

## Information Technology, Industrial Structure and Competitiveness in Malaysia : A Note

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Information technology (IT) or information and communication technology (ICT) is becoming an increasingly important factor in industrial growth and in influencing the structure and competitiveness of economies. But disparities in IT have given rise to concern with the widening digital divide. IT will play an important role as an enabler in a knowledge economy or a so-called 'K-Economy'.

Malaysia still lags behind many of the leading countries in terms of the availability and diffusion of communications infrastructure, ICT penetration rates, development of local content and info-structure networks. The penetration of IT in Malaysia is still relatively low (Table 1). Personal computer penetration in Malaysia is only at 11 percent (2.5 million) of the total population. Internet users have reached only 5 percent (about 1 million). A survey by Malaysian External Trade Development Corporation (MATRADE) in 1999 reported that 69 percent of companies registered with MATRADE have email facilities and about two-thirds have Internet connections. One source has classified Malaysia as an "emerging" country with regard to the key penetration indicators.

**Table 1: Key Penetration Performance Indicators, 1998**

|                                  |       | Status                   | Performance level |
|----------------------------------|-------|--------------------------|-------------------|
| Teledensity                      | 21.6  | main lines per 100 pop.  | 3                 |
| Cellular mobile penetration      | 10    | subscribers per 100 pop. | 3                 |
| Internet penetration             | 11.9  | per household            | 3                 |
| Internet penetration             | 6     | per 100 pop.             | 3                 |
| ISDN penetration                 | 0.04  | per 100 pop.             | 3                 |
| Internet hosts                   | 1.9   | per 100 pop.             | 3                 |
| Computers                        | 8     | per 100 pop.             | 3                 |
| Computer power                   | 1,211 | MIPS per 100 pop.        | 3                 |
| Pay TV penetration               | 2.1   | percent of households    | 3                 |
| <b>Average performance level</b> |       |                          | <b>3</b>          |

Notes: Level 1 (World Class) comprises the United States, United Kingdom, Finland, and Japan; Level 2 (Advanced) comprises Germany, South Korea, Taiwan, and Singapore; Level 3 (Emerging) comprises Argentina, Chile, Thailand, and China; and Level 4 (Rudimentary) comprises India, Indonesia, Honduras, and Nigeria

Source: *The Third Outline Perspective Plan 2001 – 2010*.

According to international sources, Malaysia has been losing competitiveness (Table 2). Finland and Ireland, on the other hand, have made rapid improvements in their ranking.

**Table 2: World Competitiveness Rankings of Selected Countries, 1994 – 2000**

|           | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----------|------|------|------|------|------|------|------|
| USA       | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| Singapore | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Finland   | 19   | 18   | 15   | 4    | 5    | 3    | 3    |
| Ireland   | 21   | 22   | 22   | 15   | 11   | 11   | 7    |
| UK        | 14   | 15   | 19   | 11   | 12   | 15   | 15   |
| Japan     | 3    | 4    | 4    | 9    | 18   | 16   | 17   |
| Malaysia  | 18   | 23   | 23   | 17   | 20   | 27   | 25   |

Source: *World Competitiveness Report*, various issues

Connectivity and infrastructure are necessary conditions for economic restructuring. Given the extent of connectivity and the availability and reach of infrastructure in Malaysia, it is unlikely for IT to have made significant contributions to structural changes in the economy. The contribution of total factor productivity (TFP) to GDP growth has not been too encouraging. TFP refers to the additional output that is not attributable to increases in labour and capital inputs. It includes the contributions of human capital, management technique, and new technology including IT, among other things. Despite some differences in results, empirical work found that the contribution of TFP to growth in Malaysia was well below that in industrial

countries.

According to the Outline Perspective Plan Three (OPP3), TFP contributed 25.5 percent of Malaysia's growth from 1991 to 2000, while the contribution of capital was much larger (Table 3). From 1990 to 1999 TFP grew by 5.1 percent per annum in manufacturing, but it registered negative growth rates in some industries.

**Table 3: Contribution of Factors of Production, 1971-2010, %**

|                        | Labour | Capital | TFP  | GDP Growth |
|------------------------|--------|---------|------|------------|
| OPP1 (1971-90)         |        |         |      |            |
| Increase               | 2.4    | 3.4     | 0.9  | 6.7        |
| Contribution to growth | 36.1   | 50.9    | 13.0 | 100.0      |
| OPP2 (1991-2000)       |        |         |      |            |
| Increase               | 1.7    | 3.5     | 1.8  | 7.0        |
| Contribution to growth | 24.3   | 50.2    | 25.5 | 100.0      |
| OPP3 (2001-10)         |        |         |      |            |
| Increase               | 1.6    | 2.7     | 3.2  | 7.5        |
| Contribution to growth | 20.9   | 36.6    | 42.5 | 100.0      |

Source: *The Third Outline Perspective Plan 2001 – 2010*

A *Corporate Sector Survey* reported that firms with higher TFP tended to:

- be export-oriented with higher foreign direct investment
- have little or no foreign control
- have lower inventories in proportion to sales
- utilise new machinery
- be predominantly semi-automated
- have more than 30 percent of workers with higher education
- conduct training and R&D

An ambitious target has been set to raise the contribution of TFP to growth. For the period of the OPP3 (2001-10), TFP is targeted to contribute 42.5 percent of overall economic growth (which is 7.5 percent per year). The Plan emphasizes strengthening science and technology (S&T), R&D, and enhancing technology and absorptive capacity.

Malaysia has made efforts to develop new sources of growth and to restructure the economy. It launched a National IT Agenda (NITA) and the Multimedia Super Corridor (MSC). The main objective of NITA is to promote the use of IT through demonstrator application areas such as the e-economy (e-commerce, e-business, e-public services, ecommunity, elearning, and e-sovereignty).

The MSC is a global test-bed to attract high technology industries. In 1999 the basic infrastructure, which includes telecommunications with 2.5 gigabits per second asynchronous transfer mode-based backbone scalable to 10 gigabits per second, was completed. Voice, image, and data will be transferable. Technology-led companies, businesses, and R&D investments have been attracted to the five cybercities. The First-Wave Flagship Application, which includes e-government, multipurpose cards, and smart schools, is being implemented. For the Second-Wave Flagship Application the programmes and projects are being implemented.

The structure of Malaysia's manufacturing sector has undergone changes. Inputs for IT products account for a sizable part of Malaysia's manufactured exports. In 2000 manufactured exports comprised about 85.2 percent of total exports compared to about 58.8 percent in 1990 (Table 4). The electronics and electrical products share of total exports increased from about a third in 1990 to about 62 percent in 2000. Exports of electronics products account for a larger share (44.7 percent) of total exports with electronic equipment parts taking up the bigger share of total exports. Semiconductors have increased from about 15 percent of exports in 1990 to 19 percent in 2000. The assembly of electronics and electrical products is still the dominant activity in this sub-sector.

**Table 4: Exports of Selected Manufactured Goods**

|      | Electronics     |       |                      |         |       |       |                           |       |       |         |                                    |       | Gross Exports<br>RM mil. |                            |       |         |
|------|-----------------|-------|----------------------|---------|-------|-------|---------------------------|-------|-------|---------|------------------------------------|-------|--------------------------|----------------------------|-------|---------|
|      | Semi-conductors |       | Electronic Equipment |         |       |       | Total Electronics Exports |       |       |         | Electrical and Electronics Exports |       |                          | Total Manufactured Exports |       |         |
|      | RM mil.         | % chg | % shr                | RM mil. | % chg | % shr | RM mil.                   | % chg | % shr | RM mil. | % chg                              | % shr |                          | RM mil.                    | % chg | % shr   |
| 1990 | 11,685          | 14.8  | 14.7                 | 3,670   | 67.0  | 4.6   | 15,355                    | 24.1  | 19.3  | 26,502  | 27.4                               | 33.3  | 46,841                   | 28.1                       | 58.8  | 79,646  |
| 1991 | 13,051          | 11.7  | 13.8                 | 6,441   | 75.5  | 6.8   | 19,492                    | 26.9  | 20.6  | 35,587  | 34.3                               | 37.7  | 61,319                   | 30.9                       | 64.9  | 94,497  |
| 1992 | 14,357          | 10.0  | 13.9                 | 8,847   | 37.4  | 8.5   | 23,204                    | 19.0  | 22.4  | 41,579  | 16.8                               | 40.1  | 71,458                   | 16.5                       | 68.9  | 103,657 |
| 1993 | 18,751          | 30.6  | 15.5                 | 12,091  | 36.7  | 10.0  | 30,842                    | 32.9  | 25.4  | 55,129  | 32.6                               | 45.5  | 89,694                   | 25.5                       | 74.0  | 121,238 |
| 1994 | 24,881          | 32.7  | 16.2                 | 17,755  | 46.8  | 11.5  | 42,637                    | 38.2  | 27.7  | 76,367  | 38.5                               | 49.6  | 120,294                  | 34.1                       | 78.2  | 153,921 |
| 1995 | 33,197          | 33.4  | 17.9                 | 23,583  | 32.8  | 12.7  | 56,780                    | 33.2  | 30.7  | 96,748  | 26.7                               | 52.3  | 147,253                  | 22.4                       | 79.6  | 184,987 |
| 1996 | 35,509          | 7.0   | 18.0                 | 29,124  | 23.5  | 14.8  | 64,633                    | 13.8  | 32.8  | 104,272 | 7.8                                | 52.9  | 158,540                  | 7.7                        | 80.5  | 197,026 |
| 1997 | 40,887          | 15.1  | 18.5                 | 39,889  | 37.0  | 18.1  | 80,776                    | 25.0  | 36.6  | 119,013 | 14.1                               | 53.9  | 178,945                  | 12.9                       | 81.0  | 220,890 |
| 1998 | 54,483          | 33.3  | 19.0                 | 59,692  | 49.6  | 20.8  | 114,175                   | 41.3  | 39.8  | 161,733 | 35.9                               | 56.4  | 237,649                  | 32.8                       | 82.9  | 286,563 |
| 1999 | 65,485          | 20.2  | 20.4                 | 79,400  | 33.0  | 24.7  | 144,885                   | 26.9  | 45.1  | 195,047 | 20.6                               | 60.7  | 271,730                  | 14.3                       | 84.5  | 321,560 |
| 2000 | 71,111          | 8.6   | 19.0                 | 95,680  | 20.5  | 25.6  | 166,791                   | 15.1  | 44.7  | 230,429 | 18.1                               | 61.7  | 317,908                  | 17.0                       | 85.2  | 373,307 |

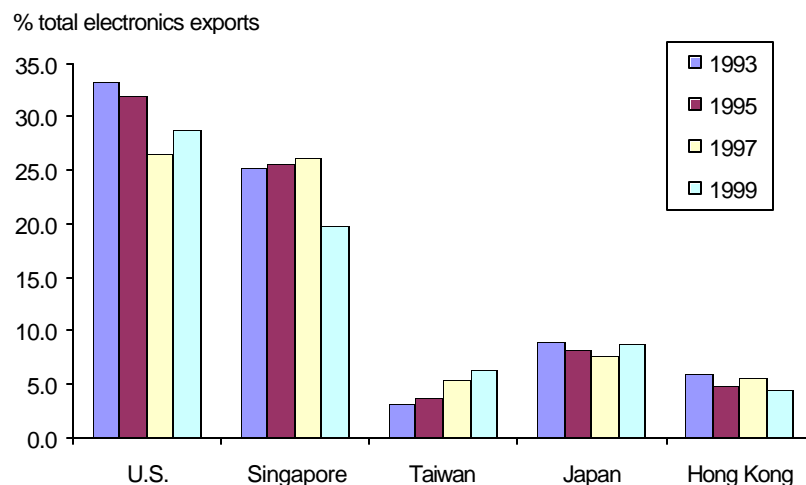
Note: <sup>1</sup> percent of gross exports

Sources: Department of Statistics Malaysia, Bank Negara Malaysia, *Quarterly Economic Bulletin & Monthly Statistical Bulletin*, various issues.

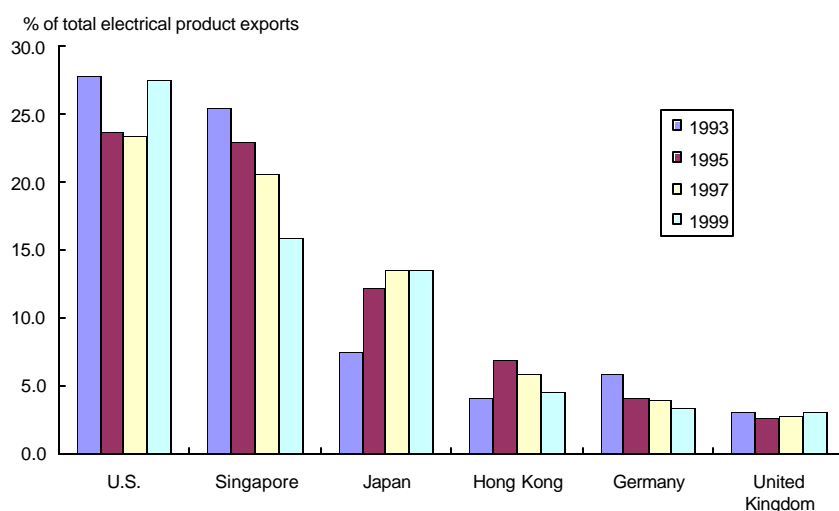
There is now a strong emphasis on making a transition towards a knowledge-based economy in which knowledge embodied in people (human capital) and technology is expected to play a much greater role. In the OECD economies, for example, the high-technology share in manufacturing production has more than doubled and has reached about 20 to 25 percent. Sectors that are considered to be knowledge-intensive services, such as education, communications, and information are growing even faster. It has been estimated that more than half of GDP in the major OECD economies is now knowledge-based.

The implications of the IT revolution may not yet be reflected in some of the Asian economies. Measuring its impact is problematic. The experience of the US in explaining productivity trends and economic growth appears to be relevant. The notion of the "IT-Determined Business Cycle" has to be made more clear. Perhaps we should make a distinction between the effect of information technology on output and exports and the behaviour of industries that produce inputs for the IT industry.

The US is an important market for Malaysia's manufactured exports. Over the last ten years the US accounted for about 20 percent of Malaysia's exports and for some 17 percent of imports (Figures 1 and 2). Malaysia has enjoyed a positive trade balance with the US, which has been steadily increasing (to RM 27 billion in 1999). The share of Malaysia's manufactured exports going to the US has been hovering in the 22 to 29 percent range (25.1 percent in 1999). Electronics and electrical products are the principal exports to the US. In 1999 the US accounted for about 29 percent of Malaysia's exports of electronic products and 27 percent of electrical products.

**Figure 1: Principal Markets for Malaysia's Electronics Exports, 1993-99**

**Figure 2: Principal Markets for Malaysia's Electrical Products Exports, 1993-99**



**Appendix Table 1: TFP Growth Rates by Manufacturing Industry, 1985 – 1999 (%)**

|                            | 1985-90<br>% | 1990-95<br>% | 1995-99 <sup>1</sup><br>% | 1990-99 <sup>1</sup><br>% |
|----------------------------|--------------|--------------|---------------------------|---------------------------|
| Food & Beverages           | 5.6          | 9.7          | 2.5                       | 6.5                       |
| Textiles & Apparel         | 10.1         | 2.2          | 8.7                       | 5.1                       |
| Wood Products              | 8.3          | -1.5         | 6.3                       | 2.0                       |
| Furniture                  | -2.6         | 7.3          | 9.8                       | 8.4                       |
| Paper & Printing           | 2.5          | 2.6          | 1.2                       | 2.0                       |
| Chemicals                  | -4.1         | -7.8         | -4.5                      | -6.3                      |
| Rubber & Plastic Products  | 0.3          | 3.7          | -6.3                      | -0.7                      |
| Glass & Clay Products      | 4.4          | 11.1         | 0.4                       | 6.3                       |
| Basic Metals               | 4.3          | 3.3          | 0.9                       | 2.3                       |
| Fabricated Metals          | 6.1          | 6.1          | 2.4                       | 4.5                       |
| General Machinery          | 7.6          | 11.0         | 13.3                      | 12.0                      |
| Electrical Machinery       | 7.7          | 8.6          | 3.6                       | 6.4                       |
| Transport Equipment        | 22.3         | 0.7          | -10.1                     | -4.1                      |
| Other n.e.c. <sup>2</sup>  | 12.9         | -19.2        | -9.1                      | 6.6                       |
| <b>Total Manufacturing</b> | <b>2.6</b>   | <b>6.6</b>   | <b>3.2</b>                | <b>5.1</b>                |

Notes: <sup>1</sup> Estimates for 1999 are based on preliminary data <sup>2</sup> n.e.c. Not elsewhere classified

Source: *The Third Outline Perspective Plan 2001 – 2010*.

**Appendix Table 2: Educational Attainment of the Labour Force, 1990-2000**

|                          | 1990             |                  | 2000             |                  |
|--------------------------|------------------|------------------|------------------|------------------|
|                          | Thousand persons | % of labor force | Thousand persons | % of labor force |
| Primary                  | 2,380.2          | 33.8             | 2,607.9          | 27.4             |
| Lower & Middle Secondary | 4,042.1          | 57.4             | 5,571.8          | 58.7             |
| Tertiary                 | 619.7            | 8.8              | 1,319.3          | 13.9             |

Source: *Third Outline Perspective Plan 2001-10*.

**Appendix Table 3: Education Indicators for Selected Countries**

|                       | Public Expenditure on Education<br>(% of GNP)<br>1996 | Tertiary Enrolment<br>(% of pop. 20-24)<br>1993 |
|-----------------------|---|---|
| Australia             | 5.5   | 42  |
| Canada                | 6.9   | 103   |
| China                 | 2.3   | 4   |
| India                 | 3.2   | 6   |
| Ireland               | 6.0   | 34  |
| Japan                 | 3.6   | 30  |
| South Korea           | 3.7   | 48  |
| Malaysia <sup>1</sup> | 5.2   | 25  |
| New Zealand           | 7.3   | 58  |
| Singapore             | 3.0   | 38  |
| United Kingdom        | 5.3   | 37  |
| United States         | 5.4   | 81  |

Note: <sup>1</sup> Refers to year 2000 and age cohort 17-23 years

Source: *The World Competitiveness Yearbook*, 1998 – 2000 as cited in *The Third Outline Perspective Plan 2001 – 2010*.

**Appendix Table 4: Public Sector R&D Expenditure and Number of Scientists and Engineers for Selected Countries**

|                       | R&D Expenditure<br>as % of GDP<br>1998 | Scientists and Engineers per<br>million population<br>1985-95 |
|-----------------------|--|---|
| Australia             | 1.7                                    | 3,166   |
| Canada                | 1.6                                    | 2,656   |
| China                 | 0.7                                    | 350   |
| India                 | 0.7                                    | 149   |
| Ireland               | 1.5                                    | 1,871   |
| Japan                 | 2.9                                    | 6,309   |
| South Korea           | 2.7                                    | 2,636   |
| Malaysia <sup>1</sup> | 0.4                                    | 500 <sup>1</sup>  |
| New Zealand           | 1.0                                    | 1,778   |
| Singapore             | 1.8                                    | 2,728   |
| United Kingdom        | 1.9                                    | 2,417   |
| United States         | 2.5                                    | 3,732   |

Note: <sup>1</sup> Refers to preliminary figures for year 1998

Source: *The World Competitiveness Yearbook*, 2000; *World Development Report*, 199/2000 as cited in *The Third Outline Perspective Plan 2001 – 2010*.