URBAN SYSTEM STUDIES:

INDUSTRIAL INFRASTRUCTURE

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OUTLINE

• ECONOMIC OVERVIEW

• CHALLENGES OF INDUSTRIALISATION

• FACTORS OF SUSTAINABLE INDUSTRIAL DEVELOPMENT

• CONCLUSIONS
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ECONOMIC JOURNEY

Before 1960s:
Transforming the Colonial Trade Economy

- High unemployment (10%)
- High population growth (4.4%)
- Limited industrial development
- Slow growth in entrepôt trade
1960s – 1970s:
Building Industrial & Infrastructure Foundations

- Economic dependence on trading and British military spending
- Reliance on Malaysia as hinterland
- Exposure to external economic shocks
1980s:

Evolving from Domestic Market to Global Market

- Erosion of wage competitiveness from lower-cost developing countries

- Recession of 1985 – 1986 as result of external demand weakness
ECONOMIC JOURNEY

1990s:
Erosion of Competitiveness

- Resource constraints and rising costs
- More intense competition in low-tech sectors
- 1997 Asian Financial Crisis
2000s & beyond:

Exposure to World of Major Crises

- Sept 11 attack in 2001 compounds global economic malaise

- 2003 SARS crisis hit tourism and economy

- 2007 - 2008 Global Financial Crisis
ECONOMIC JOURNEY

Summing up...

– As a small country evolving from colonial rule to an independent city state, Singapore faced many challenges over the last 5 decades.

– Many challenges were influenced by external political and economic crises.

– Coupled with the lack of domestic market and resources, Singapore’s journey of economic development has always been on a difficult terrain.
SINGAPORE’S PAST

Massive unemployment | Economic survival crisis

1959 - Self governance
1965 - Independence

Key issues

• Massive unemployment
• Economic survival crisis
INDUSTRIALISATION: A WAY TO SURVIVE

Early years, industrialisation was necessary for Singapore to survive in order to:

• reduce economic dependence on entrepot trade
• create jobs for its rapidly growing population

Singapore’s economic survival depended on its ability to:

• provide necessary **industrial infrastructure**
• attract investors to set up manufacturing plants
• satisfy investor needs quickly and well
COMPETITIVE ECONOMIES

60s
Labour Intensive

70s
Skill Intensive

80s
Capital Intensive

90s
Technology Intensive & Services

2000...
Knowledge Intensive & Innovative

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1960 Winsemius Report

1967 Economic Expansion Incentives Act: Allowed foreign companies to apply for pioneer status on new investments that would get five years of tax concessions.

1968 Employment Act: Provisions improved labour relations and investment climate

1979-1981 Wage Correction Policy: A high wage policy designed to force companies to raise productivity and move towards higher value-added activities.

1985 Economic Committee Report – Recommended new directions for the economy; new direction set for manufacturing and services as twin pillars of the economy.

1991 Strategic Economic Plan (SEP) – Set the strategies and programs for Singapore to become a first league developed country within the next 30 to 40 years.

2003 Economic Review Committee (ERC) Report – Set a clear direction for Singapore’s economy over the next 15 years, while addressing the current downturn; recommendations to remake Singapore into a globalised and diversified economy, and a creative and entrepreneurial nation.

(Data: World Bank; Photo: EDB)
SINGAPORE’S PRESENT

Knowledge-based Economy | Low unemployment rate

2016 Economic Performance

- GDP : S$410 B
- Per Capita: S$ 73,000
- Unemployment: 2.3%
- Knowledge-based Economy
1960s --- 2010s

- Manufacturing sector: increased from 12% to 20%
- Finance & Business services: increased from 14% to 29%
**ECONOMIC STRUCTURE (2016)**

- **Manufacturing**: 20%
- **Finance & Business Services**: 29%
- **Transport & Communication**: 12%
- **Commerce**: 14%
- **Construction**: 5%
- **Others**: 20%

**GDP**: S$410 Billion
**Per Capita**: S$73,000
SINGAPORE GDP GROWTH

132-fold growth
Over 54 years

GDP per capita

(Source: World Bank)
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CHALLENGES OF INDUSTRIALISATION

- Limited Labour Pool
- Insufficient Land Area
- Keen Regional Competition
- Lack of Natural Resources
- Small Domestic Market
APPROACHES TAKEN

- Effective Land Acquisition
- Space Creation
- Increase Land Productivity
- World-class Infrastructure
- Responsive Industrial Development
- Appropriate Industrial Policies
- Training & Education
EFFECTIVE LAND ACQUISITION

1960s – 1980s

Jurong Town Corporation (JTC) was empowered with compulsory land acquisition

- Ensure adequate land supply to support industrialisation
- Compensation amount can be appealed by landowner, but not the acquisition decision
- Provide landowners with resettlement facilities
EFFECTIVE LAND ACQUISITION

1990s

- En Bloc Redevelopment Program of old industrial estates
- Repurchase land with low value-add & unproductive usage at market rate
- Land use optimization
- Introduce higher density & value-add cluster, i.e. Biomedical Industry, Media industry
SPACE CREATION

Create land from sea (1960: 582 sqkm 2015: 719 sqkm)
SPACE CREATION

Unconventional Industrial Space Solution

• Stack up factories
• Rock cavern
• Sea-space
LAND INTENSIFICATION

Higher Land Productivity

Supply & Demand Assessment of Industrial Land

Industrial Productivity Matrix
LAND INTENSIFICATION

Vertical Integration:
Mixed use buildings for co-location of work-live-play-learn activities
WORLD-CLASS INFRASTRUCTURE
Responsive Industrial Development

1960s: Generic Industrial Estates
1970-1990s: Business Park / Science Park
2000s: Specialised Park

Innovative Industrial Landscape
RESPONSIVE INDUSTRIAL DEVELOPMENT

Specialized Industrial Parks
Wafer Fab Parks
Aerospace Park
Business Parks
One-north
Cleantech Park
Biomedical Park
Jurong Chemical Island
Airport Logistics Park
Jurong Port
Jurong Marine Base
**APPROPRIATE INDUSTRIAL POLICIES**

Adopting the ‘4P’ Principles to meet customers’ needs:

1. Policies
2. Products
3. Price
4. Processes

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<td>Wage Correction Policy (1979 to 1981)</td>
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<td>1971 Concept Plan</td>
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<td>JTC’s 10-Year Master Plan (1980)</td>
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<td>Industrial Land Pricing</td>
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<td>Industrial Parks for the 21st Century (iPark21) initiative</td>
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<td>2001 Concept Plan</td>
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TRAINING & EDUCATION

Continuous upgrading of training & education system to provide competitive manpower resources for industrial development:

- Adapt education system of modern technology and industries
- Integrating training & education with industrial policies
- On-the–Job Training & Retraining to continually upgrade labour productivity

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<td>Chem Gallery @ Jurong Island</td>
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<td>Institutes of Technical Education</td>
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SUSTAINABLE INDUSTRIAL DEVELOPMENT

KEY SUCCESS FACTORS:

- Visionary Leadership
- Long-term Planning
- Pragmatic Responses
- Effective Implementation
- Integrated Government Action
“In short, industry would modernise and enrich... [and it] would not only generate economic growth but also help to bring about a rapid transformation of social attitudes to those more consistent with needs of modernising societies”

-- Dr Goh Keng Swee, Singapore’s first Finance Minister
LONG-TERM PLANNING

Concept Plan is a strategic land use plan:

• Guides Singapore's development over the next 40 to 50 years
• Ensures sufficient land to meet long-term population and economic growth
• Balances all land use needs

Master Plan is a statutory land use plan:

• Guides Singapore's development over the next 10 to 15 years
• Translates the broad long-term strategies of the Concept Plan into detailed plans
• Shows the permissible land use and density for developments
LONG-TERM PLANNING OF INDUSTRIAL LAND USE

Redevelopment Program
- En Bloc Redevelopment
- Selective Buy Back

Optimized Land Use
- Enhance Land Productivity

Policy Review
- Lease Renewal & Extension
- Pricing Strategies
- Land Allocation Policies

Industrial Parks for the 21st Century (iPark21) initiative

JTC's Industrial Land Plan 21 (IP21) (1997)

JTC 10-year master plan for new industrial landscapes and infrastructure
PRAGMATIC RESPONSES

Constant adaptation to external changes

• Regular review of economic competitiveness
• E.g. Strategic Economic Plan; Economic Strategies Report; Economic Review Report

Flexible execution of policies

• Customization
• One-stop Services
PRAGMATIC RESPONSES

On-going innovation
• Land and space intensification
• Integrated services and utilities
• Just-in-time design & implementation

Outcome focus
• Ensure productivity growth ahead of wages
• Keep land and space affordable and available
• Move up value-chain to generate higher value
EFFICIENT IMPLEMENTATION

Pro-business environment

• Invest ahead of demand to build up industrial infrastructure
• Provide quick start up for investors to set up operations
• Build closer relationships with clients

WHY INVEST IN SINGAPORE
Spurred by continual innovation across various industries, Singapore continues to be an ever-evolving metropolis in the heart of Asia, reflecting the region’s future and ambition. See what makes investing in Singapore the ideal move into Asian markets.
EFFECTIVE IMPLEMENTATION

Competitive infrastructure

- Affordable industrial land and space
- Complete and reliable amenities & utilities
- Strong logistics support and port services
INTEGRATED GOVERNMENT ACTION

• Whole-of-Government Approach
• Multi-prong strategy compassing economic, industrial infrastructure, manpower, training, labour relations & technology advancement
**INTEGRATED GOVERNMENT ACTION**

**EDB (Economic Development Board)** and **JTC (Jurong Town Corporation)** are the Key agencies for Economic & Industrial Development

**EDB** is responsible for planning, marketing and executing strategies to make Singapore a global hub for business and investment across manufacturing and internationally traded services.

**JTC** is responsible for planning, promoting developing and managing the industrial parks, infrastructure and amenities.
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CONCLUSIONS

Singapore’s economy development has taken an approach of *integrating economic direction with industrial infrastructure*.

*Strategic industry choices and close institutional ties* had been the enabler of such an evolution.

This has *embedded Singapore’s competitiveness into policies, programme, master plans, infrastructure and business space as well as industrial land.*
CONCLUSIONS

Singapore continues to face the *challenge of staying relevant and keeping competitive* in a mature economy.

To sustain development, Singapore has to:

- Maintain strong economic fundamentals, pursue innovation and upgrade its capabilities on a continual basis
- Complement the hard infrastructure with the soft aspects of a global city, in order to remain relevant in the global competition
DISCUSSION
CASE STUDY: JURONG ISLAND
CASE STUDY: JURONG ISLAND

Development Timeframe:
• 1990s till now

Land Area:
• 32 sq km (Reclamation & Amalgamation of seven islands)

Current Status:
• Complete value chain of chemical cluster S$ 35 billion of investments by more than 100 companies

Singapore is the 3rd largest oil refinery hub in the world
CASE STUDY: JURONG ISLAND

Jurong Island operates as an integrated chemical hub with a vertically integrated structure where the output from one plant becomes the input for another, allowing them to feed off each other symbiotically.

Today Jurong Island is the cornerstone of Singapore's energy and chemicals industry and home to a vibrant portfolio of more than 100 leading global petroleum, petrochemical and specialty chemical companies.
CASE STUDY: JURONG ISLAND

Jurong Island was outfitted with three types of networks:

- an infrastructural network of service corridors, utilities, logistic services, power, roads, sewerage and telecommunications
- an integrated network of tightly synergised companies
- an IT network for a common e-business platform

These networks enabled companies locating their plants on the island to set up operations easily.
CASE STUDY: JURONG ISLAND

Cost Efficiency
The integration of utilities and logistics infrastructure allowed companies to have a cost-efficient structure, saving up to 30 percent on capital outlay and 15 percent on transport.

Key pillar of the economy
The production output of the oil refining industry on Jurong Island reached 1.5 million barrels per day in 2014. The petroleum, petrochemical and specialty chemical industries together form a key pillar of Singapore’s economy, accounting for some 34 percent of the country’s total manufacturing output in 2014 worth over S$100 billion.
INTEGRATED PETROCHEMICAL VALUE CHAIN

Refining → Crackers → Petrochemicals → Specialty Chemicals

1.3 million barrels/day
4 million tonnes /annum of C2
Over 40 companies E.g. Elastomers Polyolefins Oxo-chemicals
Over 20 companies E.g. Oilfield & Water Consumer Lubricant Additives

Asia’s leading oil hub Top 5 export refining hub
Top 10 global chemicals hub ~100 chemical companies in a single location
Planning for the future

To enhance Jurong Island’s competitiveness and sustainability, the Jurong Island Version 2.0 initiative was launched in 2010 to review five key areas:

- New Energy
- Logistics and transportation
- Feedstock options
- Clean Environment
- Clean Water
THANK YOU!