Re Shape the Thai Telecom Market

The competition of mobile market in Thailand which presents the complex commercial environment is increasingly intensive.

CAT Telecom and telecoms group True Corp get an opportunity to continue the 3G service plan although the petition from Total Access Communication Pcl (TAC) controlled by Norway's Telenor was filed to the Thai authority. Due to the acquisition of CAT, True indirect achieves the 3G license. TAC doubt if it is legal to launch 3G services by this contract.

Due to the instability cause by the new general election of Thailand in 2011, most of operators or the related organizations are not willing to move forward. The situation of development of 3G is still messy.

9.3.8. NBTC Starts to Running

The long-awaited 'super' regulator, the National Broadcasting and Telecommunications Commission (NBTC) made progress after a chairman was chosen to head the selection panel. The panel will shortlist 22 qualified candidates before trimming the number down to 11, which will head the new telecoms regulator. NBTC could reduce the level of un-fairly and un-freely competition in the market. In the past or even now, the legalization of
Thailand is not transparent and it makes some carriers denominate the market for a long time. The master plan could be effective if it increases the number of networks to access, improves the levels of internationalization, and standardizes products.

Thailand remained in 16th position in BMI’s latest Business Environment Ratings for the Asia Pacific region. Although the country still remains third from the bottom of the table, a successful election could provide much-needed political and social stability in Thailand, which would evoke investor confidence, while a commercial 3G launch would boost the country’s Industry Rewards score.

9.3.9. Improve the Quality of Service

As we can see that each mobile subscriber has more than one mobile number, the mobile market is growing but the competition is tend to be intensive. Carriers should focus on improving the quality of service, increasing the stability of the networks to be more competitive.

9.3.10. Concluding Summary:

From the above analysis of the telecommunication markets of India, Singapore, and Thailand, we found that India has innate massive national resources included land and population but Singapore is the smallest country among these three countries researched. Generally, India has the enormous
workforce, but Singapore lacks of manpower for developing its industries. Nevertheless, Singapore has the higher percentage of ICT worker per million of people from the above observation. In ordered to offset its weakness of manpower shortage, Singapore drew up policies and principles on introducing foreign work force. This demonstrated that acquired effort could make up the congenital national disadvantages. The GPD(PPP) of India is at a low level but India has effective built its nation as a technology driven country in these years although it still needs to overcome serious problems such as unbalanced development, poverty, and disease. Thailand has produced high national GDP but Thailand is more concentrated on agriculture, textile, furniture, electronic industries rather than ICT industry. It is slight weaker in ICT industry than the telecom industries of Singapore and India but overall national competitiveness is higher than India. That indicated India and Thailand respectively emphasized on the different industries for its national development. Next, Singapore has the higher percentage of ICT import, export and revenues among these three countries. Due to having a small domestic market, it has been expanded business to numerous Asia Pacific countries and invested various considerable ICT projects. The government of Singapore has been successful to build its ICT industry nowadays. For the national strategy and policy, Singapore and India put weights on their ICT industry; on the contrary, Thailand has set up a small portion about ICT in its national master plan. The different levels of control cause different levels of consequences. Moreover, the government of Singapore is considerable stable, effective, and efficient, and its commercial environment is liberal. The legislated procedure of Thailand’s ICT industry is not transparent and not
impartial. In addition, Thailand and India noticeable have the development unbalanced between the metropolitan and rural areas. We found that the less developed telecom industry can have more opportunities for growth in the future like Thailand and India. On the contrary, Singapore’s telecom market is too mature to expand further business in its nation. We concluded that the policy maker is an important factor for development the telecom market. The performance of some industries would be influenced substantial by its national development plan. Although Singapore has innate unfavorable factors, it still has the excellent functioning on development its ICT. Then, India and Thailand own strong culture in fact these limit themselves. From the above analysis based on Porter’s diamond theory and SWOT, and main points summarized, we can assume that the telecom industry of Singapore should be the most competitive country among these three objective countries, followed by India then Thailand.

From the World Economic Forum, the “networked readiness index 2010-2011” showed that Singapore has the second place out of 138 countries. India is at 48 and Thailand is at 59. (World Economic Forum, 2011) The result we analyzed presented the same phenomena as the official organization. It can be proved that the degree of the six determinants of National Diamond can point out if a specific industry is competitive in the global market. The “Government” factor is an unquestionable vital condition for developing the national competitiveness. This is even more important than other conditions. In sum, we evidently observed that why some nations are more competitive than others are, and why some industries within nations are more competitive than others are by these factors Porter declared.
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Appendix

Table 20 The Indian Telecom Services Performance Indicators (October - December 2010)

(Data As on 31st December 2010)

<table>
<thead>
<tr>
<th><strong>Telecom Subscribers (Wireless + Wireline)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Subscribers</td>
<td>787.28 Million</td>
</tr>
<tr>
<td>Urban Subscribers</td>
<td>527.50 Million (67.00%)</td>
</tr>
<tr>
<td>Rural Subscribers</td>
<td>259.78 Million (33.00%)</td>
</tr>
<tr>
<td>Market share of Private Operators</td>
<td>84.60%</td>
</tr>
<tr>
<td>Teledensity</td>
<td>66.16</td>
</tr>
<tr>
<td>Urban Teledensity</td>
<td>147.88</td>
</tr>
<tr>
<td>Rural Teledensity</td>
<td>31.18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Internet &amp; Broadband Subscribers</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Internet Subscribers</td>
<td>18.69 Million</td>
</tr>
<tr>
<td>Broadband Subscribers</td>
<td>10.99 Million</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Revenue &amp; Usage Parameters (for the QE Dec-10)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Revenue Per User (ARPU) GSM</td>
<td>INR 105</td>
</tr>
<tr>
<td>Average Revenue Per User (ARPU) CDMA</td>
<td>INR 68</td>
</tr>
<tr>
<td>Minutes of Usage (MOU) GSM</td>
<td>360 Minutes</td>
</tr>
<tr>
<td>Minutes of Usage (MOU) CDMA</td>
<td>270 Minutes</td>
</tr>
<tr>
<td>Minutes of Usage for Internet Telephony</td>
<td>160.85 Million</td>
</tr>
</tbody>
</table>

Source: Telecom Regulatory Authority of India 2010
Table 21 The Mobile Market of SingTel

<table>
<thead>
<tr>
<th>SingTel Mobile Markets</th>
<th>Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>SingTel</td>
<td>3,167</td>
</tr>
<tr>
<td>Optus</td>
<td>8,877</td>
</tr>
<tr>
<td>Bharti</td>
<td>187,708</td>
</tr>
<tr>
<td>Telkomsel</td>
<td>93,136</td>
</tr>
<tr>
<td>AIS</td>
<td>30,502</td>
</tr>
<tr>
<td>Globe</td>
<td>25,403</td>
</tr>
<tr>
<td>Warid</td>
<td>17,165</td>
</tr>
<tr>
<td>PBTL</td>
<td>1,908</td>
</tr>
<tr>
<td>Group Total</td>
<td>367,866</td>
</tr>
</tbody>
</table>

Source: SingTel

Figure 46 Thailand Mobile Market Share from 3Q2009 – 3Q2010

Source: NTC 2010
Table 22  Fixed Line Subscribers in Thailand 2003-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan</th>
<th>Provincial Area</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>4,017,535</td>
<td>2,979,866</td>
<td>6,997,401</td>
</tr>
<tr>
<td>2004</td>
<td>3,827,918</td>
<td>3,151,566</td>
<td>6,979,484</td>
</tr>
<tr>
<td>2005</td>
<td>4,012,646</td>
<td>3,280,821</td>
<td>7,293,467</td>
</tr>
<tr>
<td>2006</td>
<td>3,896,050</td>
<td>3,323,843</td>
<td>7,219,893</td>
</tr>
<tr>
<td>2007</td>
<td>4,016,333</td>
<td>3,547,019</td>
<td>7,563,352</td>
</tr>
<tr>
<td>2008</td>
<td>3,834,996</td>
<td>3,559,353</td>
<td>7,394,349</td>
</tr>
<tr>
<td>2009</td>
<td>3,701,448</td>
<td>3,503,488</td>
<td>7,204,936</td>
</tr>
<tr>
<td>2010</td>
<td>3,643,296</td>
<td>3,365,607</td>
<td>7,008,903</td>
</tr>
</tbody>
</table>

Last updated: 16 December 2010
Source: NTC

Figure 47  Average Rates of International Telephone Service in Thailand 1Q2009 – 2Q2010

Source: NTC 2010

Table 23  Mobile Grow Rate in Thailand 2002-2010 (%)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2006</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>10.84%</td>
<td>4.65%</td>
<td>4.60%</td>
<td>3.51%</td>
<td>9.15%</td>
<td>5.42%</td>
<td>3.45%</td>
</tr>
<tr>
<td>Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Paid</td>
<td>(7.12%)</td>
<td>(1.30%)</td>
<td>2.84%</td>
<td>(0.53%)</td>
<td>8.02%</td>
<td>(3.48%)</td>
<td>6.02%</td>
</tr>
<tr>
<td>Pre-Paid</td>
<td>18.15%</td>
<td>5.92%</td>
<td>4.94%</td>
<td>4.23%</td>
<td>9.32%</td>
<td>6.55%</td>
<td>3.15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Last updated: 16 December 2010
Source: NTC
Table 24 Mobile Market Revenue in Thailand from 1Q 2008 – 3Q 2010

<table>
<thead>
<tr>
<th>Service</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1Q</td>
<td>2Q</td>
<td>3Q</td>
</tr>
<tr>
<td>Voice</td>
<td>10.60%</td>
<td>11.00%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Other</td>
<td>18.91%</td>
<td>17.78%</td>
<td>17.23%</td>
</tr>
<tr>
<td>Voice</td>
<td>70.23%</td>
<td>70.44%</td>
<td>70.11%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Last updated: 16 December 2010
Source: NTC

Figure 48 Data Market in Thailand 2002-2010

Data Market in Thailand 2002-2010

Source: NTC