The Competitive Advantage of Singapore: Transition to the Innovation Stage

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Harvard Business School

New Economy Conference @ Singapore
August 2, 2001

Singapore 2001

• Singapore has achieved an extraordinary level of prosperity

• The current economic downturn is largely driven by the IT investment

• However, there are structural changes in the competitive environment that require that Singapore revisit its economic strategy
Singapore’s Economic Performance

Compound annual growth rate of GDP per capita, 1990-2000

Note: Irish GNP per capita is about 20% lower than the reported GDP per capita figure due to large dividend outflows to foreign investors. We use GNP per capita for Ireland because it is more representative. For other countries GDP and GNP are very similar.

Source: WEO
Sources of Rising Prosperity

- A nation’s standard of living (wealth) is determined by the **productivity** with which it uses its human, capital, and natural resources. The appropriate definition of competitiveness is productivity.
  - Productivity depends both on the **value** of products and services (e.g. uniqueness, quality) as well as the **efficiency** with which they are produced.
  - It is not **what** industries a nation competes in that matters for prosperity, but **how** firms compete in those industries.
  - Productivity in a nation is a reflection of what both domestic and foreign firms **choose to do in that location**. The combination of domestic and foreign firms in a particular field creates the most fertile environment for prosperity.
  - The productivity of “**local**” industries is of fundamental importance to competitiveness, not just that of traded industries.
  - Devaluation does not make a country more “competitive”, rather it reveals a **lack of fundamental competitiveness**.

- Nations compete in offering the **most productive environment** for business.
- The public and private sectors play **different but interrelated roles** in creating a productive economy.
Innovation and Prosperity

- In advanced economies, innovation is needed to support high levels of prosperity
Determinants of Productivity and Productivity Growth

Macroeconomic, Political, and Legal Context for Development

Microeconomic Foundations of Development

- Sound macroeconomic policies and a stable political/legal context are necessary to ensure a prosperous economy, but not sufficient.
- Competitiveness ultimately depends on improving the microeconomic foundations of competition.
Context for Firm Strategy and Rivalry

- A local context that encourages **efficiency**, **investment**, and **sustained upgrading**
- Open and vigorous competition among **locally based rivals**

Factor (Input) Conditions

- **High quality, specialized inputs** available to firms:
  - human resources
  - capital resources
  - physical infrastructure
  - administrative infrastructure
  - information infrastructure
  - scientific and technological infrastructure
  - natural resources

Demand Conditions

- **Sophisticated and demanding** local customer(s)
- Unusual local demand in **specialized segments** that can be served globally
- Customer needs that **anticipate** those elsewhere

Related and Supporting Industries

- Presence of capable, locally-based **suppliers** and firms in related fields
- Presence of **clusters** instead of isolated industries
California Wine Cluster

Sources: California Wine Institute, Internet search, California State Legislature. Based on research by MBA 1997 students R. Alexander, R. Arney, N. Black, E. Frost, and A. Shivananda.
Global Competitiveness Report 2000
The Relationship Between Microeconomic Competitiveness and GDP Per Capita

1999 GDP per Capita*

Microeconomic Competitiveness Index


* Adjusted for Purchasing Power Parity
Stages Of Competitive Development

Factor-Driven Economy → Investment-Driven Economy → Innovation-Driven Economy

Input Cost → Efficiency → Unique Value

Geographic Levels and Competitiveness

- World Economy
- Broad Economic Areas (e.g. APEC, ASEAN)
- Groups of Neighboring Nations
- Nations
- States, Provinces
- Cities, Metropolitan Areas
Singapore’s Current Position

• Singapore has taken the Investment-Driven strategy of economic development to an extraordinary level of prosperity

• But the limits of the Investment-Driven strategy are becoming apparent
  – Singaporean wages are already higher than other locations competing for investment-driven activities
  – Labor force participation is near its upper limit
  – Capital/labor ratios are at or near U.S. levels
  – China is fundamentally altering patterns of FDI and the competitive landscape
  – Progress in growing and globalizing indigenous companies is slow

• Regional cooperation initiatives have yet to yield major benefits
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses

II. Make the transition to an Innovation-Driven economy with a unique role in the region

III. Transform company strategies

IV. Reorient and broaden the approach to regional cooperation
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
## Competition and Local Prices

**Relative Prices for Local Goods and Services, 2000**

<table>
<thead>
<tr>
<th>Rank</th>
<th>GDP per capita (current exchange rate) Index rank</th>
<th>GDP per capita (PPP) Index rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Luxembourg</td>
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<td>25</td>
<td>New Zealand</td>
<td>Korea</td>
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</table>

Source: WEO
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
   – **Strengthen domestic competition and antitrust policy**
## Competition and Competition Policy

**Singapore’s Relative Position**

### Competitive Advantages Relative to GDP per Capita

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Country Ranking</th>
</tr>
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<tbody>
<tr>
<td>Absence of Distortive Government Subsidies</td>
<td>1</td>
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<tr>
<td>Tariff Liberalization</td>
<td>1</td>
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<tr>
<td>Hidden Trade Barrier Liberalization</td>
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<td>Absence of Legal Barriers to Entry</td>
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<tbody>
<tr>
<td>Extent of Locally Based Competitors</td>
<td>40</td>
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<tr>
<td>Intensity of Local Competition</td>
<td>27</td>
</tr>
<tr>
<td>Effectiveness of Anti-trust Policy</td>
<td>14</td>
</tr>
</tbody>
</table>

Note: Rank by countries; overall Singapore ranks 9 (5 on Quality of Business Environment)

Source: Global Competitiveness Report 2000
Competitive Pressure in Singapore
Comparative Price-Cost Margins in Manufacturing

Price - Average Cost Margin,
Average, 1990 - 98

Source: IMF
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
   – Strengthen domestic competition and anti-trust policy
   – **Improve the capabilities of the education system**
Comparative Educational Spending, Selected Countries

Public expenditure on education, Share of GDP 1996

Growth of public education spending, CAGR 1990 - 1996

Source: UN
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
   – Strengthen domestic competition and anti-trust policy
   – Improve the capabilities of the education system
   – Create an explicit strategy to mobilize older and underemployed citizens
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
   – Strengthen domestic competition and anti-trust policy
   – Improve the capabilities of the education system
   – Create an explicit strategy to mobilize older and underemployed citizens
   – Reduce government involvement in the economy
## Government-Ownership In Singaporean Companies
### Comparison with other Asian Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Share of top 20 companies with state share &gt; 20%</th>
<th>Share of companies with state share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&gt; 10%</td>
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<tr>
<td>Singapore</td>
<td>45%</td>
<td>23.6%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Japan</td>
<td>5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Korea</td>
<td>15%</td>
<td>5.1%</td>
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<tr>
<td>Malaysia</td>
<td>NA</td>
<td>17.8%</td>
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<td>Taiwan</td>
<td>NA</td>
<td>3.0%</td>
</tr>
<tr>
<td>Philippines</td>
<td>NA</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

Source: *La Porta et al (1998), Claessens et al. (1999) cover 3'000 publicly traded companies in Asia*
Evolving the Role of Government

• A strong and effective government role proved beneficial in the investment phase when efficiency and reliability were the principal competitive advantages
• Substantial government involvement will have diminishing returns
  - Government ownership is still high despite recent partial privatizations. Government ownership places constraints on company strategy, and limits competition in the affected sectors
  - Outward investments by government-linked companies are viewed with suspicion in many countries, and are likely to be politicized
  - Government “guidance” in the form of financial incentives and approval requirements draws management to focus more on the government than on the market
• A more open, pluralistic and heterogeneous society and economy are needed to spur innovation and attract mobile knowledge workers
• Government’s role must shift to improving the business environment and less involvement in the competitive process
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
   – Improve the efficiency of domestic industries
   – Strengthen domestic competition and anti-trust policy
   – Improve the capabilities of the education system
   – Mount an explicit strategy to mobilize older and underemployed citizens
   – Reduce government involvement in the economy

II. Make the transition to an Innovation-Driven economy
   – Signs of Progress
Change in R&D Investments
Compound Annual Growth Rate in R&D Expenditures, 1985-1998

International Patenting Output

Annual U.S. patents per 1 million population, 2000


Singapore’s Economic Agenda in 2001

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II. Make the transition to an Innovation-Driven economy
   – Signs of Progress
   – Challenges
   • Upgrade Singapore’s scientific, technological and knowledge creation capacity
### Science and Technology Infrastructure

#### Singapore’s Relative Position

#### Competitive Advantages Relative to GDP per Capita

<table>
<thead>
<tr>
<th>Country Ranking</th>
<th>Licensing of Foreign Technology</th>
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<tbody>
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<td></td>
<td>4</td>
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</table>

#### Competitive Disadvantages Relative to GDP per Capita

<table>
<thead>
<tr>
<th>Country Ranking</th>
<th>University / Industry Research Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Quality of Business Schools</td>
<td>18</td>
</tr>
<tr>
<td>Quality of Science Research Institutions</td>
<td>15</td>
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<tr>
<td>Intellectual Property Protection</td>
<td>12</td>
</tr>
<tr>
<td>Company Spending on R&amp;D</td>
<td>12</td>
</tr>
</tbody>
</table>

**Note:** Rank by countries; overall Singapore ranks 9 (5 on Quality of Business Environment)

**Source:** Global Competitiveness Report 2000
Composition of Singaporean Patenting in the US
Top Patenting Industries and Companies, 1999

• Top 10 Singaporean-based inventors in terms of U.S. patents, 1999
  – CHARTERED SEMICONDUCTOR MANUFACTURING PTE LTD (37 patents)
  – TEXAS INSTRUMENTS, INCORPORATED (10)
  – HEWLETT-PACKARD COMPANY (9)
  – TRITECH MICROELECTRONICS INTERNATIONAL PTE LTD. (8)
  – NATIONAL UNIVERSITY OF SINGAPORE (7)
  – TRITECH MICROELECTRONICS, LTD.
  – SEAGATE TECHNOLOGY, INCORPORATED
  – BERG TECHNOLOGY, INC.
  – BLACK & DECKER INC.
  – MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

• The electronics cluster accounts for more than 2/3 of all U.S. patents filed by Singaporean entities in 1999

Singapore’s Economic Agenda in 2001

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II. Make the transition to an Innovation-Driven economy
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     • Upgrade Singapore’s scientific, technological and knowledge creation capacity
     • Create advanced demand conditions
## Demand Conditions

### Singapore’s Relative Position

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<tr>
<td>Extent of Regulatory Distortion of Competition</td>
<td>1</td>
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<td>Openness of Public Sector Contracts</td>
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<td>Demanding Regulatory Standards</td>
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</tr>
<tr>
<td>Buyer Sophistication</td>
<td>12</td>
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<tr>
<td>Demanding Regulatory Standards</td>
<td>10</td>
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**Source:** Global Competitiveness Report 2000
**Finnish Wireless Cluster**

**Context for Firm Strategy and Rivalry**
- A history of *competition* in telecommunications services throughout the 20th century
- Early to *deregulate* in telecom related industries
- More than *100 local operators*
- Active *local rivalry* in wireless communications

**Factor (Input) Conditions**
- Substantial *public investment* in telecommunications-related R&D, with a focus on *wireless technology*
- Significant *local venture capital* for mobile applications
- Finland is becoming an *international center for WAP development* (e.g., Hewlett Packard, Siemens)

**Demand Conditions**
- World’s most *sophisticated consumers*
- 70 percent *penetration of mobile phones* (20 percent of households have abandoned wireline phones)
- *First* country to allocate *licenses* for 3rd generation wireless networks (3 competitive groups)
- Heavy usage of *short message services*
- Finland is a *test market* for WAP applications

**Related and Supporting Industries**
- Finland is home to *Nokia*, the world’s most competitive handset company
- There are approximately *3,000 Finnish firms* in telecom and IT related products and services

Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses
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II. Make the transition to an Innovation-Driven economy
   – Signs of Progress
   – Challenges
     • Upgrade Singapore’s scientific, technological and knowledge creation capacity
     • Upgrade the science, technology infrastructure
     • Create advanced demand conditions
     • Encourage private sector-led cluster development
     • Widen the base of clusters in the economy around Singapore’s unique advantages in the region
## Related and Supporting Industries

### Singapore’s Relative Position

<table>
<thead>
<tr>
<th>Competitive Advantages Relative to GDP per Capita</th>
<th>Country Ranking</th>
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<tr>
<td>Cluster Presence</td>
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<tr>
<th>Competitive Disadvantages Relative to GDP per Capita</th>
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<tbody>
<tr>
<td>Domestic Supplier Quality</td>
<td>22</td>
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<tr>
<td>Domestic Supplier Quantity</td>
<td>19</td>
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</tbody>
</table>

Note: Rank by countries; overall Singapore ranks 9 (5 on Quality of Business Environment)

Source: Global Competitiveness Report 2000
Public / Private Cooperation in Cluster Upgrading
Minnesota’s Medical Device Cluster

Context for Firm Strategy and Rivalry

- Aggressive trade associations (Medical Alley Association, High Tech Council)
- Effective global marketing of the cluster and of Minnesota as the “The Great State of Health”
- Full-time “Health Care Industry Specialist” in the department of Trade and Economic Development

Factor (Input) Conditions

- Joint development of vocational-technical college curricula with the medical device industry
- Minnesota Project Outreach exposes businesses to resources available at university and state government agencies
- Active medical technology licensing through University of Minnesota
- State-formed Greater Minnesota Corp. to finance applied research, invest in new products, and assist in technology transfer

Demand Conditions

- State sanctioned reimbursement policies to enable easier adoption and reimbursement for innovative products

Related and Supporting Industries

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Massachusetts Clusters
Widening the Cluster Base

Knowledge Creation

- Information Technology
- Healthcare
- Financial Services
- Environmental Products and Services
- Specialty Paper
- Marine
- Apparel Textiles and Footwear
- Tourism and Leisure
- Polymers
- Metalworking
## Microeconomic Business Environment

### Singapore’s Relative Position

<table>
<thead>
<tr>
<th>Competitive Advantages Relative to GDP per Capita</th>
<th>Country Ranking</th>
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<tbody>
<tr>
<td>Government Infrastructure Investment</td>
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<td>Port Infrastructure Quality</td>
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<td>Road Infrastructure Quality</td>
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<tr>
<td>Air Transport Infrastructure Quality</td>
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<tr>
<td>Overall Infrastructure Quality</td>
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<td>Quality of Public Schools</td>
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<tr>
<td>Telephone / Fax Infrastructure Quality</td>
<td>6</td>
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</tbody>
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**Source:** Global Competitiveness Report 2000
Singapore’s Economic Agenda in 2001

I. Address some enduring and emerging weaknesses

II. Make the transition from an Investment-Driven to a true Innovation-Driven economy

III. Transform company strategies
## Global Competitiveness Report 2000
### Singapore’s Ranking

<table>
<thead>
<tr>
<th>Rank</th>
<th>Current Competitiveness Index</th>
<th>Company Strategy &amp; Operations Index</th>
<th>National Business Environment Index</th>
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<tr>
<td>1</td>
<td>Finland</td>
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Source: Global Competitiveness Report 2000
## Company Operations and Strategy
### Singapore’s Relative Position

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<td>Product Designs</td>
<td>25</td>
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<td>Control of International Distribution</td>
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<td>Capacity for Innovation</td>
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<tr>
<td>Extent of Branding</td>
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<td>Extent of Regional Sales</td>
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<td>Marketing Expertise</td>
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<td>Nature of Competitive Advantage</td>
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<td>Value Chain Presence</td>
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<td>Production Processes</td>
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<td>Senior Management Recruitment</td>
<td>13</td>
</tr>
<tr>
<td>Breadth of International Markets</td>
<td>13</td>
</tr>
<tr>
<td>Company Spending on R&amp;D</td>
<td>12</td>
</tr>
</tbody>
</table>

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**Note:** Rank by countries; overall Singapore ranks 9 (15 on Company Operations and Strategy)

**Source:** Global Competitiveness Report 2000
Determinants of Relative Performance
Types of Competitive Advantage

Differentiation
(Non-Price Value)

Competitive Advantage

Lower Cost
Sources of Competitive Advantage

- Assimilating, attaining, and extending **best practice**
  - Do the same thing better

- Creating a **unique** and **sustainable** competitive position
  - Compete in a different way
Singapore’s Economic Agenda in 2001

I. Address some chronic weaknesses

II. Make the transition from an Investment-Driven to a true Innovation-Driven economy

III. Transform company strategies

IV. Reorient and broaden the approach to regional cooperation
Geographic Levels and Competitiveness

- World Economy
- Broad Economic Areas  e.g. APEC, ASEAN
- Groups of Neighboring Nations
- Nations
- States, Provinces
- Cities, Metropolitan Areas
The Mutual Dependence of Nations and Their Regional Neighbors

• A nation’s economic growth and prosperity can be greatly enhanced by healthy neighboring economies
  - A collectively larger overall market increases specialization, widens export industries, and attracts foreign investments
  - Individual nations can focus on their unique strengths

• A nation will inevitably suffer if it is isolated or an island amid countries that are not prospering
  - e.g. Israel

• A nation’s productivity can be greatly enhanced by regional coordination versus unilateral action
Global Competitiveness Report 2000

The Relationship Between Microeconomic Competitiveness and GDP Per Capita

Microeconomic Competitiveness Index


* Adjusted for Purchasing Power Parity

* ISRAEL

Regional Strategy and Geographic Scope

Geographic proximity

Benefits of regional cooperation

- Communication and mutual understanding
- Gains from increased trade and investment

Groups of Proximate Neighboring Nations

- Communication and mutual understanding
- Greater gains from increased trade and investment
  - Widen the range of traded industries
  - More efficient specialization by industry and stage in the value chain
- Investments in the business environment of each nation
Regional Strategy and Competitiveness

**Traditional View**
- Free trade zone
  - Gains from trade and investment

**New View**
- A regional strategy to enhance *competitiveness* in each neighboring country
  - Deep gains from trade and investment and
  - Policy coordination to capture *mutual benefits to productivity* among countries via specialization and capturing externalities across borders
  - A powerful lever for speeding up the process of economic reform at the *national* level
  - A tool for promoting interest and investment in the region by the *international community*
Regional Economic Coordination
Illustrative Policy Levers

Factor (Input) Conditions
- Improve regional transportation infrastructure
- Create an efficient energy network
- Upgrade/link regional communications
- Upgrade/link financial markets
- Upgrade higher education through facilitating specialization and student exchanges
- Expand cross-border business and financial information access and sharing
- Coordinate activities to ensure personal and physical safety

Context for Strategy and Rivalry
- Coordinate macroeconomic policies
- Eliminate trade and investment barriers within the region
- Simplify and standardize cross-border regulations and paperwork
- Guarantee minimum basic investor protections

Demand Conditions
- Agree on foreign investment promotion guidelines to limit forms of investment promotion that do not enhance productivity
- Coordinate competition policy

Related and Supporting Industries
- Set minimum environmental standards
- Set minimum safety standards
- Establish reciprocal consumer protection laws
- Enhance specialization and upgrading in clusters that cross national borders, e.g.
  - Tourism
  - Agribusiness
  - Textiles and Apparel
  - Information Technology

Regional Governance
- Share best practices in government operations
- Improve regional institutions
  - Regional development banks
  - Dispute resolution mechanisms
  - Policy coordination bodies
- Develop a regional marketing strategy

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The Role of Regional Coordination

• APEC and ASEAN cover a vast geographic area and encompass countries with widely different political systems and stages of development
  – APEC and ASEAN’s role can be useful in trade expansion and establishing general rules and guidelines
  – Cooperation with individual countries within the Asia area can boost trade and strengthen the competitiveness of specific clusters

• Deeper cooperation with immediate neighbors like Indonesia and Malaysia can produce significant productivity benefits
  – Meaningful cluster integration
  – Coordination of government economic and infrastructure policies

• At the same time, market integration within ASEAN, and with India, offer compelling strategic advantages to Singapore