MINISTRY OF ECONOMY
DEPARTMENT OF STATISTICS MALAYSIA

Analysing the Impact of Technological Advancement on the Economy: An Input-Output Analysis

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MyStats 202

OUTLINE

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1. INTRODUCTION

THE EVOLUTION OF INFORMATION TECHNOLOGY(IT) IN MALAYSIA

1970s and 1980s

Early IT adoption

1996

Multimedia Super Corridor (MSC)

2000s

Digital Revolution

2013

Connectivity & Innovation

2020-2021

COVID-19 Pandemic & Digital Shift

2021

MyDIGITAL Initiative

2022

Malaysia's IT Future

Technology

RESEARCH QUESTION AND RESEARCH OBJECTIVE

Research Question

What impact do these technological advancements have on various sectors within the Malaysian economy?

Research Objective

To investigate the interdependencies and economic impacts of technological advancements on various sectors within the Malaysian economy.

METHODOLOGY

1 This study utilised data obtained from the Malaysia Input-Output (I-O) Table 2021 published by the Department of Statistics Malaysia (DOSM). The Leontief I-O model is adopted (Leontief, 1974) as below:

$$X = (I - A)^{-1}Y$$

where *X* is the output, *Y* is the final demand, *I* is the identity matrix, A is the input coefficient matrix, and $(I - A)^{-1}$ denotes the Leontief inverse matrix. For the purpose of this study, *Y* refers to exports.

2 Normalised backward linkage formula can be defined as:

$$NBL_j = \frac{\sum_{i=1}^{n} l_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} l_{ij}}$$

where *NBLj* is the normalised backward linkage of sector *j*, *lij* is the *ij* element of Leontief inverse matrix, *n* is the number of sectors

Normalised forward linkage formula can be defined as:

$$NFL_i = \frac{\sum_{j=1}^{n} g_{ij}}{\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} g_{ij}}$$

where *NFLi* is the normalised forward linkage of sector *I*, *gij* is the *ij* element of Gosh inverse matrix, *n* is the number of sectors

3 An output multiplier for a sector *j* is defined as the total value of production in all sectors of the economy that is necessary for all stages of production in order to produce additional unit of product *j* for final use. It can be defined as:

$$O_j = \sum_{i}^{n} l_{ij}$$

where, *Oj* is the output multiplier of sector *j*, *lij* is the *ij* element of Leontief inverse matrix, *n* is the number of sectors

2. RESULT AND DISCUSSION

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

ICT sector contributing 13.6% of Malaysia's GDP 2022

13.6%

RM243.7 b

GROSS VALUE ADDED (GVA)

Share
Growth (yoy)

41.9% 5.6% — ICT Services

38.4% 21.3% — ICT Manufacturing

14.0% 12.0% — ICT Trade

5.7% 10.2% — Content & Media

Components and electronic boards, communication equipment, and consumer electronics continued to be the leading contributors to ICT Manufacturing

ICT PRODUCTS	EXPORTS RM Billion 2021	EXPORTS RM Billion 2022	EXPORTS Annual percentage change (%) 2021	EXPORTS Annual percentage change (%) 2022	IMPORTS RM Billion 2021	IMPORTS RM Billion 2022	IMPORTS Annual percentage change (%) 2021	IMPORTS Annual percentage change (%) 2022
ICT goods	321.5	404.1	13.8	25.7	228.6	271.0	20.9	18.5
ICT services	28.7	35.2	12.3	22.8	28.1	33.6	24.0	19.5
Content & media	5.8	5.2	-12.4	-10.6	4.0	4.2	-1.9	7.1
TOTAL	356.0	444.5	13.1	24.9	260.7	308.8	20.8	18.5
Share (%)	32.5	32.2			26.5	24.7		

Source: ICT Satellite Account 2022, DOSM

IF DEMAND INCREASES BY 25%

ICT plays a crucial role in driving technological progress, impacting various industries. Assuming a 25.0% increase in the demand for exports, significant output growth is expected in electronics and IT-related sectors.

Sector	Expected Output Changes (%)
Electronic Components and Boards	49.3
Communication Equipment & Consumer Electronics	12.7
Computers, Peripheral, Office Equipment & Machinery	9.9
Wholesale & Retail Trade	6.3
Telecommunications & Computer/Information Services	5.6
Land Transport	0.4

NORMALISED BACKWARD AND FORWARD LINKAGES

I. Strategic Sector

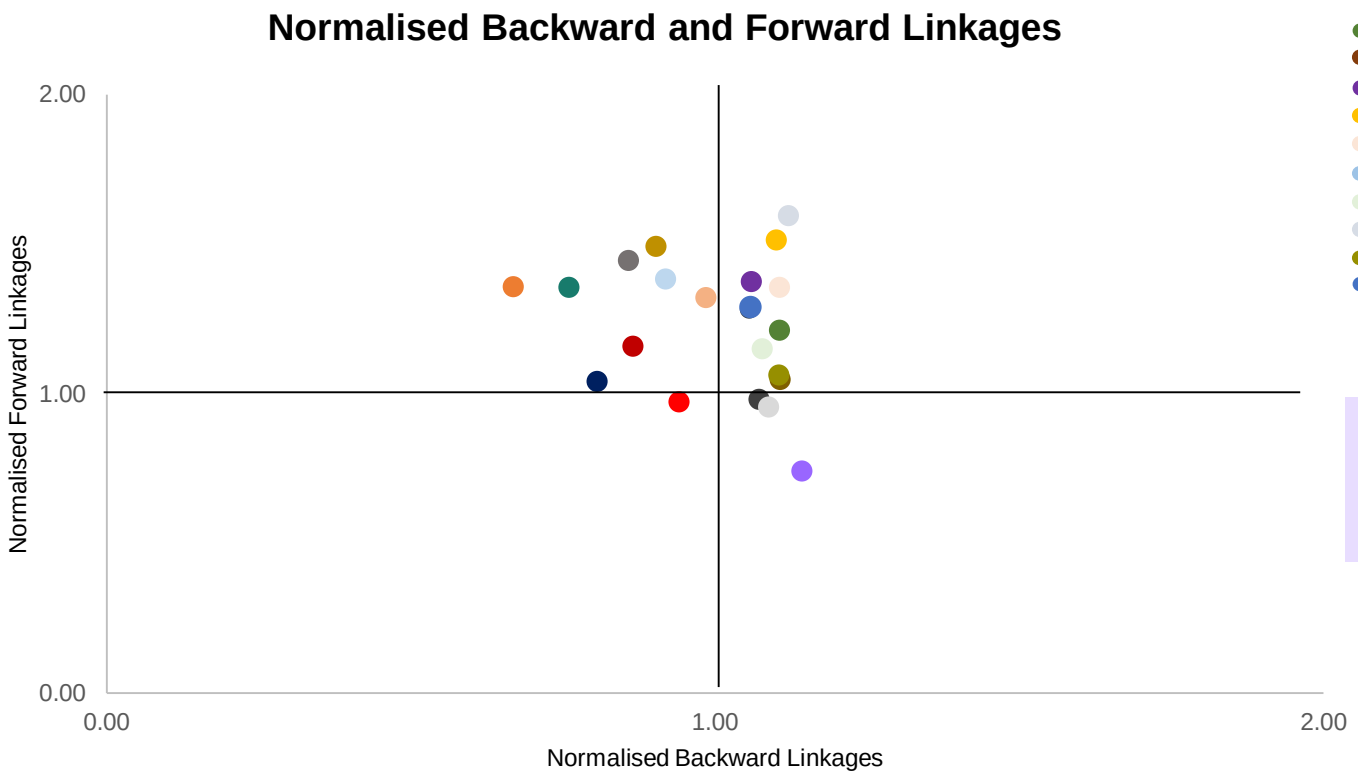
The output produced by one sector of the economy is widely used to support the production of other sectors. The growth of the strategic sector will benefit and spillover effect to the downstream sectors in the supply chain.

- Wholesale & Retail Trade, Repair of Motor Vehicles and Motorcycles
- Electricity and Gas
- Other Fabricated Metal Products
- Monetary Intermediation
- Crude Oil and Natural Gas
- Professional
- Printing
- Insurance/ Takaful and Pension Funding

III. Independent Sector

The sector that earns inputs and sells its output is less than the average of all sectors in the economy. This sector is an established sector in its own ecosystem and its spillover to other sectors of the supply chain is minimal.

- Telecommunications & Computer and Information Services



II. Key Sector

The sector that earns input and sells its output exceed the average sector in the economy. Investments in this sector will give an advantage to the growth of the sector and other sectors involved in the economy chain.

- Electronic Components and Boards
- Communication Equipment and Consumer Electronics
- Coke and Refined Petroleum Products
- Specialised Construction Activities
- Motor Vehicles, Trailers and Semi Trailers
- Basic Precious and Other Non-Ferrous Metals
- Land Transport
- Repair & Installation of Machinery and Equipment
- Warehousing and Support Activities for Transportation
- Publishing Activities & Motion Picture, Programming and Broadcasting Activities

IV. Driven Sector

The sectors that obtain input from other sectors that have an average of more than the average of all sectors in the economy.

- Computers, Peripheral, Office Equipment and Machinery
- Electricity Distribution & Control Apparatus, Batteries and Accumulators
- Basic Iron and Steel

OUTPUT MULTIPLIER – AN ILLUSTRATION

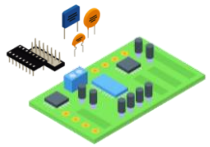
Let's assume there's an increase in demand for **computers, peripherals, office equipment, and machinery** by **RM1 million**

Direct Effects

Computers, Peripheral, Office Equipment and Machinery

2.03

Indirect Effects



Electronic component & boards

1.97

Communication Equipment and Consumer Electronics

1.97

Land transport

1.92

Induced Effects

Employment

To produce additional output, industries will hire more workers. Hence, employment and income levels rise.

Spending

Increase purchasers of goods and services by households. Creating new final demand, which generates new output to meet demand.

RM1 million increase in demand will lead to a total output of **RM7.89 million** for the whole economy.

CONCLUSION

Based on the analysis, it is revealed that:

- ICT key sectors are highly affected by technological advancement, particularly Electronic components and boards.
- It is expected that the output i.e. Electronic components and boards will be increased by 49.3 per cent to the demand changes, highlighting their crucial role in technological infrastructure and innovation
- Sector specifically Communication equipment and consumer electronics is pivotal in the digital transformation

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THANK YOU