

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	ii
COUNTRY ABBREVIATIONS	ii
EXECUTIVE SUMMARY	iv
MALAYSIA: KEY SOCIO-ECONOMIC INDICATORS, 1995-98	viii
CHAPTER 1	
INTRODUCTION	1
CHAPTER 2	
METHODOLOGY	4
2.1 Introduction	4
2.2 The Oslo Manual	4
2.3 Basic Definitions	5
2.4 Questionnaire Design	6
2.5 Sampling Methodology	7
CHAPTER 3	
TECHNOLOGICAL INNOVATION IN MALAYSIA	11
3.1 Introduction	11
3.2 Technological Innovation in the Manufacturing Sector	11
CHAPTER 4	
INNOVATION IN THE MANUFACTURING SECTOR	21
4.1 Introduction	21
4.2 Profile of Innovative Companies	21
4.3 Innovation: Patterns and Activities	27
4.4 Resources Devoted to Innovation	38
4.5 Impact of Innovation	40
4.6 Factors Hampering Innovation	47
4.7 Public Policies to Encourage Innovation	49
CHAPTER 5	
INTERNATIONAL COMPARISONS	50
5.1 Introduction	50
5.2 Economic Characteristics of Countries Compared	50
5.3 Characteristics of Innovation Surveys from Other Countries	52
5.4 Innovation in the Manufacturing Sector	53
BIBLIOGRAPHY	
APPENDIX A: TABLES	
APPENDIX B: STAGE 1 SURVEY QUESTIONNAIRE	
APPENDIX C: STAGE 2 SURVEY QUESTIONNAIRE	

ACKNOWLEDGEMENTS

This study on the National Survey of Innovation In Industry 1999 by Malaysian Science and Technology Information Centre (MASTIC), Ministry of Science, Technology and the Environments (MOSTE) is a project that requires close cooperation among several quarters throughout the nation.

MASTIC would like to acknowledge the following for their support to the materialisation of this report:

- Secretary General of MOSTE;
- Members of Technical Committee;
- University Malaya Consultancy Unit;
- Researchers Team, Mrs. Ong Fon Sim and Dr. Cassey Lee Hong Kim; and
- Respondents

While it would be impossible to thank each and every one involved, we sincerely appreciate their invaluable assistance throughout the study. Behind every demanding task there lies a group dynamic the elements of which are good insights, team spirit, understanding and cohesiveness.

LIST OF ABBREVIATIONS

CIS	Community Innovation Survey
CIS-2	Second Community Innovation Survey
CPI	Consumer Price Index
EC	European Commission
EEA	European Economic Area
GDP	Gross Domestic Product
GNP	Gross National Product
ICT	Information and Communication Technology
K-Economy	Knowledge Economy
MASTIC	Malaysian Science and Technology Information Centre
NIS	National Innovation Survey
NIS-1	First National Innovation Survey
NIS-2	Second National Innovation Survey
OECD	Organization for Economic Co-operation and Development
PPI	Producer Price Index
R&D	Research and Development
RM	Ringgit Malaysia
S&T	Science and Technology
SME	Small and Medium Enterprise
SMI	Small and Medium Industry
TPP	Technological Product and Process

COUNTRY ABBREVIATION

Country Abbreviation

Belgium	B
Germany	D
Denmark	DK
Spain	E
France	F
Italy	I
Ireland	IRL
Luxembourg	L
Netherlands	NL
Austria	A
Portugal	P
Finland	FIN
Sweden	S
United Kingdom	UK
Norway	NO
United States	US
Australia	AUS
Poland	PO
Canada	CA
Malaysia	MY

EXECUTIVE SUMMARY

The National Survey of Innovation 1997-1999 Report presents findings from the Second National Survey of Innovation carried out by the Malaysian Science and Technology Information Centre (MASTIC). The Survey attempts to collect data on the state of technological innovation in the Malaysian manufacturing sector during the period 1997-1999.

In the Survey, a total of 4,000 firms in the manufacturing sector were sent survey questionnaires. Of the 1,044 firms that responded, 217 (or 21%) indicated that they carried out innovation activities during the reference period of 1997-1999. The incidence of innovation varied from one industry to another. In general low-technology industries such as manufacture of wearing apparel, footwear, wood and cork products had very low incidence of innovation - less than 10% of firms in each of these industries carried out innovation activities.

Other low-technology and medium-low-technology industries were observed to have a fairly moderate level of innovation (between 10% to 30%). They include: food and beverage, textiles, paper and paper products, printing and publishing, plastic products, non-metallic mineral products, leather products, iron and steel basic, fabricated metal products, machinery and transport equipment.

A few low-technology and medium-low-technology industries registered very high incidence of innovation (between 30%-40%). They are tobacco, furniture and fixtures, industrial chemicals, miscellaneous petroleum and coal products, and rubber products. Two high-technology industries

showed high incidence of technological innovation: electrical machinery, apparatus, appliances and supplies, and professional and scientific equipment.

In terms of size (measured by employment size), innovating firms tend to be larger than non-innovating firms. About two-third of innovating firms are locally controlled firms (local ownership exceeding 50%). The remaining (33%) are foreign-controlled companies. In the case of non-innovating firms, a higher proportion (72%) are locally controlled firms. Most of the innovating firms (87%) and non-innovating firms (76) are limited companies (Sendirian Berhad). The characteristics of innovating firms also reflect the export-oriented industrialization process in Malaysia in the past thirty years. The majority of innovating firms (67%) were established in the past 20 years. Only 14% of the innovating firms did not export their products.

When innovating firms were asked to state their reason(s) for innovating, the most commonly cited objective was improving product quality. A total of 140 firms (or 76%) considered this objective to be "very important". The second most important objective of innovation was the opening-up of new markets.

Where do firms obtain information for innovation? For innovating firms, the most important source of information for innovation came from clients or customers. This suggests the importance of market-driven innovations. Information from within the company represented the second most important source of information for innovation. Interestingly, the three sources of information that were not considered to be important for innovation were: universities or other education institutes, patent disclosure, and government non-profit organizations. This strongly hints at the lack of commercial spillovers from public research.

In terms of public support for innovation, the most

commonly used types of incentives by innovating companies are the duty-free importation of machinery (41%) and tax incentives (29%). Commercialization of R&D fund was the least popular (3%).

How do innovating firms allocate their resources to achieve innovation? A total of 102 firms (47%) reported that resources were allocated to acquire machinery and equipment. Intramural R&D expenditure was the next important area that received allocation - from about 85 companies (39%). Resources devoted to training were not substantial with the majority of the companies spending less than RM100,000. This did not reflect the emerging trend towards the knowledge-based economy where human capital formation is critical.

How important is innovation to firms that carry it out? One measure of this is the innovation intensity, measured by total expenditure on innovation over total turnover. The survey findings indicate a low overall intensity at 1.4%. In terms of employment size, large companies (with 250 employees or more) had the highest level of intensity (8.3%). Wholly local-owned companies had a higher percentage of innovation intensity (2.3%) compared to the wholly foreign-owned ones (1.5%). Another measure of the impact of innovation is the number of patents and industrial design applied and granted. The innovative companies reported very low level of patents and industrial design applications. Only about 8% of the companies had applied for patent.

In the survey, firms were also asked about factors that hamper innovation. Overall, almost 50% of the companies faced problems in their innovative efforts, with some companies reporting projects as seriously delayed, abolished or not even started. The most common factor that hampered innovation was the high cost of innovation (cited as "very important" by 53 firms or 24% of the innovating firms). The economic crisis in 1997/98 was cited as a "very important" factor hampering

innovation by 27 firms (10%).

How does the state of technological innovation in Malaysia compare to these countries? Countries that have carried out innovation surveys in recent years include Australia, Canada, Holland, Poland, United States and countries from the European Economic Area (EEA). Most of these countries have GDP per capita that are three to four times that of Malaysia. In addition, the GDP share of the service sector in these countries is much higher (60%). About 53% of all firms in the manufacturing sector in the twelve EEA member countries were innovative during the period 1994-96. This incidence of innovation is 2.5 times the level observed in Malaysia (i.e. 21%). The incidence of innovation for Malaysia is slightly lower than observed in countries such as Australia (26%), Portugal (26%) and Spain (29%).

The innovation gap between firms in the EEA countries and Malaysia is larger for small (20-49 employees) and medium-sized firms (50-249 employees) compared large-sized firms (250 or more employees). The average incidence of innovation for small firms in EEA countries is 44% compared to 15% in Malaysia. For large firms, the average incidence of innovation in EEA countries is 79% or 2.5 times the rate observed for Malaysia (32%).

There are significant variations in innovation incidence across EEA countries for each industry in the manufacturing sector. However, the incidence of innovation observed is generally consistent with its technological content / classification. High-technology industries tend to have high incidence of innovation, for example, electrical and optical equipment (50-88% in EEA and 35% in Malaysia).

Malaysia: Key Socio-Economic Indicators, 1995-99

	1995	1996	1997	1998	1999
Population (million persons)	20.7	21.2	21.6	22.2	22.7
Labor Force (million persons)	8.3	8.6	9.0	8.9	9.0
Employment (million persons)	8.0	8.4	8.8	8.6	8.7
Unemployment (as a % of labor force)	3.1	2.5	2.4	3.2	3.0
GNP Per Capita (RM)	10,252	11,429	12,314	12,135	12,305
GNP Per Capita (US\$)	4,087	4,543	4,377	3,093	3,238
Real GDP (RM billion)	166.6	183.3	197.1	182.2	192.8
Real GNP (RM billion)	155.2	170.1	182.7	172.8	179.2
% Change in real GDP	9.8	10.0	7.5	-7.5	5.8
GDP by Industrial Origin (RM, Constant 1987 Prices)					
Agriculture, forestry and fishery	17,114	17,890	18,010	17,415	18,075
Mining & quarrying	13,643	14,040	14,305	14,424	13,974
Manufacturing	45,174	53,387	58,788	50,899	57,761
Construction	7,411	8,610	9,522	7,333	6,922
Services	85,348	92,963	102,163	101,452	104,782
CPI (1994 = 100)	3.4	3.5	2.7	5.3	2.8
PPI (1994 = 100)	3.9	2.3	2.7	10.7	-3.3
Merchandise balance (RM billion)	0.1	10.1	10.3	69.2	86.5
Services balance (RM billion)	-19.2	-18.4	-22.7	-22.2	-32.1
Current account balance (RM billion)	-21.6	-11.2	-15.8	37.4	47.9
Current account balance as a % of GDP	-9.7	-4.4	-5.6	13.9	17.1
Total external debt (RM billion)	85.0	97.8	170.8	163.0	161.6
Debt service ratio (% of exports of goods and services)	6.6	6.8	5.5	6.7	6.0
Annual population growth rate	2.8	2.4	1.9	2.8	2.4
Dependency Ratio	64.2	62.9	61.8	60.7	59.6
Life expectancy at birth (years):					
Male	69.4	69.3	69.6	69.7	69.8
Female	74.1	74.1	74.5	74.7	74.8
Population per doctor	2,177	2,076	1,521	1,477	1,465
Enrolment rate at primary schools (6-11 years old)	95.8	95.2	95.3	95.1	95.0

Source: Bank Negara Malaysia Annual Report
Economic Report, Ministry of Finance