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Economic Briefing
To the Penang State Government

Reading Economic Numbers and Understanding

Inside this issue:

The turn around into an up cycle is now official

In our March issue of *briefings* we mentioned that the performance numbers from the first quarter of 2002 will be needed to confirm a turn around in the country's economy. Well, it is official. Bank Negara announced this past week that Malaysia's economy grew 1.1%, year-on-year, during the first quarter signifying an upswing in the growth cycle based on two consecutive quarters of expansion. Growth was 0.4% during the last quarter of 2001. The upswing is caused by the smaller decline in the manufacturing sector, which fell by a marginal 2.1% during the first quarter of 2002 compared to the hefty rate of negative 8.5% during the previous quarter. Crudely speaking a ten-fold improvement. By no longer acting to drag down the government's effort to manage the local economy amidst the global downturn, this improvement in the manufacturing sector allows both the services and the construction sectors to push the domestic economy along. Services grew 4.6% and construction, 2.9%, during the first quarter of 2002. These are moderated rates compared to the 5.5% and 2.5% growth rates in the two sectors during the previous quarter. In other words, given the structure of Malaysia's economy in terms of the relative proportions of the different sectors, further improvements by the manufacturing sector will be needed if better numbers are to be observed during the following months. And understanding that Malaysia's manufacturing is mostly export oriented, which is the result of the country's industrial strategy as discussed in our March issue, the country's economy remains tied to global cyclical shifts, that is, surging during boom times but also vulnerable during downturns.

Keeping accounts of the economy

Taking note of economic numbers amounts to keeping accounts, doesn't it? But it is important to ensure that the different accounts are consistent with one another. One accounting format that we don't often see presented, provides a useful summary of the different components making up the country's economy at any particular point in time. There are four separate but integrated accounts for the national economy based on the system of national accounts or SNA. These are the i) domestic production, ii) income and outlay, iii) accumulation and iv) rest of the world accounts. The components that fall into the various accounts are as follows:

$C + G + I + (X-M) = Y - P$
$Y = C + G + T + S$
$S = I + CA$
$T + CA = (X-M) + P$

C = private consumption
G = government consumption
I = gross investments
X-M = exports less imports (i.e., trade and services balance)
Y = national income or gross national product (GNP)

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T = net transfers (i.e., spending outside Malaysia by Malaysians less spending within Malaysia by non-Malaysians)
P = net factor payments (i.e., earnings outside Malaysia by Malaysians less earnings within Malaysia by non-Malaysians)
S = gross savings
CA = current account balance

The components on the left side of the equal sign represent incomings. Their figures can be conveniently entered into separate rows representing the four accounts in the following schema. Meanwhile those on the right side are the outgoings, and their figures are entered as separate columns.

Accounts	I	II	III	IV	Total
I		C+G	I	X-M	=GDP
II	Y-P			P	=GNP
III		S			=resource balance
IV		T	CA		=external balance
Total	=GDP	=GNP	= resource balance	=external balance	

The attempt here is to fill in official numbers from Bank Negara's report to see if they add up without discrepancies. In the following table the 2001 figures are entered.

Imputed National Accounts, Malaysia, 2001 (RM b. in current prices)

Accounts	I	II	III	IV	Total
I		**207.8**	**79.6**	61.5	348.9
II	335.1			**-28.4**	306.7
III		107.0			107.0
IV		-8.1	27.4		19.3
Total	335.1	306.7	107.0	33.1	

The numbers in bold are imputed numbers based on the appropriate equations, because Bank Negara reports only the rates but not the numbers. Notice the discrepancy of RM13.8 b. between the row and column totals for accounts I and IV. This means that the reported numbers are inconsistent. It cannot be the result of imputation error, because given the equation structure the components cannot take on any other values.

If we were to force both column and row totals to be the same, we end up with the following adjusted imputed figures. GDP has to be RM348.9b. (i.e. RM13.8b. more) and net factor payments amount to –RM42.2b.

Adjusted Imputed National Accounts, Malaysia, 2001 (RM b. in current prices)

Accounts	I	II	III	IV	Total
I		**207.8**	**79.6**	61.5	348.9
II	348.9			**-42.2**	306.7
III		107.0			107.0
IV		-8.1	27.4		19.3
Total	348.9	306.7	107.0	19.3	

(data source: Malaysia (2002) Bank Negara Malaysia Annual Report 2001, Kuala Lumpur)

Such discrepancies are not always as large. For example if we were to conduct the same exercise using Bank Negara's 1996 figures, the imputed table can be successfully obtained with similar adjustments to produce row and column total consistencies as follows:

Adjusted and Imputed National Accounts, Malaysia, 1996 (RM b. in current prices)

Accounts	I	II	III	IV	Total
I		**149.1**	**103.7**	-9.3	243.5
II	252.0 (243.5)			**-14.3 (-5.8)**	237.7
III		91.5			91.5
IV		-2.9	-12.2		-15.1
Total	252.0 (243.5)	237.7	91.5	-23.6 (-15.1)	

(data source: Malaysia (1999) Bank Negara Malaysia Annual Report 1998, Kuala Lumpur)

The unadjusted figures show a smaller -RM 8.5b. inconsistency in the row and column totals for accounts I and IV, which when adjusted, as shown in brackets, would equalize the right and left hand sides of the equations representing these two accounts.

For readers who remain unconvinced that the above examples actually point to inconsistencies rather than technical error, we bring them back to the published national accounts figures which are available for the years 1983 and 1968. Repeating the above exercise on the figures obtained for these two years produced consistent row and column totals without requiring adjustments.

National Accounts, Malaysia, 1983 (RM b. in current prices)

Accounts	I	II	III	IV	Total
I		**47.5**	**26.5**	-4.0	70.0
II	70.0			**-4.4**	65.5
III		18.0			18.0
IV		0.0	-8.4		-8.4
Total	70.0	65.5	18.0	-8.4	

(data source: Malaysia (1988) National Account Statistics. Dept. of Statistics Publication, Kuala Lumpur)

National Accounts, Malaysia, 1968 (RM b. in current prices)

Accounts	I	II	III	IV	Total
I		**6.9**	**1.3**	0.3	8.5
II	8.5			**-0.1**	8.4
III		1.3			1.3
IV		0.2	0.0		0.2
Total	8.5	8.4	1.3	0.2	

(data source: Bhanoji Rao V V (1976), National Accounts of West Malaysia 1947-71, Hinemann Asia, Singapore.)

Conclusions

The purpose of the above exercise is to be able to display official numbers in a convenient summary framework that is consistent with national account conventions. The way official statistics are displayed the critical numbers have been decoupled making it difficult for analysts to examine one number alongside others that bear a consistency relationship with it. The numbers shown on this framework serve a different purpose. When looking at numbers, the popular concern has been on growth rates used chiefly to gauge the current performance of the economy. But when attention shifts from performance to longer term stability and sustainability, we need to also look at the national account figures as shown in the above tables.

In the case of Malaysia, the strong point has always been its high savings rate that helps narrow the resource gap (the difference between savings and investments) in which the appropriate accounting balances are made on the current account. While the country has traditionally enjoyed a positive merchandise balance in its trade statistics, the same cannot be said once the services balance is included. However, it is important to point out here that trade balance is only indirectly linked to the current account. As the accounting framework shows, the policy to improve the trade balance can only help address current account problems if consumption does not proportionately rise (given a stable propensity to save) as trade improves. This is less likely since increasing incomes tend to boost consumption and crowd out investment funds. Thus understanding the framework will allow policies to not only address trade balance but savings and investment propensities as well.

The amount of net transfers is relatively small and thus is of lesser concern compared against the large negative net factor payments (the difference between GDP and GNP). Long term management and planning of the economy have to address these factors. ***§ Chan Huan Chiang***

The State Of Innovation In Penang

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Introduction

Increasing globalisation of economic activities like trade and investments has made it necessary for firms to introduce new and innovative products in the market. The development and success of new and innovative products and processes depend on the innovative capabilities of the firms. Innovative capabilities, in turn, rely on the rapid acquisition of knowledge and information, which are key factors for building and maintaining competitiveness. Expenditure on R&D has commonly been used as a measurement of the extent of innovation. However, R&D is only an input indicator and cannot be quoted as a reliable indicator for the success of an innovation activity in the market, expenditure on R&D is thus, not a good measurement to gauge the level of innovation or even R&D in Malaysia. Furthermore, many of the firms do not have R&D departments as well as separate accounting system for innovative activities executed by the engineers/staff. As such a combination of R&D and patent statistics, and other quantitative measures such as education expenditure, percentage of qualified scientists and engineers and capital intensity have sometimes been used to assess technological innovative capability (Norlela Ariffin, 2000). However, information about innovation is more or less neglected by official statistics.

Despite Best's (1999) statement "….Penang has manufacturing capabilities which could serve as a platform for making the transition to a cluster dynamics that fostered industrial innovation", many first tier suppliers/contractors to the MNC customers in Penang are currently not undertaking innovation activities. Their engineers, however, provide feedback to the MNC customers on the products and production processes. This could be mainly due to how some of the companies view technologies. Some companies perceived that 'time to volume' is more important than 'first to market' for certain relevant technologies. For this purpose, these companies would probably place emphasis on production processes that could help to reduce the time to ramp up production rather than emphasising the development of a product that could rapidly be introduced to the market. On the other hand, some firms tend to engage with other key industry companies and develop vendor relationships to leverage and reduce risks in R&D.

Box 1: What Is Innovation?

Technological innovation in the manufacturing sector is a subjective matter. It comprises substantial improvement of current products or development and manufacture of a product, which is new to the business. Technological innovation also comprises substantial improvement of existing process or development of new production process through the introduction of new process equipment or reengineering of operational process.

The State Of Innovation

A survey on innovation in Penang's manufacturing sector in 2000 indicated that less than 50 percent of the 191 respondents carried out innovation activities during the 1997-1999 period. There were more companies that have undertaken process innovation compared with those that carried out product innovation. The findings of the 2000 survey also indicate that companies in the electronics, fabricated metal products and chemical products industries were more innovative compared to companies from the rest of the industries. The fabricated metal products companies were mainly supporting and ancillary industries to the electronics industry. This finding is in tandem with those recorded by Norlela (2000), which showed that all the electronics firms (both foreign & local) she interviewed had carried out basic innovative activities.

An interview survey on innovation was carried out in Penang in 2001 in collaboration with the University of Hannover, Germany. This survey covered 37 firms, comprising 18 foreign and 19 local companies in the electronics and supporting industries as well as solution providers, comprising those involved in software development. The findings of this survey are discussed below.

Innovation Activities in MNCs/Foreign Companies

The MNCs/foreign companies comprise the manufacturing companies as well as service providers. A summary of the companies interviewed is shown in Table 1.

Table 1: Summary of MNC/Foreign Companies Interviewed

US-based Firms	German Firms	Japanese Firms	Others
12 Firms	3 Firms	2 Firms	1 Firm

Most of the US-based and German firms undertake some level of technological innovation. Some of these firms even have dedicated departments to take on R&D activities, which are mainly enhancement, development and design activities. Many of the companies with R&D (or D&D) departments are capable of undertaking circuit design, layout design, packaging design as well as product design for radio frequency (RF) products, non-volatile devices (NVD), microcontrollers and programmable logic chips (PLC). The Malaysian engineers are also capable of designing chipset for microprocessors.

In cases where actual design and development are not carried out in Penang, the engineers at the plants here undertake testing and prototyping activities, which include the α and β phases. Other capabilities of Malaysian engineers in product and process innovation include product mature testing (PMT), a process before mass production as well as design verification testing (DVT). Some of the engineers in the MNCs offshore plants in Penang also hold patents. For the companies that do not have R&D departments in Penang, their engineers work closely with the design engineers at the headquarters (HQs) or the company's design centres overseas to design for manufacturability. In some cases, they also collaborate on circuit design.

Other than product development and prototyping, most of the MNCs carry out activities to improve and develop production processes. This is not surprising because, Penang, Malaysia is known for its strength in assembly and test. Many of the MNCs are also utilising front-end technology for manufacturing. This is supported by Norlela (2000), who stated that firms that are producing disk drive and electronic components related products focus on developing new processes and equipment specifications to optimise product performance. According to her, these firms also focus on automating and developing processes to achieve high volume and faster production lead-time.

The accomplishment of some of the MNCs in Penang, particularly the US-based companies in the areas of D&D is quite remarkable. These companies were initially set up as offshore assembly and then test plants of the MNCs or the manufacturing arm of their respective headquarters (HQs). However, the transfer/introduction of other value-adding activities such as failure analysis, design for manufacturability, prototyping as well as D&D has enabled the transfer of technology and know-how to the Malaysian workforce in these MNC plants. The provision of training, either in Malaysia or in their other sister companies overseas has further contributed to the technology and know-how transfers to the Malaysian workforce.

Over the past decade, many key MNCs in contract manufacturing businesses have also set up manufacturing plants in Penang. As contract manufacturers, many would assume that there would be little or minimal innovation activities at the local plants. However, recently, some of the US-based contract manufacturers have set up design centres/sections, which are involved in process innovation on test, equipment, mechanical, tooling; concurrent engineering that encompass design for manufacturability and design for test; debugging; as well as product prototyping.

There are instances where the engineers in the MNCs help design the machines used in the production processes to achieve better quality and higher yield. They will either co-design the machines with their local machine & equipment manufacturers or contract the fabrication of the machines to the local companies by giving them the specifications for the machine.

Local Companies

Presently, there are very few local companies that are actually producers of electronics products. Most of the local companies are suppliers and supporting industries to the electronics MNCs. These companies are either in the fabricated metal products sector, supplying tools, jigs and fixtures or in the automation industry, supplying machinery & equipment. In addition to being suppliers of hardware, there are also local companies that are solution providers to the MNCs. These companies provide software solution to the MNC customers, either in CAD (computer aided design) tools, software for automation or mechanical/manufacturing.

Of the 19 local companies surveyed, 5 are in the fabricated metal products/automation sector, 3 are contract manufacturers and 9 are service/solution providers. It is usual to find that most of the local companies in the automation industry carry out basic innovation activities. These companies have the capabilities to design and customise the machinery and equipment for their MNC customers, as evidenced in their ISO 9001 certification. Some of the machinery & equipment that the local companies are capable of designing and building include the following:

Semiconductor Industry: Discrete test handlers such as tube to tube test handler, tray to tray test handler, tube/tray to reel and reel test handler; laser marking machines; visual inspection handler; wafer handling machine; auto die attach; BGA (ball grid array) dicing handler; coupler machine for fibre-optic products as well as visual inspection system for checking cosmetic and dimensional rejects. The local companies have an edge over the foreign companies because engineering cost in Malaysia is still relatively low and as such, locally made machinery and equipment are cheaper compared with the imported ones.

Disk Drive Industry: Swaging/sizing machine to check the dimension of the bearing; as well as machines used in HSA (headstack assembly) operations.

The local engineering companies (basically machining and fabricating) normally embark on developing products, either direct/indirect components or equipment, which used to be imported from overseas such as from Japan or US. The innovation process of these companies is normally from 'zero-base' with continuous improvement. Some of the more innovative firms developed and built special production lines, which could ensure consistency of production flow and quality control. Such innovative activities are deemed to help the local firms to obtain jobs and projects from the MNCs and local large-scale companies. Some of these firms even provide total solutions, namely they design and fabricate automation equipment, design software as well as assemble the wiring. In some cases, product innovation activities performed by the local companies include customisation from standard platforms such as robotics and motorised machines.

Some local companies took advantage of the economic crisis to carry out D&D activities and to find their own niche markets. They also took advantage of the pegged ringgit to entice cost-cutting MNCs and large-scale companies to purchase relatively cheaper machinery & equipment as well as parts and components from them.

Some local companies in the contract manufacturing business have developed from being original equipment manufacturers (OEM) to original design manufacturers (ODM). They are also involved in process innovation to improve their yield, quality and delivery of products. An example of such process innovation is the tracking of production process from the front of line (FOL) till end of line (EOL). The local companies that have developed into ODMs are not only good at manufacturing activities but are also involved in concurrent & development engineering, the α and β phases of prototyping activity, design for manufacturability and design for test. This shows that the customers have confidence in the capabilities of the local companies to deliver their orders. However, presently, there are very few local companies that have reached that stage.

Recently, many local business services have been set up. These are mainly service providers who offer turnkey solutions to their manufacturing customers such as data warehousing; logistics, which include the 'real time' tracking of goods and materials as well as collaboration of the workflow; manufacturing execution system, such as shop floor control, tracking of machinery & equipment and products as well as maintaining JIT (just in time) manufacturing; and software for administration. Many of the local solution providers are also capable of developing software for material requirement planning (MRP), human resource management (HRM), customer relationship management (CRM), supply chain management (SCM), enterprise resource planning (ERP), as well as procurement portals for their customers. The customers use these platforms to manage their suppliers. As solution providers, many of these companies also provide the hardware, in which case they usually subcontract the fabrication job to another local company.

Why Companies Innovate And How Do They Innovate?

Companies innovate for a variety of reasons. Most companies innovate to sustain growth and competitiveness in the local, regional and global markets. Some companies embark on innovation activities because of customers' requirements. As such, they need to research on new market trends and features to offer products/services that meet their customers' needs. Some companies innovate to be more competitive, especially with the diminishing value of the ringgit (due to the pegging) in comparison to the US dollar today compared with the period before the Asian financial crisis. The devaluation of the ringgit has resulted in a drop in profit margins, and thus, the companies, particularly the local firms need to innovate to gain better market share as well as higher profit margin. Lastly, some companies, particularly the MNCs acknowledged the capabilities of the Malaysian workforce and thus endeavour to provide challenging jobs and careers to their workforce. This enables continuous advancement of the Malaysian workforce, which will eventually result in them undertaking higher value-added activities.

Some local companies began to innovate from 'zero-base'. However, many companies look for collaboration partners to help them to complete a product/services. This is in the form of supplying/providing 'the missing link/ piece of the puzzle'. For example, companies that have ideas on new products/services but lack resources would look for collaboration partners who could provide them the resources to accomplish the venture.

As for some MNCs in Penang, they consider the cost effectiveness of the Malaysian workforce compared with those in China & India very important. Although most of the MNCs have the capacities and capabilities to innovate, some seek collaboration partners because of reasons other than technology/idea and resources. For example, the collaborations could be based on cost when the MNCs are motivated to reduce cost. Alternatively, the MNCs collaborate with their local suppliers because it would facilitate their operations if design, design for manufacturability, design for test, prototyping and manufacturing activities are near each other.

However, it is not very common to find MNCs collaborating with local suppliers on D&D of their core products except for the parts and components as well as machinery & equipment used in the production process. This is mainly because the MNCs view technologies at different perspectives. If the technology forms their core competency, then there is hardly any collaboration. If the MNCs view the technology as key competency, then there is possibility of outsourcing if the MNCs could not conduct the D&D in-house. However, if the MNCs view the technology as general competency, outsourcing is more prominent.

Nevertheless, it is not surprising to find that companies, both MNCs and local large-scale companies, with D&D (or R&D) departments collaborate with solution providers in their innovation activities. This is mainly because various kinds of software are required in the innovation activities. The collaboration partners could either be local or foreign-owned service providers in the areas of CAD tools or automation software. These collaboration partners either develop and customise the software for their customers or modify existing software to customise to the needs of the customers.

To enhance their capabilities, some of the local companies do not only develop collaborative partnerships but also have equity ownership in some foreign companies. This will enable easier and faster transfer of technology and know-how to the local companies. This finding corresponds with Norlela's (2000) that local firms build a larger range of advanced innovative capabilities, or higher precision capability by initiating new learning links and drawing new knowledge flows through joint-ventures with world-class suppliers or other specialised firms or acquisitions of specialised high-technology firms in the global electronics industry.

Although collaborative partnerships are significant between customers and suppliers, between equity holders as well as between sister companies, collaborative partnership with the government research institutes and local universities is still minimal. Most of the MNCs are adamant that the technological capabilities and infrastructure at the government research institutes and universities have not met their standards. On the other hand, local companies are not fully aware of the facilities offered by these research institutes and local universities. In addition, they are also unsure of the procedures and requirements to seek collaboration with the government research institutes and local universities. ***§ Anna Ong***

(Part 2 of this article will be featured in next month's Briefing)