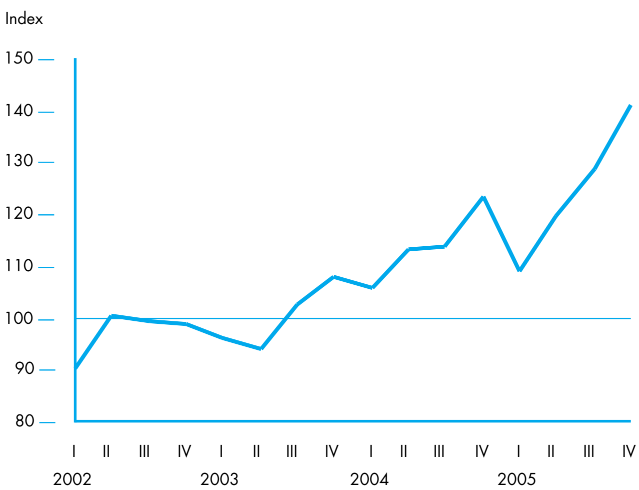
# MANUFACTURING

## OVERVIEW

(Chart 9.1)

The manufacturing sector saw growth accelerate to 14 per cent in the fourth quarter, from 13 per cent in the third quarter. All clusters, except biomedical manufacturing, registered better performances. For the whole of 2005, the manufacturing sector grew by 9.3 per cent, led by the transport engineering, biomedical manufacturing and electronics clusters. This came on the back of favourable external economic conditions, in particular, sustained recovery in the global electronics industry and strong demand in the marine industry.

**QUARTERLY INDEX OF INDUSTRIAL PRODUCTION TOTAL MANUFACTURING (2003 = 100)** [Chart 9.1]




## PERFORMANCE OF CLUSTERS

(Chart 9.2, Tables 9.1 and A9.1–A9.4)

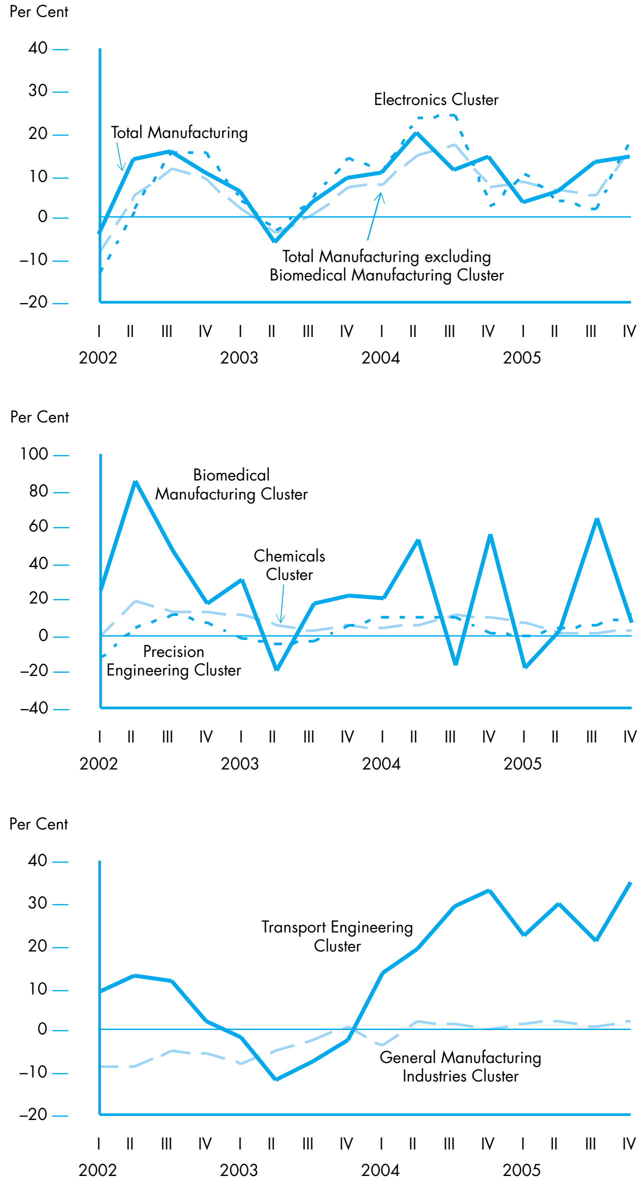
*Robust growth in almost all clusters...*

The transport engineering cluster remained the strongest performer in 2005, growing by a substantial 27 per cent. This was a further acceleration from the 24 per cent increase in 2004. The marine & offshore engineering segment surged by 37 per cent, up from the 34 per cent in 2004. This was on account of the sharp rise in ship-repairing jobs and building of container ships and marine crafts. Similarly, the aerospace segment grew by 19 per cent, compared with 16 per cent in 2004. Commercial aircraft repairs increased due to sustained demand from the Asia Pacific and the US.

The biomedical manufacturing cluster expanded substantially by 11 per cent, following the 26 per cent spike a year ago. Growth in pharmaceuticals moderated from the 30 per cent in 2004 to 12 per cent because of changes in the product mix. On the other hand, export demand from Europe and the US markets boosted production of medical devices and appliances by 5.5 per cent, similar to the 5.8 per cent increase in 2004.

**The transport engineering cluster remained the strongest performer...**

**CHANGES IN INDEX OF INDUSTRIAL PRODUCTION**
[Chart 9.2]




The electronics cluster grew by 8.7 per cent, slowing from the 15 per cent increase in 2004. Demand for high-end disk drives stimulated output of data storage by 20 per cent. This was a reversal from the 8.3 per cent decline in the earlier year. The infocomms & consumer electronics segment saw output rise by another 16 per cent, as the production of new mobile communications devices increased. The semiconductor segment grew by a healthy 9.8 per cent but computer peripherals contracted by 4.2 per cent.

Growth in the precision engineering cluster eased from 7.7 per cent in 2004 to 5.6 per cent. The machinery & systems segment turned in another year of double-digit, albeit moderated, growth of 12 per cent. This was attributed to higher production of lifting machinery, refrigerating machinery, compressors, machine tools and dies. Performance in the precision modules and components segment was dragged down by the contractions in the lead frames, metal stampings and electroplating services industries. But the segment still managed an increase of 2.5 per cent due to greater production of plastic components and precision screws.

The chemicals cluster registered a lower growth of 2.7 per cent, compared with the 7.9 per cent a year ago. Output of petroleum products continued to rise by a robust 9.0 per cent, boosted by good processing margins. Petrochemicals production, however, was up only marginally as existing capacity was almost fully utilised.

The general manufacturing industries improved from the 0.1 per cent contraction in 2004 to grow by 1.4 per cent. Production in the food industries climbed by 7.2 per cent, in contrast to the modest growth of 1.7 per cent in the previous year. Growth in the printing industries also edged up slightly to 1.5 per cent.

**MANUFACTURING** [TABLE 9.1]

| | 2005 Value Added (% Share) | 2002 | 2003 | 2004 | **2005p** |
|---|---|---|---|---|---|
| | | Percentage Change Over Previous Year | | | |
| **INDEX OF INDUSTRIAL PRODUCTION (2003 = 100)** | | | | | |
| *Electronics Products* | 35.8 | 4.2 | 5.2 | 14.8 | 8.7 |
| *Chemicals* | 14.0 | 11.1 | 6.5 | 7.9 | 2.7 |
| *Precision Engineering* | 12.4 | 2.0 | –0.7 | 7.7 | 5.6 |
| *Transport Engineering* | 10.1 | 8.9 | –6.0 | 23.9 | 27.1 |
| *General Manufacturing Industries* | 9.3 | –6.9 | –3.7 | –0.1 | 1.4 |
| ***Total Manufacturing Excluding Biomedical Manufacturing*** | 81.7 | 4.1 | 1.6 | 11.6 | 9.0 |
| *Biomedical Manufacturing* | 18.3 | 41.6 | 11.2 | 25.7 | 10.7 |
| **TOTAL MANUFACTURING** | 100.0 | 8.4 | 3.0 | 13.9 | 9.2 |

Note: The industries are classified according to the SSIC 2000.

Source: Economic Development Board

## INVESTMENT COMMITMENTS

(Chart 9.3, Tables 9.2 and A9.5–A9.6)

*Manufacturing investment commitments rose further from 2004...*

The manufacturing sector attracted $8.5 billion of fixed assets investment commitments in 2005, surpassing the $8.3 billion in 2004. This reflected Singapore's attractiveness and competitiveness as a hub for the full chain of manufacturing activities. The commitments will create new capacities in manufacturing and enhance future growth. When fully operational, they will generate $6.4 billion of value added and create 16,700 jobs, of which 49 per cent are for skilled workers.

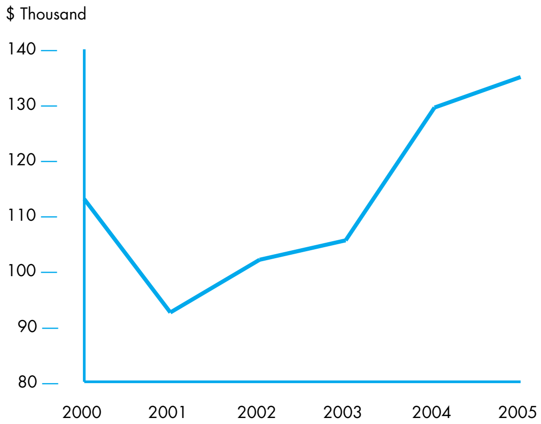
About three quarters of the total commitments came from overseas investors. The top investors were from the US, Europe and Japan with commitments of $2.1 billion, $2.0 billion and $1.3 billion respectively. Commitments from new geographical areas totalled $1.0 billion. Local investors accounted for another $2.1 billion.

Almost 75 per cent of the commitments were for projects in the electronics and chemicals clusters. Biomedical manufacturing, transport engineering and precision engineering attracted commitments of $0.9 billion, $0.6 billion and $0.4 billion respectively.

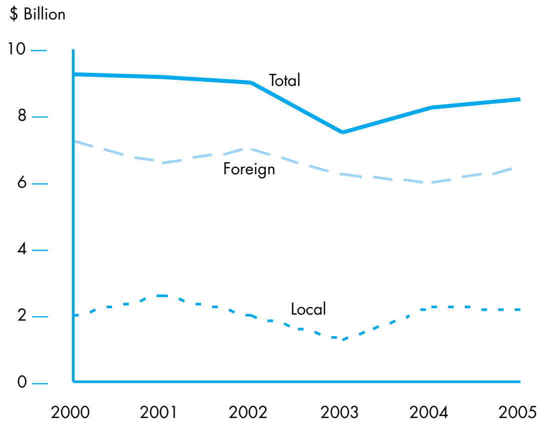
**The top investors were from the US, Europe and Japan...**

**KEY INDICATORS IN THE MANUFACTURING SECTOR** [Chart 9.3]

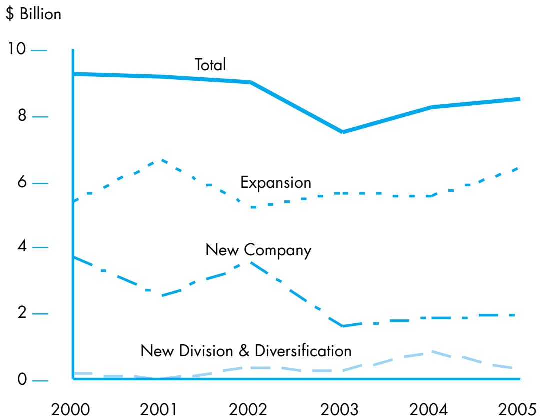
**VALUE ADDED PER WORKER OF MANUFACTURING**



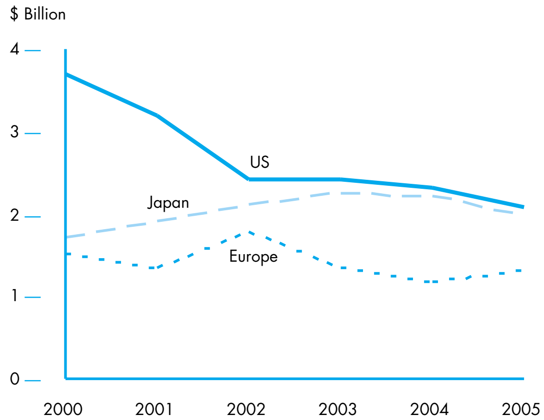

**INVESTMENT COMMITMENTS IN MANUFACTURING**




**NEW COMPANY, EXPANSION AND NEW DIVISION & DIVERSIFICATION INVESTMENTS**




**INVESTMENT COMMITMENTS BY REGION/COUNTRY**




**MANUFACTURING INVESTMENT COMMITMENTS BY CLUSTER, 2005** [TABLE 9.2]

| Cluster | Fixed Assets Investment ($ Billion) | Fixed Assets Investment (%) | Value Added ($ Billion) | Value Added (%) | Employment (No) | Employment (%) | Skilled & Above (%) |
|---|---|---|---|---|---|---|---|
| **Electronics** | 4.35 | 51.1 | 2.10 | 32.8 | 8,400 | 50.3 | 39 |
| **Chemicals** | 1.98 | 23.2 | 0.65 | 10.2 | 500 | 3.0 | 91 |
| **Biomedical Manufacturing** | 0.86 | 10.1 | 2.57 | 40.2 | 1,100 | 6.6 | 39 |
| **Precision Engineering** | 0.42 | 4.9 | 0.42 | 6.6 | 2,300 | 13.8 | 75 |
| **Transport Engineering** | 0.60 | 7.0 | 0.44 | 6.9 | 3,200 | 19.2 | 59 |
| **General Manufacturing Industries** | 0.31 | 3.6 | 0.22 | 3.4 | 1,200 | 7.2 | 40 |
| **TOTAL** | 8.52 | 100.0 | 6.40 | 100.0 | 16,700 | 100.0 | 49 |

Source: Economic Development Board

## RESEARCH & DEVELOPMENT (R&D)

*Singapore's R&D capabilities continued to strengthen…*

### R&D Manpower

(Table 9.3)

The total number of persons engaged in R&D activities in Singapore increased from 28,825 in 2003 to 31,006 in 2004. The number of research scientists and engineers[1] (RSE) rose 11 per cent from 17,074 in 2003 to 18,935 in 2004, while the number of full-time postgraduate research students (FPGRS) dipped by 8.9 per cent from 4,065 to 3,705. Overall, the number of TRSEs (RSEs + FPGRSs) increased 7.1 per cent from 21,139 in 2003 to 22,640 in 2004.

Correspondingly, the number of RSEs per 10,000 labour force rose from 79 in 2003 to 87 in 2004. Similarly, the number of TRSEs per 10,000 labour force improved from 98 in 2003 to 104 in 2004. The full-time equivalent number of researchers per 10,000 labour force in 2004 was 98, up from 93 in 2003.

The private sector accounted for 55 per cent (17,072) of total R&D manpower and employed 61 per cent of all RSEs. The number of RSEs in the private sector increased 18 per cent from 9,827 in 2003 to 11,596 in 2004.

### R&D Expenditure

(Charts 9.4–9.6)

In 2004, expenditure on R&D totalled $4.1 billion, surpassing the $3.4 billion in 2003. As a percentage of GDP, total R&D expenditure went up from 2.1 per cent to 2.2 per cent. In comparison, Sweden's total R&D expenditure as a percentage of GDP was 4.0 per cent in 2003, Finland 3.5 per cent in 2003, Japan 3.2 per cent in 2003 and Denmark 2.5 per cent in 2002.

**…total R&D expenditure went up…**

**RESEARCHERS** [TABLE 9.3]

| Year | RSEs | Non-Degree | RSEs Per 10,000 Labour Force |
|---|---|---|---|
| 1995 | 8,340 | 1,760 | 47.7 |
| 1996 | 10,153 | 2,101 | 56.3 |
| 1997 | 11,302 | 2,039 | 60.2 |
| 1998 | 12,655 | 2,275 | 65.5 |
| 1999 | 13,817 | 2,465 | 69.9 |
| 2000 | 14,483 | 2,498 | 66.1 |
| 2001 | 15,366 | 2,068 | 72.5 |
| 2002 | 15,654 | 2,154 | 73.5 |
| 2003 | 17,074 | 2,374 | 79.4 |
| 2004 | 18,935 | 2,611 | 86.7 |

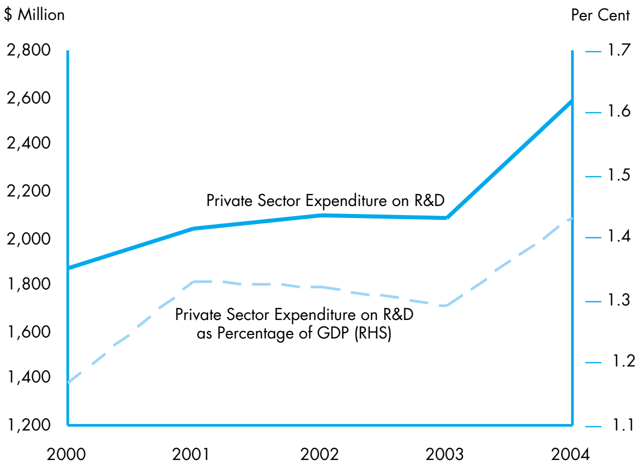
RSE: Research Scientist and Engineer.

Source: Agency for Science, Technology and Research

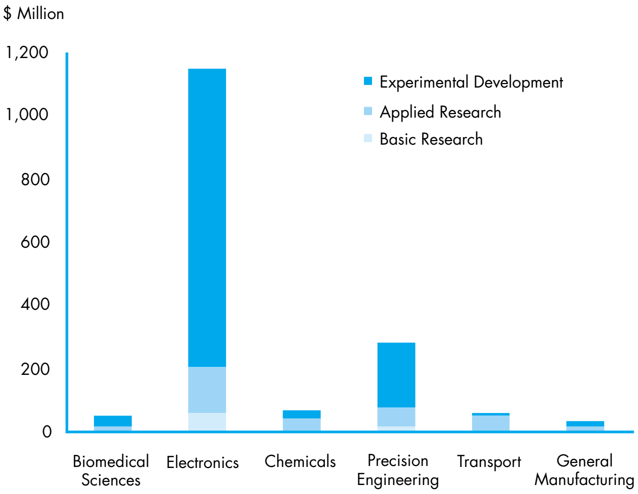
[1] From 2002 survey, full-time postgraduate research students (FPGRSs) constituted a category on its own. It was not subsumed under the RSE category. However, "Total" RSEs (also known as TRSEs) comprises both the RSEs and the FPGRSs.

Private sector expenditure on R&D increased from $2.1 billion in 2003 to $2.6 billion in 2004, accounting for 64 per cent of total expenditure on R&D. As a percentage of GDP, private sector expenditure on R&D was 1.4 per cent (*Chart 9.4*). 64 per cent of the private sector R&D expenditure ($1,649 million) was in the manufacturing sector, 36 per cent ($928 million) in the services sector, and 0.5 per cent ($13 million) in the primary industries and construction sector. The distribution of R&D expenditure in the manufacturing and services sectors are illustrated in *Chart 9.5* and *Chart 9.6* respectively.

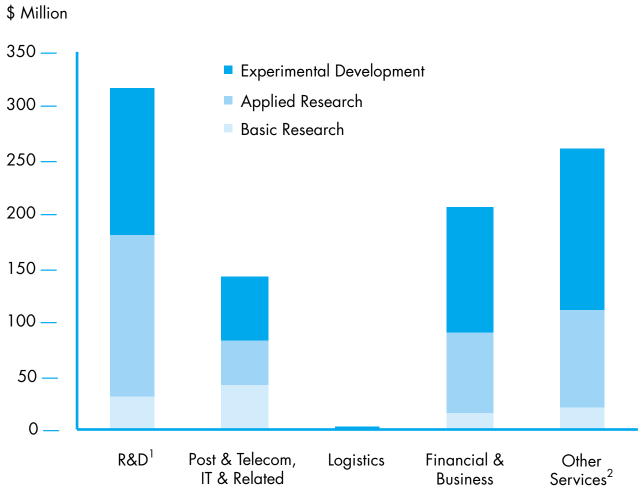
**PRIVATE SECTOR R&D EXPENDITURE** [Chart 9.4]




**DISTRIBUTION OF R&D EXPENDITURE IN THE MANUFACTURING INDUSTRIES IN 2004** [Chart 9.5]




**DISTRIBUTION OF R&D EXPENDITURE IN THE SERVICES INDUSTRIES IN 2004** [Chart 9.6]




[1] Firms with R&D in life sciences, electronics, chemicals, engineering, IT and other natural sciences as their primary activity.
[2] Mainly firms involved in the distribution and servicing of machinery, electrical and pharmaceutical goods.

## Patenting Indicators[2]

Patenting activities in Singapore continued to grow in 2004. The number of patent applications increased 26 per cent from 1,001 in 2003 to 1,257 in 2004. The number of patent awards rose 30 per cent from 460 in 2003 to 599 in 2004. The private sector accounted for 62 per cent of applications and 72 per cent of awards; the A*STAR research institutes 18 per cent of applications and 16 per cent of awards; the higher education sector 20 per cent of applications and 9.8 per cent of awards; and the Government sector 0.9 per cent of applications and 1.7 per cent of awards. R&D expenditure per patent application decreased marginally from $3.4 million in 2003 to $3.2 million in 2004.

[2] Excludes patenting data from Intellectual Property of Singapore (IPOS). Since 2002, the R&D survey publishes only the patenting data of survey respondents.

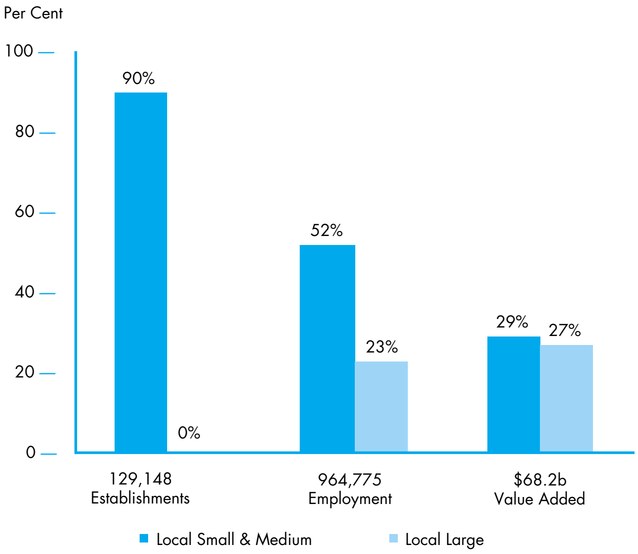
## LOCAL ENTERPRISES

### Performance of Local Enterprises

(Chart 9.7)

In 2003, local enterprises constituted 90 per cent of all establishments in the manufacturing and services sectors, employing 74 per cent of workers in these sectors. Their contribution to total value added was 56 per cent.

**LOCAL ESTABLISHMENTS IN MANUFACTURING AND SERVICES, 2003** [Chart 9.7]




### Promising Local Enterprises

The Promising Local Enterprises (PLE) Programme, launched in 1995, has achieved its target of developing 100 PLEs with turnover of at least $100 million each by 2005. To date, more than 530 companies have benefited from the PLE initiative. As at 2005, 102 of them achieved a turnover of more than $100 million. The average revenue per PLE for 2005 was $92 million, an increase from $76 million in 2004.

PLEs in the manufacturing sector committed a total of about $664 million in fixed assets investment in 2005. These projects would generate value added of $588 million and create some 3,731 jobs when they are fully realised. In the services sector, PLEs contributed $65 million in total business spending (TBS) for projects committed in 2005, generating value added of $148 million and some 600 jobs.

### Growth Strategies

#### *Co-investment*

(Table 9.4)

PLE Investments Pte Ltd has to-date cumulatively committed $78 million equity injection in 16 projects, of which 15 are invested in Singapore-based PLEs. One investment involves an overseas enterprise that plans to list on the Singapore Exchange (SGX), thus generating economic spin-offs for Singapore. The investment in the 15 Singapore-based PLEs are mostly in precision engineering, electronics and exportable services.

**PERFORMANCE OF PORTFOLIO COMPANIES UNDER PLE INVESTMENTS AS AT DECEMBER 2005**
[TABLE 9.4]

| | |
|---|---|
| NO. OF SINGAPORE PLE PROJECTS INVESTED | 15 |
| TOTAL REVENUE | $1.07 billion |
| VALUE ADDED | $242 million |
| NO. OF INVESTEES WITH IN-HOUSE R&D | 11 |
| NO. OF INVESTEES WITH REGIONAL PRESENCE | 11 |
| TOTAL LOCAL EMPLOYMENT | 1,700 |
| VALUE ADDED PER WORKER | $142,000 |
| COMPANIES ACHIEVED REVENUE > $100 MILLION | 4 |
| COMPANIES LISTED IN SGX AFTER PLEI INVESTED | 5 |

Source: Economic Development Board

### *Collaboration*

The Local Industry Upgrading Programme (LIUP) helps to deepen existing relationships and forge strategic alliances between Singapore-based MNCs (LIUP partners) and local companies. The number of LIUP partners rose from 137 in 2004 to 142 by end 2005. Some 1,500 local companies have also benefited from LIUP, an increase from 1,360 local companies in 2004.

### *Capability and Innovation Development*

In 2004, a total of 13 PLEs were awarded grants under EDB's Innovation Development Scheme (IDS), which encourages the development of a culture of pervasive innovation in Singapore-based companies.

### *Enterprise 50 and Public Listings*

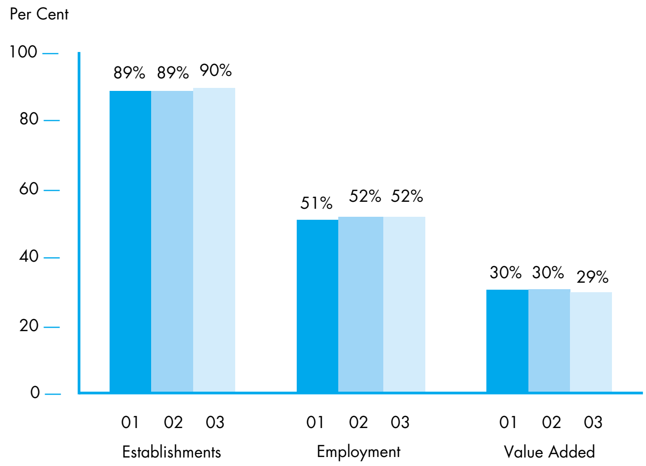
PLEs continued to leverage on the Enterprise 50 (E50) competition, which recognises the achievements of the 50 top privately-held local companies. In 2005, PLEs accounted for 23 of the top 50 local companies in the E50 awards. Seven PLEs were publicly listed in 2005.

### Small and Medium-Sized Enterprises (SMEs)

(Chart 9.8)

In 2003, local SMEs comprised 90 per cent of the total enterprises in the manufacturing and services sectors, employing 52 per cent of workers in these sectors and contributing 29 percent of the total value added. To enhance SMEs' competitiveness, four strategies are adopted. They are: nurturing a pro-business environment that encourages enterprise formation and growth; enhancing productivity, innovation and capabilities of enterprises; increasing access to markets and business opportunities; and supporting and driving the development of key industries.

**SMEs' SHARE OF MANUFACTURING AND SERVICES** [Chart 9.8]



## (1) Nurturing a Pro-Business Environment

### *Broad-Based Assistance*

*SME First Stop*

The SME First Stop was set up in 1998 to serve as a convenient first point of contact for SMEs to access information on Government assistance and regulations governing their business. In 2005, it facilitated some 7,700 cases of enquiries, bringing a total of 61,450 since its launch.

*Enterprise Development Centres*

To widen the reach to SMEs, Enterprise Development Centres (EDCs) have been set up. The EDCs provide first-level advisory and diagnostic services and second-level consultancy services for SMEs requiring in-depth consultancy for more complex process and system changes. Two such centres, EDC@ASME and EDC@SMa were launched in 2005, at the Associations of Small and Medium Enterprises (ASME) and Singapore Manufacturers' Federation (SMa), respectively.

### *Access to Finance*

*Deal Flow Connection*

Deal Flow Connection (www.dealflow.org.sg) is a platform that links SMEs seeking funds with financiers and investors through the help of financial intermediaries. In 2005, more than 250 matches were facilitated. Besides matching services, the portal also offers entrepreneurs access to information and advice on finance-related issues.

*SME Credit Bureau*

SME Credit Bureau is Singapore's first central database on credit-related information on SMEs. It aims to enhance the credit transparency of SMEs and lessen the challenges they face in obtaining financing. It was launched in March 2005, together with the Association of Small and Medium Enterprises, Singapore Business Federation and Infocredit D&B (Singapore) Pte Ltd.

*SME ACCESS Loan*

A new SME financing scheme, SME ACCESS Loan, which taps funds from the capital market was launched in April 2005. The new scheme is specially designed for SMEs with limited track record, constrained by lack of collateral or faced difficulty in getting loans for internationalisation.

*Loan Financing Schemes*

Local Enterprise Finance Scheme (LEFS) offers fixed interest rate loans to help enterprises upgrade and expand their operations. Loan Insurance Scheme (LIS) provides an alternative access to financing through the use of loan insurance. Under LIS, Participating Financial Institutions (PFIs) have the added flexibility of using their own funds to package attractive loan facilities for the enterprises based on their risk profile. A portion of the loans will be insured against default risks. A total of 5,919 LEFS/LIS applications, amounting to $699 million were approved in 2005. Some 3,207 enterprises took up LEFS/LIS for the first time in 2005.

### *Entrepreneurship Promotion*

*BlueSky Exchange, BlueSky Evening & BlueSky Festival*

The Action Community for Entrepreneurship (ACE) organises activities regularly to promote dialogue and networking among entrepreneurs. The BlueSky Exchange is a roundtable discussion between entrepreneurs and ACE members where they can bring up issues, suggest ideas and seek help and advice for their business. The BlueSky Evening is an informal networking session for entrepreneurs and aspiring entrepreneurs to build contacts, and share and learn from one another. In 2005, some 640 entrepreneurs attended the dialogue and networking sessions organised by ACE. The second BlueSky Festival to celebrate and showcase the spirit of entrepreneurship, organised in July 2005, attracted some 1,200 participants and 8,500 visitors.

*Entrepreneurial Talent Development Fund*

The $25 million Entrepreneurial Talent Development Fund was set up in June 2004 to develop entrepreneurial talent by encouraging "learning by doing". A total of 300 students from eight institutes of higher learning are expected to participate in 70 business ventures over the next five years. As at end 2005, 22 student business ventures worth $900,000 were funded.

## (2) Enhancing Productivity, Innovation and Capabilities of Enterprises

*Local Enterprise Technical Assistance Scheme*

The Local Enterprise Technical Assistance Scheme (LETAS) provides assistance to SMEs to defray the cost of engaging consultants to upgrade and modernise their business operations in the areas of IT and quality management systems. A total of 1,264 LETAS applications, amounting to $7.6 million, were approved in 2005. 962 companies took up LETAS for the first time in 2005.

*BrandPact™*

The $20 million capability development initiative – BrandPact™ – was launched in April 2005. It includes brand training workshops, brand diagnostics, online resources as well as financial support for local enterprises as they grow and expand within Singapore and into the global markets. The aim is to raise awareness and understanding of branding among enterprises, develop brand-savvy executives and catalyse the adoption of branding as a strategy for business competitiveness.

## (3) Increasing Access to Markets and Business Opportunities

*Access to Government Procurement Opportunities*

The rules and regulations of Government Procurement were eased in 2004 to give SMEs greater access to Government projects. A seminar was organised in June 2005 to brief some 500 SMEs on the new Government procurement rules. A new guidebook, "The Government Procurement Guide for SMEs", was also launched at the seminar to help SMEs access information on Government Procurement procedures and guide them on how to participate in Government projects.

*Access to Business Opportunities in FTA-Partner Markets*

Awareness among SMEs on trading in goods and services under the Free Trade Agreements (FTAs) framework was created through guidebooks, seminars and news alert. This has helped SMEs leverage on the FTAs Singapore has concluded with key trading partners such as the US, European Free Trade Area, Japan, Australia and New Zealand. In 2005, some 670 SMEs were reached through the various awareness programmes.

## (4) Supporting and Driving the Development of Key Industries

### *Partnering Industry to Develop Key Sectors*

*Local Enterprise and Association Development Programme*

The Local Enterprise and Association Development (LEAD) programme was launched in May 2005. A total of $50 million has been set aside to develop industry capabilities and grow SMEs in key industries. The programme also aims to strengthen the leadership of the industry associations so that they play an instrumental role in the improvement and upgrading of their industries.

### *Retail*

*Warehouse Retail Scheme*

A new Warehouse Retail Scheme (WRS) was piloted in 2005 with three retailers - Ikea, Courts and Giant. The projects are expected to generate a capital investment of about $200 million and 1,700 jobs. The retailers will house their regional activities and flagship stores in a land area of 9.3 ha at Tampines.

*Customer Centric Initiative*

A Customer Centric Initiative (CCI) for the Retail Sector was launched in August 2005. It is a nation-wide programme aimed at transforming Singapore's service standards in the retail industry, and encouraging companies to be committed to service excellence. As at 2005, 20 retailers with some 900 outlets and 20,000 service staff in Singapore had participated in this initiative.

### *Food Manufacturing*

*HACCP System*

Two food safety certification initiatives were introduced to encourage food manufacturers to adopt the Hazard Analysis and Critical Control Point (HACCP) system. The HACCP Toolkit, a self-help tool for HACCP implementation, was pilot-tested with ten food manufacturers and launched in December 2004. An Accreditation Scheme for HACCP Certification Bodies was introduced in 2005. As HACCP is recognised by food safety professionals and regulators worldwide, these initiatives will help HACCP-certified food manufacturers gain greater access to overseas markets.

*Singapore Premium Food Gifts Programme*

The Singapore Premium Food Gifts (SPFG) programme was launched in 2002 to upgrade the capabilities of food companies so that they can create higher value products for the tourist and export market. More than 50 popular local dishes have been developed and packaged as food gifts. The latest collection of food gifts was launched in May 2005. At the same time, a hybrid retail-cum-food & beverage concept was set up to market the food gifts. The S.P.F.G. Boutique Café at Singapore Changi Airport Terminal 1 is the first such shop dedicated to selling a comprehensive range of Singapore Premium Food Gifts.

### *Transport Engineering*

*Auto-Ignite*

A multi-agency initiative, known as "Auto-Ignite", was launched in October 2005, with the aim to double the revenue of automotive supporting industry from about $457 million a year to $1 billion over the next three years. Auto-Ignite will focus on market and capability development for the automotive industry and will provide technical and financial assistance to aspiring and existing automotive players.

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