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MEASURING THE KNOWLEDGE-BASED ECONOMY

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DISCUSSION PAPER ON ICT STATISTICS: MALAYSIAN PERSPECTIVE*

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INTRODUCTION

1. Malaysia has embarked from a production-based economy to a knowledge-based economy since the year 2000. A Master Plan to chart the strategic direction towards the knowledge-based economy was launched in September 2002. The Master Plan provides a strategic framework outlining the changes to the fundamentals of the economy. Besides an overall socio-political, cultural and security environment, Information and Communication Technology (ICT) has been identified as one of the critical factors for the development of a knowledge-based economy.
2. In terms of ICT benchmark¹ for selected countries², Malaysia is ranked 7th and is classified as being in the 'medium' category. Following the establishment of the Ministry of Energy, Communication and Multimedia, Malaysia is now better equipped in terms of institutional, legislative and regulatory framework. Though Malaysia's performance in the ICT sector is emerging, the ICT penetration rate while better than Malaysia's neighbour (other than Singapore) is only half of Australia.
3. Malaysia adopts a centralized statistical system. The power to collect and compile official statistics is vested upon the Department of Statistics, Malaysia (DOSM). However other government agencies are also involved in data collection (particularly their own areas of specialization) through their statistical units which are manned by statistical staff seconded from DOSM. As such sources of ICT statistics are not confined to DOSM.

¹ Eight indicators were identified namely – Daily newspapers per 1000 people, Radios per 1000 people, Television per 1000 people, Telephones mainlines per 1000 people, Mobile Telephones per 1000 people, Personal computers per 1000 people and Internet hosts per 1000 people.

² Finland, Hong Kong, Singapore, Korea, Ireland, Argentina, Malaysia, Brazil, South Africa, Thailand, Philippines and Indonesia.

DEVELOPMENT OF ICT STATISTICS

4. The current statistical system does provide a number of ICT statistics though not comprehensive enough to meet the growing demand of users and to cover the high technology development. The Department of Statistics conducts Censuses and Surveys to provide ICT statistics covering both the supply and the demand side. Other government agencies on an ad hoc basis carried out specialized survey on ICT. ICT statistics are also generated as a by-product of administrative records. Following is a list of major surveys and censuses conducted by DOSM which include ICT related questions:

ICT Statistics (Demand side)

- Population and Housing Census 2000
- Household Expenditure Survey
- Household Income Survey
- Labour Force Survey

ICT Statistics (Supply side)

- Annual Survey of Manufacturing Industries
- Census of Computer and Telecommunications Services Establishment 2001
- Economic Census 2001
- Distributive Trade Survey/Census

In addition export import data on ICT related items are produced by DOSM on a monthly basis.

ICT INDICATORS CURRENTLY COMPILED

5. Amongst the major ICT indicators currently available are as follows:

Principal statistics of the ICT industries: -

- Number of Establishments in ICT industries
- Number employed in ICT industries
- Output – ICT Manufacturing Industry
- Input – ICT Manufacturing Industry
- Value Added
- Salaries and Wages
- Fixed Assets
- Revenue – ICT Service Industry
- Expenditure – ICT Service Industry

Import and export of ICT related commodities

Radios per 1000 population

Television per 1000 population

Telephone mainlines per 1000 population

Mobile Telephones per 1000 population

Internet hosts per 1000 population

Consumer Price Index for mobilephone

Consumer Price Index for PC with printer

Telephone penetration rate

Internet penetration rate

Number of Internet subscribers

Number of PCs installed

Monthly expenditure of households on ICT related appliances and services

Percentage of households with PCs

Percentage of households with access to Internet

Number employed in ICT related occupation

Number of graduates in ICT related fields

Number of students in ICT related fields

Number of computers in schools

CURRENT DOSM STATISTICAL PROGRAMS ON ICT

6. Following is a brief description of DOSM current household and establishment surveys and censuses that cover ICT related questions:-

6.1 Establishment, Survey and Censuses

(i) Manufacturing

The Annual Survey of Manufacturing Industries provides data on the products and activities of establishments classified under Manufacturing. Probability sampling is used in the selection of sample size. Data on industries related to the manufacture of ICT products are covered in this survey. The publishing industries that are part of the MSIC 2000 ICT – Information Content sector are also covered in this survey. The Annual Survey of Manufacturing Industries has been conducted annually since 1975 (with the exception of reference years 1980 and 1998). Basic data collected in the Annual Survey of Manufacturing Industries include value of production, cost of materials, capital expenditure (by type) inventories, employment and payroll. The Census of Manufacturing Industries, conducted once in five years (except for 1998) collects data from all manufacturing

establishments. Data provided by the census is the same as for the Annual Survey of Manufacturing Industries.

(ii) Telecommunications (and Broadcasting)

An annual “survey” of telecommunications provides national-level estimates of revenues and expenditures for the telephone, radio and television broadcasting and other communication services industries. Data for the broadcasting and telecommunications industries are collected on an establishment basis. Basically, since the number of players in this industry is limited, a complete set of accounts is requested. This “survey” commenced for reference year 1987, and has been conducted each year thereafter. However there has been no consistency in data content. The 2001 Economic Census however marks the initial coverage of the telecommunications and broadcasting industries in a more formal manner. Data for the broadcasting and telecommunications industries will be collected on an establishment basis. The census collects data on revenue (by source), operating expenditure (by type) and employment and payroll.

(iii) Computer and related activities

This has been one area where data collection has been lacking. However, with the Economic Census 2001, dearth of data in this component of the ICT sector should be overcome. The Economic Census covers all the industries in this sub group. A Census of computer and telecommunications services establishment was carried out in 2001 for the first time.

(iv) Wholesale of machinery equipment and supplies (ICT goods)

This sub sector of the ICT industries is canvassed on a quarterly basis on sales and cost of sales. This is a purposively selected sample covering the market leaders in this industry. Data collection on a quarterly basis commenced in 1998 and has been on-going since.

(v) Product classification system

Beyond classifying the industries that constitute the ICT sector, it is equally important to have a product classification system. To this end, DOSM has also focused its attention towards developing a MSIC 2000 Product Classification System. The new classification system allows greater depth in product description and classification.

6.2 Population and Housing Census and Household Surveys

(i) Population and Housing Census

In the 2000 Population and Housing Census of Malaysia, questions on the availability of personal computers at home as well as subscription to Internet facilities in the household were asked for the first time. This was a result of a strong demand from stakeholders comprising planning agencies, human resource and educational departments as well as other ministries apart from the private sector. In addition questions on occupations were asked of every person aged 10 years and above. These were canvassed ever since Malaysia conducted its population censuses. Data collected in the 2000 Census is extremely useful when used in conjunction with other information collected in the census such as ethnic group, education, labour force and urban/rural areas. The cross-tabulation of these variables with the information on availability of personal computers and Internet facilities in the household yields important information on the penetration rates of ICT

for identified target groups and the digital divide that exists amongst them.

(ii) Household Expenditure Survey (HES)

The Household Expenditure Survey (HES) conducted by DOSM is the only survey at present that provides data on ICT usage in households. The survey is conducted once in every five years to update the pattern and the basket of goods and services to provide the weights for the consumer price index (CPI). Household consumption/usage on items such as telephone, mobile phone, fax, PC and Internet services were tracked in the quinquennial survey.

(iii) Labour Force Survey (LFS)

Questions on occupation of the labour force were asked in the annual Labour Force Survey. However detailed classification of occupation to enable identification of ICT related occupation is not possible given the constrain of the sample size, which covered only 1.2% of the total households.

(iv) Household Income Survey (HIS)

Past Household Income Surveys did not cover ICT related questions. However in the recent HIS, which was carried out in the year 2002, questions on telecommunications and usage of ICT appliances and subscription of Internet services in households were covered.

METHODOLOGICAL CONCERNS

7. Defining the ICT sector

- 7.1 Industries are classified according to the International Standard Industrial Classification (ISIC) which is used to classify business units into groupings, which carry out similar economic activities. Business units are classified according to their main economic activity. Each of these classifications has a structure, which classifies activity at a number of levels. At the broadest level that main purpose is to provide a meaningful, broad dissection of the economy; this provides for fundamentally different activities such as farming, mining, manufacturing, wholesaling, retailing, etc. Each of these broad industrial sectors is then further desegregated into increasingly detailed dissections of the economic activity carried out.
- 7.2 None of these industrial classifications contains a distinct industrial heading which equates to the ICT sector because the goods and services which characterise this sector are produced and distributed by business classified to a number of different industrial sectors. For instance, manufacturing activities associated with ICT goods are still classified to the manufacturing sector. This suggests that the ICT information model is more complex than for most other industrial statistics where activities can be typically confined to a single industrial sector. Clearly, manufacturing activity is distinctly different to on-selling activity (i.e. the sale of goods purchased, as distinct from goods produced), or service provision and on this basis it is illogical to expect all activity relating to ICT to be found under one industrial heading.
- 7.3 Some criticism of industrial classifications may be valid at the finer levels, particularly where specialisation in ICT activities is low. Low specialisation would mean that a large proportion of businesses, which have no ICT activity, would be drawn into a survey frame based in that industry. The redefinition of some industry classes may be desirable to

reduce this problem. An example of this concerns the treatment of 'Computer and electronic product manufacturing'. In the ISIC, these industries are placed in machinery industries or with electrical equipment. But Computer and electronic product manufacturing industries have fundamentally different manufacturing processes of other machinery and electrical equipment with which they have been grouped. Even if it were possible to redefine some classes so that their ICT specialisation ratios become higher, it is always likely that there will be a number of industry classes which will include some units which are ICT related and some which are not.

- 7.4 Given that there is a requirement to combine both the manufacture of information and communication goods with information and communication services in an ICT sector, that sector can therefore best be described as a set of related industries i.e. industries which are characterised by their association with the production and diffusion of ICT.

8. Occupational classification

- 8.1 Structural shifts due to innovation particularly information and communication technologies have had a profound impact on the workforce skill requirement and have resulted in changes in occupational composition. The use of computer and other high tech tools is transforming the way of working and doing business. Detailed data for occupational and educational attainment is needed to better detect the occupational shifts. Occupational classifications at the detailed level could only be obtained from census sources but available only once in 10 years. While the Labour Force Sample Survey (conducted on a quarterly basis yearly) though could provide a more regular and updated set of occupational data is not representative at the detailed level. In this

regard, the concern is to develop a sample survey, which could give a reliable estimate at the detailed level.

INDICATIONS OF DEMAND FOR ICT STATISTICS

9. As Malaysia forges ahead to embrace a knowledge-based economy, one of the major challenges confronting the nation is the need to equip workers with new skills whilst building a culture of high technology. The need to upgrade and develop human resources of the country towards gearing them to an economy based on information and communication technology (ICT), constant monitoring of this aspect is particularly important. It therefore comes as no surprise that data on ICT is now much sought after.

10. The data on the ICT information collected in the 2000 Census, Household Surveys and Economic Censuses and Surveys has generated a lot of users for this data. Amongst the main users of this data are:
 - (a) Federal, state and local authority area planning agencies.

 - (b) Ministries, departments and agencies with special interest in the stock and development of human resources having ICT related skills such as:
 - Ministry Energy, Communications and Multimedia
 - Ministry of Human Resources
 - Ministry of Science, Technology and Environment
 - Ministry of Education
 - Ministry of Rural Development

 - (c) The private sector consisting of business and industry.

(d) Research related institutions, within the country as well as international agencies.

(e) The general public

11. The data on ICT collected by DOSM is heavily in demand judging by the requests from the above-mentioned ministries/departments/agencies/private sector and other users.

MEASUREMENT OF KNOWLEDGE-BASED ECONOMY

12. For Malaysia's purpose, a knowledge-based economy is defined as an economy in which knowledge, creativity and innovation play an ever-increasing and important role in generating and sustaining growth. In a k-based economy, knowledge is the most critical factor and educated and skilled human resources or human capital is the most valuable asset. The development of a knowledge-based economy could be measured against the following critical factors:

12.1 Quality of human resources

Literacy; secondary enrolment; tertiary enrolment; enrolment in science and technology-related subjects; science graduates; technical graduates; expenditure on education; thinking and innovation skills; a learning culture; lifelong learning facilities; English language skills; receptivity to change.

12.2 Research and Development (R & D)

Public and private sector expenditure on R & D; personnel in R & D; scientist and engineers in R & D; patents filed.

12.3 Infostructure

Newspapers; radios; television; telephone mainlines; mobile telephones; costs of international telephone calls; freedom/availability of information.

12.4 Infrastructure

Investment in ICT infrastructure; electricity; personal computers; Internet hosts; Internet subscribers; Internet usage.

12.5 Economy

Knowledge workers; knowledge-based industries; knowledge-based services; tacit and codified knowledge; knowledge embodied in work processes and products; e-commerce; high-technology exports; venture capital; openness to foreign knowledge workers; entrepreneurship; risk-taking culture.

13. According to the Knowledge-based Economy Master Plan, Malaysia journey towards becoming a knowledge-based economy began when vision 2020 was launched in 1991. The National Information Technology Agenda (NITA) and the inception of the Multimedia Super Corridor (MSC) are the next big steps toward bringing Malaysia into the knowledge intensive high technology era through a number of important flagship applications.

14. DOSM to be able to play its role effectively will have to review its collection programs and methodologies. The k-based economy Master Plan has identified DOSM as the implementation agency to put in place a better data collection and feedback mechanism to enhance the acquisition of data pertinent to knowledge and digital gaps in society.

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