Chapter 9

MANUFACTURING

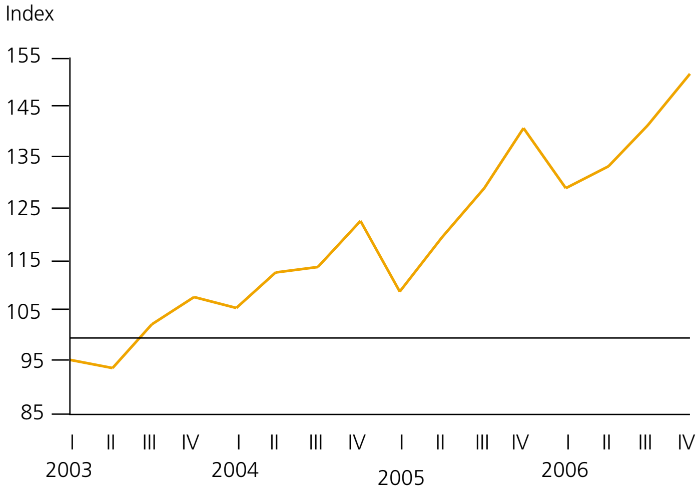
OVERVIEW

[Chart 9.1]

The manufacturing sector eased in the fourth quarter of 2006 to grow by 7.7 per cent compared with 9.5 per cent in the previous quarter. This was due to moderated growth in the transport engineering and precision engineering clusters as well as output declines in the electronics and chemicals clusters, which partly offset the stronger performance in the biomedical manufacturing and general manufacturing clusters.

For the year as a whole, the sector grew 12 per cent in 2006, up from 9.5 per cent in 2005. Among industry clusters, the transport engineering and biomedical manufacturing clusters were stronger performers. Excluding the biomedical manufacturing cluster, manufacturing output increased 9.1 per cent.

INDEX OF INDUSTRIAL PRODUCTION
TOTAL MAUFACUTRING (2003 = 100)
[Chart 9.1]



PERFOMANCE OF CLUSTERS

[Tables 9.1, A9.1-A9.4 and Chart 9.2]

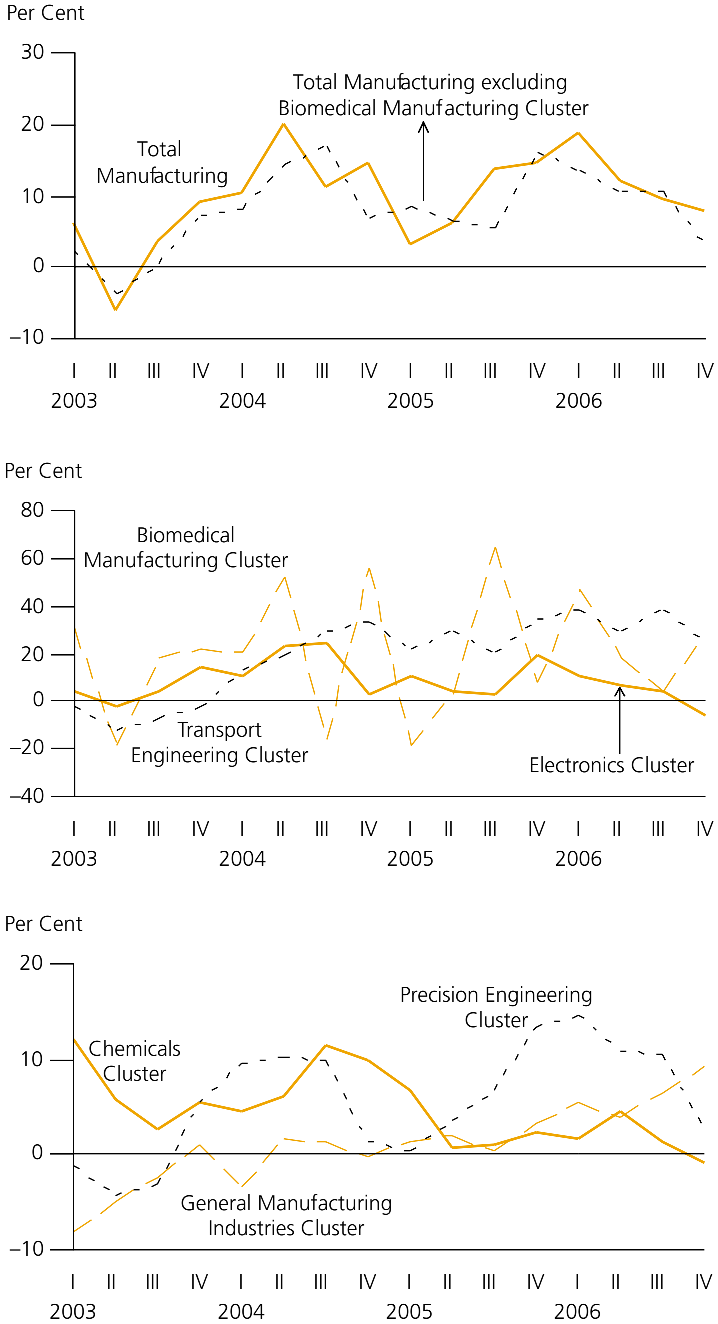
Another sparkling year for the marine and offshore segment...

The transport engineering cluster recorded sterling growth of 32 per cent in 2006, extending the 27 per cent surge in 2005. Within the cluster, the marine and offshore engineering segment expanded substantially by 43 per cent on the back of continued vigour in shipbuilding, ship repair and oil rig building activities. Producers of oil field equipment also benefited from robust demand, especially from the Middle East, the US and Asia.

Another sterling performance by the marine and offshore engineering segment.

CHANGES IN INDEX OF INDUSTRIAL PRODUCTION

[Chart 9.2]



MANUFACTURING
[TABLE 9.1]

	2006 Value Added (% Share)	2005		2006				2006
		4th Qtr	Annual	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual
		Percentage Change Over Same Period Of Previous Year						
INDEX OF INDUSTRIAL PRODUCTION (2003 = 100)								
Electronics	28.8	19.8	9.2	10.4	7.2	3.8	–6.2	3.2
Chemicals	13.9	2.4	2.7	1.7	4.5	1.5	–0.7	1.7
Precision Engineering	12.6	13.4	6.1	14.6	10.8	10.5	3.1	9.5
Transport Engineering	11.2	34.7	26.8	38.5	28.9	38.9	24.8	32.3
General Manufacturing Industries	8.9	3.3	1.8	5.5	4.0	6.5	9.3	6.3
Total Manufacturing Excluding Biomedical Manufacturing	75.4	16.3	9.2	13.4	10.5	10.7	3.1	9.1
Biomedicals Manufacturing	24.6	7.6	10.7	47.5	18.2	4.7	27.0	22.5
Total Manufacturing[1]	100.0	14.4	9.5	18.6	11.9	9.5	7.7	11.5

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

Source: Economic Development Board

The aerospace segment grew 18 per cent, supported by rising demand for commercial aircraft repair jobs as a result of the proliferation of budget air travel in the region. The land transport segment also posted double digit growth of 11 per cent, on the back of higher production of vehicle parts and components.

The biomedical manufacturing cluster expanded by 23 per cent, up from 11 per cent in 2005. While the pharmaceuticals segment grew 27 per cent, the medical technology segment contracted 4.3 per cent. Output of pharmaceuticals was higher, due to the wider variety of active pharmaceutical ingredients produced. The decline in the medical technology segment was due to fewer overseas orders for medical equipment and appliances.

The precision engineering cluster rose by 9.5 per cent, up from 6.1 per cent in 2005. Growth came mostly from the machinery and systems segment, which jumped 20 per cent on the back of brisk overseas orders for lifting machinery, air-conditioning equipment, compressors and machine tools. The precision modules and components segment grew 3.5 per cent. Slower growth in the electronics cluster also resulted in fewer orders for metal and plastic precision components, metal stampings and electroplating services.

Growth in the electronics cluster moderated from 9.2 per cent to 3.2 per cent in 2006, as expansion in the semiconductors segment was offset by declines in the data storage, infocomms and consumer electronics, and computer peripherals segments. Production of semiconductors surged 28 per cent in 2006, with growth of above 30 per cent in the first three quarters. However, fourth quarter growth tapered off to 13 per cent, reflecting slower global demand. The data storage segment shrank 28 per cent in 2006, due mainly to the relocation of production offshore. The 12 per cent contraction in the infocomms and consumer electronics segment was due to lower output of PCs, mobile handsets and consumer electronics products. The computer peripherals segment shrank by a smaller 3.8 per cent compared to the 6.0 per cent drop in the preceding year, due to lower production of office automation equipment and supplies.

The chemicals cluster grew by 1.7 per cent, down from 2.7 per cent in 2005 as the contraction in the petroleum segment partly offset the expansion in other segments. Lower refining margins, weaker demand together with some maintenance shutdowns brought output down by 2.7 per cent from 2005. The petrochemicals and specialty chemicals grew at 5.2 per cent and 5.1 per cent respectively.

The general manufacturing industries cluster grew 6.3 per cent, up from 1.8 per cent a year ago. The printing and food industries rose by 4.3 and 4.2 per cent respectively while the miscellaneous industries expanded 9.1 per cent over the year.

INVESTMENT COMMITMENTS

[Tables 9.2, A9.5-A9.6 and Chart 9.3]

Investor confidence in our manufacturing sector remained strong…

Investments in manufacturing remained strong in 2006. In the final quarter, some $2.9 billion of investment commitments in fixed assets were received. For the full year, the sector attracted $8.8 billion of investment commitments, up from $8.5 billion in 2005. When fully operational, these commitments would generate almost $7 billion of value added and create 16,200 jobs, of which 56 per cent are skilled.

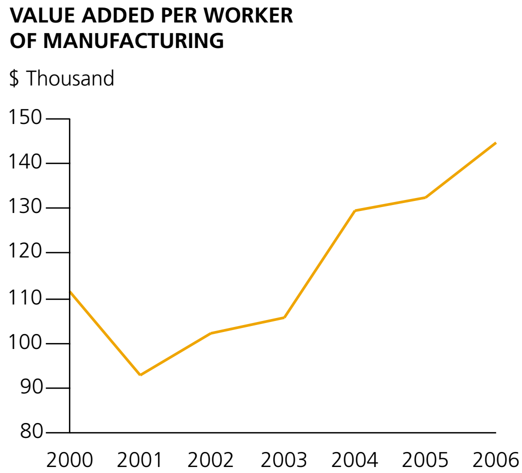
Electronics, chemicals and BMS accounted for most of new investment commitments.

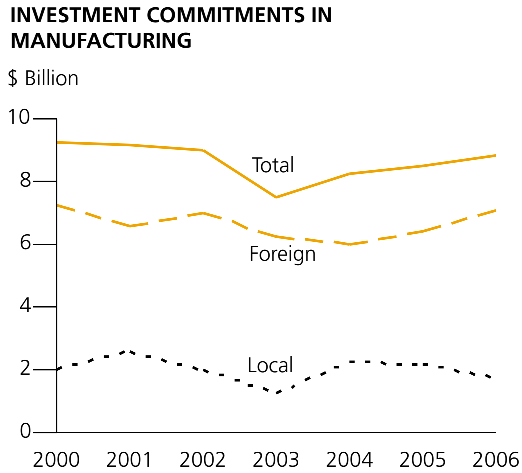
Collectively, EU investors (mainly from Netherlands, Germany, UK, France and Italy) committed slightly over $2.3 billion, or 26 per cent of the total. This was a shade above the total committed by US investors, which accounted for 25 per cent. The next largest sources came from local and Japanese investors, who committed 19 per cent and 14 per cent respectively.

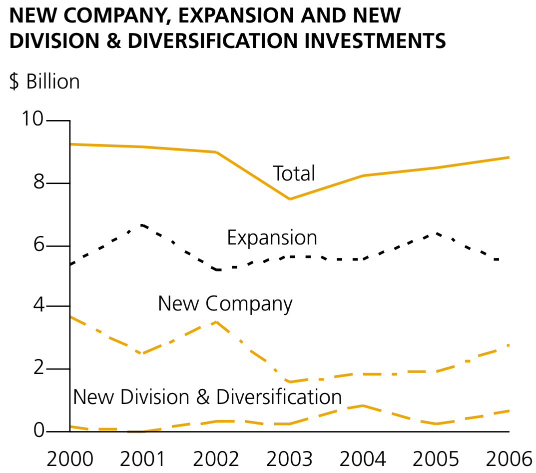
About 88 per cent of the commitments went to projects in the electronics, chemicals and biomedical manufacturing clusters, which attracted $4.3 billion, $2.6 billion and $0.9 billion respectively. For the precision engineering and transport engineering clusters, investment commitments amounted to $0.4 billion and $0.5 billion respectively.

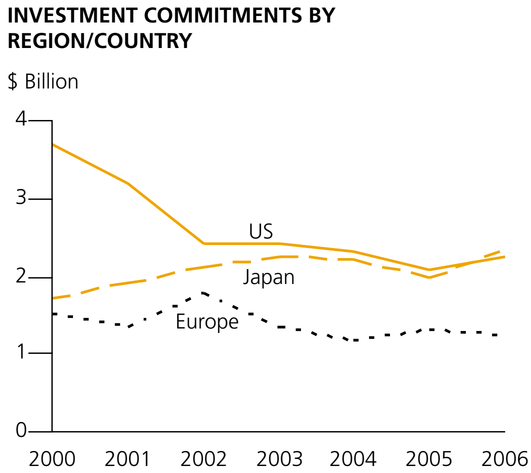
KEY INDICATORS IN THE MANUFACTURING SECTOR

[Chart 9.3]









MANUFACTURING INVESTMENT COMMITMENTS BY CLUSTER, 2006

[TABLE 9.2]

Cluster	Fixed Assets Investment ($ Billion)	Fixed Assets Investment (%)	Value Added ($ Billion)	Value Added (%)	Employment (No)	Employment (%)	Skilled & Above (%)
Electronics	4.34	49.1	3.00	43.0	7,400	45.7	78
Chemicals	2.57	29.1	0.59	8.5	800	4.9	81
Biomedical Manufacturing	0.90	10.2	2.02	28.9	600	3.7	51
Precision Engineering	0.41	4.6	0.50	7.2	1,900	11.7	52
Transport Engineering	0.47	5.3	0.62	8.9	4,400	27.2	56
General Manufacturing Industries	0.15	1.7	0.25	3.6	1,100	6.8	41
TOTAL	8.84	100.0	6.98	100.0	16,200	100.0	56

Note: Figures may not add up due to rounding.

Source: Economic Development Board

RESEARCH & DEVELOPMENT (R&D)

Steady growth in Singapore's R&D capabilities…

R&D EXPENDITURE

[Table 9.3]

Gross expenditure on R&D (GERD) increased nearly 13 per cent from $4.1 billion in 2004 to $4.6 billion in 2005. Private sector expenditure on R&D jumped 17 per cent from $2.6 billion to $3.0 billion in 2005, accounting for 66 per cent of GERD. The manufacturing sector accounted for 65 per cent of private sector expenditure on R&D in 2005.

Public sector expenditure on R&D grew 5.4 per cent from $1.5 billion in 2004 to nearly $1.6 billion. Of the total, the public research institutes accounted for slightly over 40 per cent ($630 million); the higher education sector, 31 per cent ($478 million); and the government sector, 29 per cent ($443 million).

As a percentage of GDP, GERD climbed from 2.2 per cent in 2004 to 2.4 per cent in 2005. Private expenditure on R&D also rose from 1.4 per cent to 1.6 per cent in 2005.

Singapore's R&D intensity (measured by GERD as a percentage of GDP) has surpassed the OECD average (almost 2.3 per cent in 2004) and the EU-15 average (1.9 per cent in 2003), but it is below that of the US (2.7 per cent in 2004) and Japan (3.1 per cent in 2004). Relative to small advanced countries, Singapore's R&D intensity is ahead of that of Ireland (1.2 per cent in 2004) the Netherlands (1.8 per cent in 2004) and approaches that of Denmark (2.5 per cent in 2004), but it trails that of the world leaders: Israel (4.7 per cent in 2005), Sweden (4.0 per cent in 2003), Finland (3.5 per cent in 2004) and Switzerland (2.9 per cent in 2004). Among the Newly Industrialized Economies, Singapore's R&D intensity trails that of Taiwan (2.6 per cent in 2004) and South Korea (2.9 per cent in 2004).

R&D EXPENDITURE

[TABLE 9.3]

	Gross Expenditure on R&D (GERD) ($ Million)	Private Sector Expenditure on R&D ($ Million)	Public Sector Expenditure on R&D ($ Million)	Private Sector's Share of GERD (%)	GERD as % of GDP (%)	Private Sector Expenditure on R&D as % of GDP (%)
2000	3,010	1,866	1,143	62.0	1.9	1.2
2001	3,233	2,045	1,188	63.3	2.1	1.3
2002	3,405	2,091	1,313	61.4	2.2	1.3
2003	3,424	2,081	1,343	60.8	2.1	1.3
2004	4,062	2,590	1,472	63.8	2.2	1.4
2005	4,582	3,031	1,551	66.2	2.4	1.6

Source: Agency for Science, Technology and Research

R&D MANPOWER

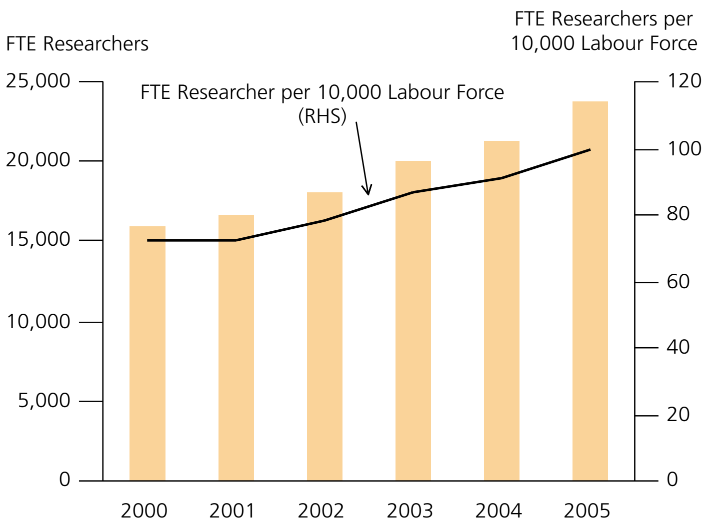
[Chart 9.4]

The full-time equivalent (FTE) number of researchers in Singapore rose by more than 11 per cent to 23,789 in 2005. The FTE number of researchers per 10,000 labour force also climbed from 91 in 2004 to 100 in 2005.

In the private sector, the FTE number of researchers expanded 14 per cent to 14,238 in 2005. In terms of educational profile, 6.3 per cent (893) of the private sector researchers were PhD holders, 21 per cent (3,007) Master degree holders and 56 per cent (7,930) Bachelor degree holders.

In the public sector, the FTE number of researchers, excluding the full-time postgraduate research students, climbed 12 per cent to 5,834 in 2005. The number of full time postgraduate research students increased 0.4 per cent to 3,718 in 2005. Excluding full time postgraduate research students, 39 per cent (2,252) of public sector researchers were PhD holders, 28 per cent (1,613) Master degree-holders and 32 per cent (1,851) Bachelor degree-holders. Among the full-time postgraduate research students in 2005, 28 per cent (1,043) were enrolled on Master degree programmes and 72 per cent (2,675) on PhD programmes.

RESEARCHERS [Chart 9.4]



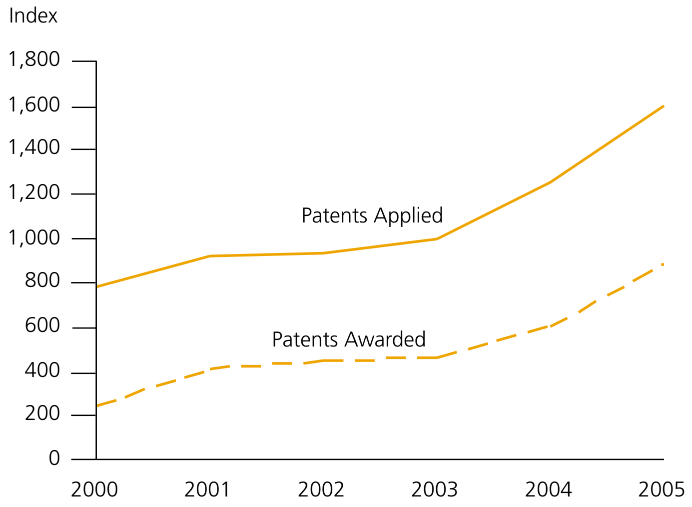
PATENTING ACTIVITY OF R&D PERFORMERS

[Chart 9.5]

The patenting activity of R&D performers in Singapore continued to grow in 2005. The number of patent applications increased 27 per cent to 1,594 in 2005, and the number of patent awards increased 46 per cent to 877 in 2005. The private sector accounted for 73 per cent of the patent applications and 83 per cent of the patent awards of the R&D performers in 2005.

PATENTING INDICATOR

[Chart 9.5]



LOCAL ENTERPRISE DEVELOPMENT

SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)

(1) Nurture a Pro-Business Environment that Supports Enterprise Formation and Growth

Entrepreneurship Promotion and Development

BlueSky Exchange & Evening and BlueSky Festival

The Action Community for Entrepreneurship (ACE) organises activities regularly to promote dialogue and networking amongst entrepreneurs. The BlueSky Exchange and Evening is a networking session for aspiring entrepreneurs and start-ups to establish contacts with financiers, professionals and the more established entrepreneurs. In 2006, some 600 entrepreneurs attended the networking sessions. The BlueSky Festival is held annually to celebrate and showcase the spirit of entrepreneurship. The third BlueSky Festival held in July 2006, which also featured an investment forum, attracted another 600 participants.

Access to Finance

Over-the-Counter (OTC) Capital

A new trading platform was introduced in July 2006. Known as the Over-the-Counter (OTC) Capital, it allows SMEs with high growth potential but not ready for main board listing to access private equity financing. The OTC Capital seeks to help SMEs raise capital by offering new shares to interested investors without the need for a costly prospectus.

SME ACCESS Loan

The SME ACCESS Loan was launched in April 2005 to tap funds from the capital market. It has since generated $100 million of loans for some 400 SMEs, of which about half have limited collateral, track record or face difficulties in getting funds for internationalisation. The success of the SME ACCESS Loan has also indirectly catalysed the generation of securitised loans by financial institutions.

Loan Financing Schemes

The Local Enterprise Finance Scheme (LEFS) offers fixed interest rate loans to help enterprises upgrade and expand their operations, while the Loan Insurance Scheme (LIS) is a variable-cost financing scheme in which a portion of the loans will be insured against default risks. More than 3,000 LEFS/LIS loans amounting to $490 million were extended to SMEs in 2006.

Business Support Services

EnterpriseOne

EnterpriseOne was officially launched in February 2006 as the one-stop business information network for SMEs. EnterpriseOne consists of 2 key pillars: an enterprise-centric *business.gov.sg* online portal supported by a telephone hotline; and a network of Enterprise Development Centres (EDCs), offering face-to-face business advisory and consultancy services to enterprises. Two new EDCs were launched in 2006: EDCs at the Singapore Chinese Chamber of Commerce and Industry and the Malay Chamber of Commerce and Industry. The EDCs at the Association of Small and Medium Enterprises and the Singapore Manufacturers' Federation were launched in 2005.

(2) Support and Drive the Development of Key Industries

Building Industry Capabilities and Critical Infrastructure

Local Enterprise and Association Development Programme

The 3-year $50 million Local Enterprise and Association Development (LEAD) Programme was launched in May 2005. It aims to strengthen the leadership of industry associations so that they can play an instrumental role in the improvement and upgrading of their industries. The programme supports the development of industry roadmaps comprising key projects to develop industry capabilities and help SMEs grow. Since the launch, 13 industry associations have been supported under LEAD.

SME Training for Enhanced Performance and Upgrade and Workforce Skills Qualifications

A new training programme to address training needs of SMEs - SME Training for Enhanced Performance and Upgrade (Step-UP) - was launched in July 2006. Seven Step-UP courses for trainees in the textile and apparel, and furniture industries were supported in 2006. Workforce Skills Qualifications were also developed for the food and beverage, and precision engineering industries.

Capability Development Programme

A 5-year $35 million Capability Development Programme was launched in October 2006. It aims to upgrade the capabilities of SMEs to enable them to move up the value chain and provide better support to large enterprises. The marine and logistics industries were the first two industries to tap into the programme.

(3) Enhance Capabilities of Enterprises

Upgrading of IT and Quality Management Systems

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. Some 1,000 SMEs were supported with $6 million LETAS grants in 2006.

Technology Innovation

Technology Innovation Programme

The 5-year $150 million Technology Innovation Programme (TIP) was launched in August 2006 to encourage SMEs to build technology capabilities. The programme supports enterprise-level technology innovation projects, secondments of experts from A*STAR Research Institutes to SMEs and Institutions of Higher Learning, and industry-specific Centres of Innovations. 3 Centres of Innovations for the food, marine, and environmental industries will be set up in the first half of 2007 to enhance the technology infrastructure for SMEs in these industries.

Business Excellence

SME Management Action for Results

The SME Management Action for Results (SMART) Initiative was launched in October 2006. It aims to assist 300 SMEs to develop their business management capabilities in a systematic manner to enhance their competitiveness and grow their business over the next three years. Under the initiative, a pool of qualified consultants will be assigned to assist SMEs identify and implement initiatives for strengthening their business management systems and processes.

(4) Increase Access to Markets and Business Opportunities

Lowering the Technical Barriers to Trade

Export Technical Assistance Centre

The Export Technical Assistance Centre (ETAC) was launched in October 2006 to provide information and advisory services to help SMEs understand and comply with standards and technical regulations in overseas markets. To date, the ETAC has responded to enquiries from the food, electrical and electronics, machinery equipment and biomedical devices industries.

Access to Business Opportunities

SBF Global Sourcing Hub

The SBF Global Sourcing Hub was launched in January 2006. It aims to raise SMEs' awareness of business opportunities available in the private sector; showcase SME suppliers' products/services; and facilitate SMEs' participation in the e-marketplace by providing them a platform to transact online with corporate buyers. To date, some 64 buyer organisations and 1,700 suppliers have registered on the portal.

Contributed by:

Ms Kok Yit Hoe
Senior Officer
Research and Statistics Unit
Economic Development Board

Ms Dawn Lai
Assistant Head, Research & Statistics Unit
Policy Planning Department
Agency for Science, Technology and Research

Ms Shirley Wee
Senior Manager
Corporate Planning
SPRING Singapore

Leong Wai Ho
Senior Economist
Economics and Strategy Division
Ministry of Trade and Industry