

**STUDY ON  
THE INDUSTRIAL STANDARDIZATION  
AND  
QUALITY ASSURANCE IMPROVEMENT PROGRAMME  
IN  
MALAYSIA  
(SUMMARY)**

**JANUARY 1993**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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## Abbreviations

ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
AIST	Agency of Industrial Science & Technology (Japan)
AJDF	ASEAN-Japan Development Fund
AMTC	Advanced Manufacturing Technology Centre
ANSI	American National Standards Institute
APITD	Action Plan for Industrial Technology Development
APMC	Association Pan Malaysian Cement
ARQS	Assessment and Registration of Quality Systems
ASEAN	Association of South East Asian Nations
ASTM	American Society of Testing and Materials
AT & T	American Telegraph and Telephone
ATC	Appropriate Technology Centre
BCS	British Calibration Service
BNM	Bank Negara Malaysia
BS	British Standards
CAD	Computer-Aided Design
CAE	Computer-Aided Engineering
CAM	Computer-Aided Manufacturing
CBC	Chemical and Biochemical Centre
CBU	Completely Built-up Unit
CCIR	Consultative Committee on International Radio
CCITT	Consultative Committee on International Telegraph and Telephony
CE Meter	Carbon Equivalent Meter
CEO	Chief Executive Officer
CIAST	The Centre for Instructor and Advanced Skill Training
CKD	Completely Knocked Down
COC	Certificate of Competence Scheme
CPI	Consumer Price Index
CPIG	Concrete Products Industry Group
CPO	Crude Palm Oil
CRT	Cathod Ray Tube
CS	Canadian Standard
CSA	Canadian Standards Association
CTC	Ceramic Technology Centre
CUEPACS	Congress of Unions of Employees in the Public Civil Service
CWQC	Corporate-Wide Quality Control
DEC	Digital Equipment Corp.
DOA	Department of Agriculture

EDI	Electronic Data Interchange
EI	Electrical Inspectorate
EIA	Electronics Industry Association
EIAJ	Electronics Industry Association, Japan
EPU	Economic Planning Unit
EXCO	Executive Committee
FAMA	Federal Agricultural Marketing Authority
FMM	Federation of Malaysian Manufacturers
FMP	Fifth Malaysia Plan
FRIM	Forestry Research Institute of Malaysia
FTZ	Free Trade Zone
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product
GTZ	The German Agency for Technical Cooperation
HICOM	Heavy Industries Corporation of Malaysia
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HP	Hewlett-Packard Corp.
IC	Integrated Circuits
IC	Instrumentation Centre
ICA	Industrial Coordination Act
IEM	Institute Engineers Malaysia
IKM	Institut Kimia Malaysia (Mara Vocational Institute)
ILAC	International Laboratory Accreditation Conference
IMF	International Monetary Fund
IMP	Industrial Master Plan
INTAN	National Institute of Public Administration
IPQC	In-Process Quality Control
IOA	Institute of Quality Assurance
IQC	Incoming Quality Control
IQCM	Institute of Quality Control, Malaysia
ISC	Industry Standards Committee
ISDN	Integrated System Digital Network
ISO	International Organization for Standardization
ITAF	Industrial Technology Assistance Fund
ITM	Institut Teknologi MARA (MARA Institute of Technology)
ITU	International Telecommunication Union
JACTIM	The Japanese Chamber of Trade & Industry, Malaysia
JARING	Joint Academic/Advance Research and Integrated Networking
JAS	Japanese Agricultural Standards
JASO	Japanese Automobile Standards Organization



JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
JISC	Japanese Industrial Standards Committee
JKR	Development of Public Works
JMI	Japan Machinery & Metals Inspection Institute
JSA	Japanese Standards Association
JSAE	Society of Automotive Engineers of Japan, Inc.
JUSE	Union of Japanese Scientists and Engineers
KIS	Korean Industrial Standards
KS	Korean Standard
LCD	Liquid Crystal Display
LMW	Licensed Manufacturing Warehouse
LNG	Liquefied Natural Gas
LSI	Large Scale Integrated Circuits
MANPU	The Malaysian Administrative Modernization and Management Planning Unit
MARDEC	Malaysian Rubber Development Corporation
MARDI	Malaysian Agricultural Research Development Institute
MAYPAC	Malaysian Packet Services
MDP	Mandatory Deletion Programme
MDTCA	Ministry for Domestic Trade and Consumer Affairs
MEF	Malaysian Employees Federation
MELCOM	Matsushita Electric Company, Malaysia
METP	Ministry of Energy, Telecommunication and Posts
MEXPO	Malaysian Export Trade Centre
MFA	Multinational Fiber Agreement
MHLG	Ministry of Housing and Local Government
MIDA	Malaysia Industrial Development Authority
MIDEC	Metal Industry Development Centre
MIDF	Malaysian Industrial Development Finance
MIMOS	Malaysian Institute of Microelectronic Systems
MIMOS	Malaysian Institute of Microelectronics Systems
MITI	Ministry of International Trade and Industry (Japan)
MITI	Ministry of International Trade and Industry (Malaysia)
MNC	Multinational Corporation
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOL	Ministry of Labour
MOSTE	Ministry of Science, Technology and Environment
MOT	Ministry of Transport
MOU	Memorandum of Understanding
MPI	Ministry of Primary Industries
MS	Malaysian Standards

MTMA	Malaysian Textile Manufacturers Association
MTUC	Malaysian Trade Union Congress
MYS	Ministry of Youth and Sports
NAMAS	National Measurement Accreditation Service
NATA	National Association of Testing Authorities
NATLAS	National Testing Laboratory Accreditation Scheme
NAVLAP	National Voluntary Laboratory Accreditation Programme
NCR	National Cash Resister Corp.
NDP	National Development Policy
NEP	New Economic Policy
NFPEs	Non-financial Public Enterprises
NIEs	Newly Industrialized Economics
NIF	New Investment Fund
NIST	Agency of Industrial Science & Technology
NPC	National Productivity Corporation
NPL	National Physical Laboratory
NR	Natural Rubber
OECD	Overseas Economic Cooperation Fund
OEM	Original Equipment Manufacturer/Manufacturing
OJT	On the Job Training
OPP1	First Outline Perspective Plan
OPP2	Second Outline Perspective Plan
OQC	Outgoing Quality Control
OS	Operating System
PDC	Product Design Centre
PDC	Penang Development Centre
PIA	Promotion of Investment Act
PMD	Prime Minister's Department
PORIM	Palm Oil Research Institute of Malaysia
PROTON	Perusahaan Otomobil Nasional (National Automobile Industry)
PTC	Plastics Technology Centre, SIRIM
QCC	Quality Control Circle
QIP	Quality Improvement Practice
QM	Quality Management
QRSP	Quality and Reliability Society of Penang
QSCRS	Quality System Consultants Registration Scheme
R & D	Research and Development
REM	Replacement Equipment Manufacturer/Manufacturer
REM	Replacement Equipment Market
RRIM	Rubber Research Institute of Malaysia
RTC	Rubber Technology Centre

SAMM	Skim Akreditasi Makmal Malaysia
SIA	Semiconductor Industry Association of America
SILAS	SIRIM Laboratory Accreditation Scheme
SINGLAS	Singapore Laboratory Accreditation Scheme
SIRIM	Standards and Industrial Research Institute of Malaysia
SKD	Semi-Knocked Down
SMC	Standard Malaysian Cocoa
SME	Small and Medium Scale Enterprise
SMI	Small and Medium Scale Industries
SMP	Sixth Malaysia Plan
SMR	Standard Malaysian Rubber
SPM	Sijil Palajaran Malaysia (Malaysia Certificate of Education)
SQC	Statistical Quality Control
SRIJ	Society of Rubber Industry, Japan
SRIS	Society of Rubber Industry, Japan Standard
SRP	Sijil Rendat Palajaran (Lower Certificate of Education)
STANCO	Standards Committee
SUM	Science University of Malaysia
T/C	Technical Agreement
TAB	Tariff Advisory Board
TC	Technical Committee
TELARC	Testing Laboratory Accreditation Council
TEXPRO	Technical Services For Exporters Programme
TQC	Total Quality Control
TQM	Total Quality Management
TTC	Telegram and Telephone Committee
TV	Television Set
UN	United Nations
UOM	University of Malaysia
USM	Universiti Sains Malaysia (University of Science Malaysia)
UTM	Universiti Teknologi Malaysia (University of Technology Malaysia)
VAT	Value Added Tax
VLSI	Very Large Scale Integrated Circuits
WG	Working Group



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## **I. Background, Objective and Scope of Work of the Study**

### **1. Background of the Study**

The industrial standardization has been undertaken by SIRIM (The Standards and Industrial Research Institute of Malaysia) being the core body of enhancement and promotion activities under the jurisdiction of MOSTE (Ministry of Science, Technology and Environment). As for the quality management, there are three organizations for the promotion activities at the national level; namely, MANPU (The Malaysian Administrative Modernization and Management Planning Unit) in the government sector, and NPC (National Productivity Corporation) and SIRIM in the commercial and industrial sector.

Malaysia has promoted export-oriented industrialization, targeting the growth of the economy to become a fully developed nation by the year 2020.

The rapid industrialization of recent years in Malaysia has been promoted by active introduction of foreign investment. As a result, the export-oriented industries are dominated mainly by large business enterprises such as public (or ex-public) corporations and foreign invested firms. However, the development of supporting industries which supply parts and materials is still behind, and small and medium-scale industries (SMIs) engaged in those sectors have not reached a level that can produce quality products.

In order to overcome such shortcomings, efforts have been exerted to restructure domestic industries by enhancing SMIs as supporting industries for export related industries. In this connection, enhancement and promotion of the standardization and quality management in the industrial sector becomes more important and essential.

The Malaysian Government has decided to develop a comprehensive action program to enhance and promote standardization and quality management among the industry, and, in September 1990, requested the technical assistance of the Japanese Government for the study.

In response to the above request, JICA (Japan International Cooperation Agency) conducted a preliminary study mission in January 1991, and signed the Scope of Work (S/W) in agreement with EPU (Economic Planning Unit, Prime Minister's Department) for implementation of the study. This report presents the outcome of the study thus carried out by the study team of JICA in accordance with the agreed

Scope of Work.

## **2. Objective of the Study**

The Objective of the Study is to prepare a comprehensive plan of action through, among others,

- 1) Developing more effective programs for industrial standardization, certification and quality control,
- 2) Promoting activities of industrial standardization, certification and quality control, and
- 3) Upgrading capabilities of testing and inspection ("testing" means testing for standards development and product certification),

in order to improve the quality of Malaysian industrial products, thereby contributing to industrial development and export promotion.

## **3. Scope of the Study**

The scope of the Study is defined in the S/W which was agreed upon by the Malaysian Government and JICA on January 30, 1991. The scope includes the following items:

1. To study background and relevant conditions.
  - 1.1 Present status of industry
  - 1.2 Industrial standardization, and quality control for industrial products
  - 1.3 Comparison of the same situation in Japan
  - 1.4 Export conditions of Malaysian industrial products
  - 1.5 Government policies, laws and regulations for industrial development
2. To study present situation and future plan of industrial standardization, quality control and testing.
  - 2.1 Government policies, laws and regulations, and administrative mechanisms for industrial standardization (including certification systems), quality control and testing
  - 2.2 Personnel for industrial standardization, quality control and testing
  - 2.3 Methods of testing, inspection and calibration and their facilities

2.4 Adequacy of existing technical supports for standards and quality development

3. To review policies and strategies for development and promotion of industrial standardization, quality control and testing.

3.1 Policies, laws and regulations

3.2 Organization and function for development and promotion of industrial standardization, quality control and testing

3.3 Methods of testing, inspection and calibration

3.4 Facilities for testing and inspection

3.5 Personnel education and training for development and promotion (development) of industrial standardization, quality control and testing

3.6 Relation between Malaysian Government and private sector concerning industrial standardization, quality control and testing

4. To formulate a development and promotion program.

4.1 Promotion program for industrial standardization, quality control and testing

4.2 Estimate cost of development and promotion program

4.3 Analysis of the program effect

## **II. Industrial Development, and Necessity of Enhancement and Promotion of Industrial Standardization and Quality Assurance in Malaysia**

*The past trend and present status of industrial development in Malaysia are analyzed and industrial development strategy in the future and its targets to be supported by standardization and quality management are studied.*

### **1. Past Trend and Present Status of Industrial Development in Malaysia**

#### **1.1 Economic Growth**

The economy of Malaysia has sustained stable growth for the last two decades. Though Malaysia has a relatively small population, industrialization of the nation is well advanced and the Gross National Product (GNP) level is also in a moderate range. The greatest factor of the drastic expansion of the Malaysian economy is the growth of exports. The Government has promoted economic growth encouraging the development of export-oriented industry as a basic strategy in view of the limits of domestic-market-oriented industrialization due to the limited scale of domestic market based on the small population. In addition, recent increases in local construction demands stemming from growth of private investment also contribute greatly to the economy. These tendencies suggest that the expansion of export and domestic investment will be an essential key factor for Malaysia to sustain sound growth of the economy.

During the period of 1985–1990, the electrical and electronics machinery and the rubber-based industries grew most rapidly with respective annual averages of 26.8% and 23.2%. The transport equipment, textile and garments, and wood-based industries also grew considerably, at respective rates of 14.1%, 11.6% and 11.2%. Growth of the other industries remained below 10%.

The majority of the manufacturing industry in Malaysia is owned by the private sector, mainly by large foreign capital enterprises and joint ventures financed with foreign capital. In the past thirty years, the Government of Malaysia has made efforts to promote domestic and foreign investment by providing various incentives for investment to promote industrialization. After the 1970s in particular, development of export-oriented industry depended heavily on foreign investment because of deficiency of capital, technical know-how and marketing ability.

## **1.2 Industrial Development Plan**

Following the First Outline Perspective Plan (OPP1), 1971–1990, the Second Outline Perspective Plan (OPP2), 1991–2000, which embodies the National Development Plan (NDP), was adopted in June 1991.

The objective of the NDP is to attain a balanced development of the economy in order to establish a more united and just society towards the realization of the ultimate objective, that Malaysia becomes a fully developed nation by the year 2020 not only economically but also in all other aspects. The NDP places emphasis on increasing efforts to make the economy more resilient in meeting external changes and uncertainties, and also the need to maintain a conducive climate to attract investment into the country in order to cope with increasing competition around the world and from neighboring countries for foreign capital investment.

Thus, in order to remain competitive in the export of manufactured goods and to sustain rapid economic growth, the NDP has adopted the development strategy of increasing productivity and further diversifying into higher value-added production, while pursuing policy reforms aimed at widening and deepening the industrial base, leading to higher value-added products and increased linkages with SMIs.

The Sixth Malaysian Plan (SMP) 1991–1995, is being implemented as the first phase of the OPP2. The SMP's thrust for industrial development is to promote new sources of growth so as to strengthen and diversify the industrial base while maintaining the importance of the traditional sources of growth, namely, the electric and electronics, and textile and apparel industries. It emphasizes the development of export-oriented, high value added, high technology industries with strong support from R&D and the growth of domestic high technology industries.

## **1.3 Trends of the International Economic Environment and Direction of Industrial Development in Malaysia**

Manufacturing industries in advanced industrial countries have made strenuous efforts to maintain international competitiveness in the face of eroding factors such as rapid appreciation of their currencies and increases in the cost of labor, and also labor shortages in some countries. One strategy commonly adopted has been to concentrate on production of higher value added products in their home countries, together with automation for saving labor, while proceeding apace with the international division of labor and specialization of production on an international level. To set up an international network which optimizes the overall production systems

on an international level, encompassing all stages from procurement of raw materials through production and distribution of products has been of vital importance. To meet this requirement, the leading manufacturers in the advanced industrial countries have been setting up bases in several countries abroad, each specialized for the procurement and primary processing of raw materials, the production of parts, components and intermediates, and the production of final products. Similarly, manufacturers in the NIEs, especially South Korea and Taiwan also have been expanding their international operations to counter the effects of rapid appreciation of home currency values and increasing labor costs.

Against this background, manufacturers of those countries looking to transfer their production bases have been attracted to Malaysia because this nation is equipped with the various forms of infrastructure vital to industrial activities and has energetically pursued policies to attract foreign investment as a means of promoting industrial development. Thus, a large number of foreign companies have transferred their production bases to Malaysia and the country has succeeded in building up a thriving export oriented industry based on foreign investments.

At that time the foreign companies which decided to undertake such a transfer to Malaysia did so particularly in view of the competitive labor force and the comparatively well equipped infrastructure available in the country, and the policies for attracting foreign investors. However, it is considered difficult for Malaysia to continue to maintain comparative advantage relative to the surrounding countries on the basis of the competitiveness of its labor costs alone since a rise in those costs can not be avoided.

## **2. Target for Promotion of Industrial Standardization and Quality Assurance**

Industrialization in Malaysia certainly does seem to be progressing in quantitative and qualitative terms. However, the main driving force for this industrialization is the foreign affiliates or the joint venture firms depending on the technical support of the foreign companies. The domestic production of precision parts and high quality materials required for the production of manufactured exports is definitely advancing to some extent but this is largely due to in-house production by the foreign affiliates, or even in cases where supplies are made from external sources, these come from a very limited number of suppliers. Moreover the majority of such suppliers are themselves foreign affiliates which were producers of those materials and parts in their home countries. The majority of local firms, with the exception of such foreign affiliates, have no links with the export-orientated indus-

tries. There are some local manufacturers of component parts and intermediates to be supplied to the foreign affiliates, but these supplies are confined to those which do not require high precision, or those which are not critical for the performance and strength of final products. Moreover, the materials used by such local manufacturers of component parts and intermediates are largely imported, since domestic supplies cannot be anticipated. In the case of the molds and dies used for metal and plastic processing, all that is locally available are those which are used for the production of general consumer products destined for the domestic market. The molds and dies used for the production of important parts are imported and supplied to the parts manufacturers by the end users of those parts. In general, standard parts and devices are imported as well. Further, treatment processing of metal materials which has a considerable influence on the quality of final products (such as surface or heat treatment) is not handled by local industries. All such treatment processing is done by specialist industries comprising the foreign affiliates.

The current strategy of the manufacturing enterprises in the advanced industrial countries which seek to expand their international operations is to set up their overseas production bases in the countries where not only investment environments are satisfactory but also competitive production is assured with the local supply of required parts and materials. Malaysia can offer considerably satisfactory conditions which attract foreign investors, including the provision of incentives for foreign investment and well equipped infrastructure, but there are few local manufacturers who are capable of absorbing the technology required by foreign affiliates. This in turn means that Malaysia is still behind in the provision of a supporting network of peripheral industries and of technical infrastructure which will increasingly be demanded for the localization of overseas production bases as part of the international operation of manufacturers in the advanced industrial countries. Moreover, for the balanced development of industry in Malaysia, it is necessary to undertake the modernization of the local industries which will support the mainstay industries while the development of the latter will be further promoted mainly with the expansion of foreign capital investments. These efforts to expand the localization of industry will provide the key to the development of domestic technologies in the country.

## **2.1 Promotion of Industrial Linkages with Improvement of Quality and Technology of Local Firms**

Many of the industries developed with foreign investments stay with building few linkages with existing indigenous industries. As a result, in Malaysia there exist a large number of small local firms engaged in manufacturing industries which are

entirely different from the export-oriented industries, although there are also a considerable number of large-scale manufacturing companies having few linkages with local firms as represented by FTZ companies.

One of the underlying constraints in developing linkages between foreign affiliate firms and local firms is inadequate technical capabilities of local firms for absorbing transferred technology. Most of the foreign affiliate companies are reluctant to nurture local suppliers of required parts and materials, unless they have technical capabilities of absorbing transferred technology to some extent, since technical guidance and assistance to be exerted for nurturing capable local suppliers are costly and time-consuming efforts for those foreign affiliate companies and, furthermore, it is uncertain yet whether those local firms can grow to become qualified suppliers. Hence, most of the foreign affiliate mainstay manufacturers operating in Malaysia are dependent on imported parts and materials or supplies from other foreign affiliate manufacturers which have been established to domestically produce those parts and materials.

In view of this situation, the key thrusts of industrial development strategy for Malaysia should be 1) to further the industrialization based on foreign investments, while encouraging 2) the updating of technical capabilities of local firms for absorbing technology and 3) the development of local supporting industries, and thereby 4) promoting the elevation of technical level of those local supporting industries and their linkages with the mainstay or associated manufacturers.

Another important factor for the successful advancement of Malaysia's industrialization would be to shift and diversify the industries from the labor intensive industries towards the more sophisticated industries on which Malaysia can sustain competitiveness with comparative advantages of wider factors other than the labor cost. The labor shortage and the labor cost increase are becoming more significant in Malaysia with the rapid expansion of industry. These conditions in Malaysia will force labor-intensive industries to be shifted to other countries where cheaper labor forces are abundantly available. On the other hand, the sophisticated-technology based industries, which require continuous innovation of technology, have to stay in the industrialized countries, since these need to have the supporting basis for such innovation. Under this trend, Malaysia should focus on the possibility of developing the type of industries having the nature in-between the foregoing two types of industries. The development of the more sophisticated industries should be associated with the sophisticated supporting industries. The technical capabilities of local firms are far below the level that can meet such requirements, and therefore the immediate needs must be met by promoting foreign investments in



these fields, while encouraging the transfer of their technology to local firms, as well as the upgrading of technical capabilities of local firms for technology absorption and quality management so that they can grow to function as capable supporting industries in the future. The firms which are engaged in those supporting industries should continuously devote themselves to improvement of technology to meet the needs of the mainstay industries. Hence the local firms engaged in the supporting industries should undertake long-term efforts for gradual upgrading of their technical capabilities, envisaging that they will be able to develop and produce components, parts and materials with their own technologies so as to meet the users' needs in future.

## **2.2 Assurance of Credibility of Malaysian Products in Export Markets**

Malaysia should pursue the comprehensive promotion of industrialization with the development of the inter-industry and sectoral linkages, particularly focusing on enhancement of supporting industries, as well as the provision of appropriate supports to the industry.

Out of such measures, priority should be given to enhancement of the reliability of Malaysian products in export markets. Reliability is generally accumulated through export of quality products. Nevertheless it is not an easy task to those who intend anew to go into or penetrate the export markets, besides MNCs who have established their international reputations. There would be a limit to such attainment of reliability if Malaysian manufacturers proceed only by their respective efforts. In this respect, government support is needed.

## **2.3 Coordination and Adjustment for Pursuing Industrial Development while Protecting Quality of Human Life**

In the industrialized countries, the current concern is to take appropriate coordination and adjustment of industrial development as well as technology in order to protect the quality of human life, but this issue has arisen in the industrialization that has reached an advanced level through a long process of industrial development. However, in the developing countries, the situation today is quite different from that, where the industrialization is rapidly progressing with a mirror of industries established in the industrial countries. This current situation has brought about drastic changes in consumer markets, while encouraging industrial interests to undertake more of a variety of industries. People's concern for quality of human life has been rising in recent years, but industrial interests still pay little regard to this issue, because they are more interested in catching up with rapidly progressing

industries and drastically changing markets and, further, any measures for protecting quality of human life often cause additional costs for production and distribution of products. It is essential for further promotion of technology to give proper consideration in human life, coping with various problems arising from advancement of technology and inflow of industrial products, so as to eliminate impediments in industrialization.

#### **2.4 Sustaining Competitiveness of Industry through Institutional Buildup of Technical Infrastructure**

The development of technical infrastructure as well as economic infrastructure plays a crucial role in strengthening competitiveness of industry. The technical infrastructure includes those matters related to R&D for development of technology, technical guidance and education, and testing. Industrialization in Malaysia in the past has been dependent largely on labor intensive industries developed mainly with foreign investment, which were based on technology transferred from industrial countries and adopted without any modification or improvement. However, as already mentioned in the foregoing section, it is likely that the labor intensive industries will be shifted to other countries where cheaper labor is available. Manufacturers in the industrialized countries, at the same time, are shifting many of their production bases abroad, except those based on the most sophisticated technology or those requiring continuous innovation of technology to meet the changing needs of the market. They are seeking the countries where transferred industries can sustain competitiveness with continuous improvement. An important area for Malaysia to focus on should be institutional buildup of technical infrastructure, including the enhancement of R&D institutions and supporting industries.

### **3. Selection of Strategic Industry for Enhancement and Promotion of Industrial Standardization and Quality Assurance**

The optimum strategy of industrialization in Malaysia is to continue the promotion of foreign investment in order to develop the core industries which have significant impact on the development of relevant local industries and thereby bring about balanced development of industry. The priority industries selected thus far are the component parts industries relevant to the automotive industry and the electric and electronic machinery and appliance industry, since these industries need to elevate and stabilize their quality level and can expect significant effects from standardization and quality management. These industries include a part of the metal engineering industry which supplies these component parts, and the plastic processing industry.

The second priority industry is the rubber based industries, particularly the rubber glove manufacturing industry, which is a resource based export industry. Assurance of quality is the key for stable growth of the industry in the future. They require further efforts to ensure the stability of their quality.

The third includes another part of the metal engineering industries which are engaged in the fields for domestic markets and have no linkage with export industries. The upgrading of these industries, however, is vital to the enhancement of bases for expanding the supporting industries in the future.

### **III. Undertaking of Standardization and Quality Management in Industry**

*How Malaysian industries tackle standardization and quality management is grasped from the viewpoint of respective industries.*

#### **1. Quality Management**

The degree of diffusion on awareness of quality management is extremely different by industries and levels of companies. The small and medium enterprises, particularly those having no relation with export business or foreign affiliate companies generally have little awareness of quality management.

The firms manufacturing parts and materials to be supplied to mainstay assembly companies of automobiles or electrical and electronic appliances industries apply quality management systems which have been adopted by those assembly companies. In practice, the mainstay assembly companies placing orders force part manufacturers to conclude inspection agreements or QC agreements with those ordering firms in addition to inspection at the time of shipment of parts produced. The ordering firms carry out checks and surveillance on a regular or spot basis to ensure that these agreements are strictly observed by the parts manufacturers, while also carrying out technical supervision of local firms focusing especially on quality management systems. In some cases technical supervision is given by some other company appointed by the ordering firm.

However, only a small number of the local firms have reached the stage in which they are able to apply quality management and effect an upgrading of their technical levels autonomously. The majority implement quality management in response to demands coming from their clients. Although there are some companies which started to use advanced quality control systems such as TQC or SQC, in only a very few cases does this result in feedback of the results to the production processes, the identification of root causes, or the improvement of technical aspects.

Many manufacturers undertake quality management as is required for the respective markets, so less attention is paid to quality management for the production of products destined for the domestic markets where requirements are low. In the case of firms which supply their products mainly to local markets, quality management is usually no more than inspection at the time of shipment of products, though they assign persons in charge of quality management. Furthermore, equipment for inspection is not sufficient in the majority of SMIs.

It is also noted that recognition of the quality level which is set as a target for quality management is low. Many firms which are engaged in the production of export products regard the quality levels demanded by users as being excessively high, and reluctantly strive to meet the users' quality requirements as imposed obligations for the purpose of product sales. Local firms should recognize the importance of satisfying quality levels of products demanded in international markets.

## **2. Utilization of Standards and Undertaking of Standardization by Industries and Individual Firms**

### **Present State of the Use of Standards**

Individual firms use a variety of foreign standards or international standards depending on the requirements of their clients. In particular, the BS, ASTM and JIS have been widely applied. In Malaysia industrial standardization has evolved to meet the needs of foreign companies rather than the needs of domestic industries, because many of the manufacturing firms in Malaysia have been relying on for their business, their overseas parent companies, overseas clients and their affiliated companies, as well as imports of required materials and parts.

### **Awareness of the Necessity of National Standards**

In contrast to the use of such international and foreign standards, the awareness of the necessity for national standards remains very weak among the industrial circles in Malaysia. There is a general view prevailing in those circles that MS standards are less rigorous than international or foreign standards, and this leads to their misunderstanding that as the level of products produced is already higher than the level of MS standards, the MS standards will force them to produce products which fail to conform to international standards. Another misunderstanding prevailing in the industries is that the standards are restrictive regulations rather than technical guidelines.

Also a serious matter is a view prevailing in the industrial circles that standardization is not for their own sake but merely a governmental activity, in particular SIRIM's.

### **Necessity of Developing Standards as a Technical Basis for Quality Management**

Despite the fact that international and foreign standards are applied, there are still many areas in which national standards need to be developed as the technical basis for production. In particular, this is essential for SMIs.

Nevertheless, it is not necessary that all standards be developed anew as national standards. If there already exist appropriate international or foreign standards, the adoption of these would be effective. In some cases, it may be adequate to develop these as association standards.

### **3. Approaches to ISO 9000 Quality Management Systems**

Many firms have an interest in complying with demands from export markets for the application of quality management systems based on the ISO 9000 Series. To meet this requirement, industrial associations are examining the possibility of instituting a technical assistance program to be provided to member firms which intend to seek certification of quality systems based on the ISO 9000 Series. This assistance would include the holding of seminars organized with the assistance of SIRIM or the employment of qualified quality consultants by associations. However, in general because of the large amount of paperwork required by the ISO 9000 quality system it is difficult for small and medium firms to tackle such tasks.

### **4. Education and Training of Quality Management**

Only a limited number of firms make active use of the services of the NPC which is the body responsible for the promotion of quality management in Malaysia. Although a fair considerable number of persons participate in seminars relating to quality management, they are mostly from foreign affiliates or large local firms which represent a relatively small number of the total.

The majority of local firms show low interest in seminars pertaining to the introduction or basic theory of quality management, but they appreciate seminars or training for quality management applicable to specific industries which are given usually by manufacturers' associations in specific industrial sectors.

One major problem encountered in employees' training for quality management is difficulty of communication. In the case of foreign affiliates, staff dispatched from the parent company are usually responsible for quality management. Some of them face difficulty in communication with local employees. Moreover in recent years there is difficulty even among local staff to communicate in English. Such communication difficulties are magnified in areas involving fine details or sensitive questions. In the case of small enterprises even local staff who are responsible for quality management encounter linguistic problems in directing local operators. Another problem is the fact that there are very few textbooks or reference works on quality management written in local languages, and so the local staff in charge must trans-

late for trainees, and this slows down and obstructs the promotion of quality management.

Communication problems are not only caused by such linguistic barriers. Inability to comprehend the directions given by quality management staff due to educational limits also occurs. In particular to some extent basic education on statistics is vital to quality management, since quality management relies on application of statistical methods.

## **5. Tests and Inspection**

In-house testing and inspection capacity of manufacturing firms is not sufficient. In fact production is carried out on the assumption of the insufficiency of such testing and inspection capacity. For high quality materials and parts, tests at the time of receiving those materials and parts are minimized by procuring them from reliable suppliers which are mostly abroad. Further, items for which high quality is required are often not produced domestically but are imported from reliable overseas supply sources.

The main external tests which firms need to carry out are performance tests, either in the development stages or in the trial production stages. Although tests during normal operation are minimized through a rigorous application of quality control in production lines and also thorough control of the quality of incoming materials and parts as noted above, the performance tests on finished products carried out in the trial production stages are essential for determining optimum production processes. Such testing is entrusted to SIRIM and other domestic testing institutes, and where the equipment of these bodies is not sufficient, arrangements are made for use of testing equipment of foreign-affiliated companies, while those affiliates depend on their parent organizations for conducting tests in many cases. Moreover, the facilities of the SISIR, SEEL or STS of Singapore are also made use of.

With regard to the calibration of measuring devices and equipment, use is often made of the services offered by foreign measuring device manufacturers who have service offices in Malaysia.

## **6. Quality Management by SMIs and Tasks Required**

In general it is difficult for SMIs to grapple with the problems involved in implementing industrial standardization and quality management. The actual degree of difficulty experienced will differ greatly according to conditions such as the exist-

ence of tie-ups with foreign-affiliated companies or exporting firms, the connections with export markets, etc. The patterns of small and medium enterprises can be classified into the following categories in connection with their approaches to industrial standardization and quality management:

- 1) Firms which carry out direct export of finished products: rubber glove manufacturers, apparel manufacturers, etc.
- 2) Firms supplying parts or materials to foreign affiliates located in Malaysia: a part of the metal engineering and plastics processing sectors.
- 3) Firms serving the local markets: the remaining sections of the metal engineering and plastics processing sectors, etc.

All the above industries need to have technical guidance. However, as the level and content of necessity differs respectively, it is essential to give adequate guidance which meets their needs. For example, it is not easy to formulate a guideline for ISO 9000 covering SMIs in general, but it may be possible to prepare a guideline appropriate to specific industries where many SMIs are concentrated.



#### **IV. Present Status of Industrial Standardization in Malaysia**

*This chapter gives an overview of the industrial standardization activity undertaken in Malaysia as a background for determining conclusions and deriving recommendations there from.*

All the functions relating to standards and certification are centralized at SIRIM, and SIRIM therefore faces difficulty in intensifying or expanding those activities due to its human resource constraints, although SIRIM has made every possible effort to meet increasing demand resulting from the rapid growth of industry.

As for the promotion of quality assurance at the national level, there are three organizations involved as the core bodies, namely, MANPU (The Malaysian Administrative Modernization and Management Planning Unit) in the government sector, and NPC and SIRIM in the commercial and industrial sector. Besides these three organizations, the National TQC Advisory Committee having representatives from government agencies, private companies, training and research institutions, etc., was specially appointed to provide the necessary direction and help direct TQC activities within industry. However, the committee is not active at present.

NPC is the body that promotes quality management, while SIRIM is involved in promotion of quality improvement through standardization and certification activities. There is no coordination organization above NPC and SIRIM, and the coordination has been undertaken by the two agencies directly.

##### **1. Standardization Activities**

###### **Organization and process for establishment of standards**

SIRIM is the implementing agency for standardization as the core body in development of national standards and certification systems in Malaysia.

Anyone may propose a draft standard. Usually, several specialists, in most cases SIRIM staff, prepare a preliminary draft standard. Then the preliminary draft is deliberated by the Technical Committee (TC). When a final draft standard is completed, it is submitted by the TC to the Industry Standards Committee (ISC) for its approval. After the ISC's approval has been granted, the draft is further submitted to the Standards Committee (STANCO) for its approval. The draft approved by STANCO is finally sent to the Council of SIRIM which is the highest authority. After the endorsement of the Council, the standard is officially published as a Malaysian Standard (MS).

### **Present State of Standard Development**

As of December, 1991, 1,651 standards are registered as the national standards of Malaysia (MS). These are classified into three categories as follows:

a) Product standard	1,007 standards	(61%)
b) Method standard	424 standards	(26%)
c) Basic standard	220 standards	(13%)
Total	1,651 standards	(100%)

The following are the groupings of MS by industrial sectors:

a) Building & civil engineering	154 standards	(9%)
b) Electro-technical	219 standards	(13%)
c) Mechanical	231 standards	(14%)
d) Foods & agriculture	240 standards	(15%)
e) Chemicals & pharmaceuticals	502 standards	(31%)
f) Consumer products standards	286	(17%)
g) Information technology standards	19	(1%)
Total	1,651 standards	(100%)

International and foreign standards adopted into the MS are 201 standards, accounting for 12% of the total number of MS established. The majority are based on BS standards, amounting to 96 MS standards, followed by 76 based on ISO standards.

## **2. Certification System**

SIRIM is responsible for the certification system in Malaysia, including the certification of all industrial products and primary products and also the assessment and registration of factories for the quality system, although the certification of some primary products is entrusted to RRIM and FAMA. Mandatory certification items are regulated by relevant ministries or their agencies on behalf of which SIRIM undertakes the certification.

In Malaysia the certification system has been in existence nearly 20 years, since 1973. It has been revised and improved several times during those years, and now is composed of the following:

- 1) Product Certification System
  - 1)-1 Voluntary Certification System
    - a) Quality Mark System
      - a)-1 MS Mark System
      - a)-2 Certified Mark System
    - b) Safety Mark System
  - 1)-2 Mandatory Certification System
    - a) Control Label System
    - b) Others
      - b)-1 Natural Raw Rubber Certification System (SMR)
      - b)-2 Cacao Bean Certification System (SMC)
- 2) Assessment and Registration of Quality Systems (ARQS)
- 3) Quality System Consultants Registration Scheme (QSCRS)

## 2.1 Product Certification System

### **Voluntary certification system**

In the product certification system, the voluntary certification system consists of the quality mark system and the safety mark system. The quality mark indicates conformity of the product to meet the quality and function specified in the relevant standard. There are two types of marks; one is the "MS" Mark certifying that the product meets MS standards, and the other is the "Certified" Mark certifying that the product meets foreign or international standards. The "Safety" Mark is to certify that the product satisfies safety requirements specified in MS standards.

### **Mandatory certification system**

There are some products of which the production, import and sales are controlled by relevant ministries or their agencies. For those products, SIRIM is entrusted to certify whether the products meet quality and performance specified in the applied standards, by means of the control label system.

There are two categories of the mandatory certification system operated by SIRIM, as follows.

- a) Products of which the importation, production, shipment or sales, are controlled under regulations in order to protect the safety of consumers, and for which the use of control labels is compulsory based on certification by SIRIM.
- b) Products for which the indication of quality grade is compulsory so that confidence is maintained in Malaysian products in the world market.

## **2.2 Assessment and Registration of Quality System (ARQS)**

This system is used to register the enterprises which have been assessed as those adopting a quality system that meets ISO standards related to such quality system. SIRIM operates ARQS established on the basis of ISO 9001 and 9002.

## **2.3 Quality System Consultants Registration Scheme (QSCRS)**

The QSCRS system aims to prevent services from being provided by incapable consultants by means of SIRIM's registration of consultants who have adequate experience and expertise regarding the quality system based on the ISO 9000 Series. This may be considered to be a subsystem that supports the ARQS.

## **2.4 Increased Use of the Certification System**

The following are the measures being carried out by SIRIM for promotion of greater use of the certification system.

### **Use of Malaysian Standards for procurement of goods and services by the federal government and public agencies**

As the Cabinet Paper has been approved only recently, it is too early to assess its effects.

### **Industrial Technology Assistance Fund (ITAF)**

In order to promote the development of small and medium industries, the Ministry of Industry established the Industrial Technology Assistance Fund (ITAF) in early 1990 (annual budget in the first year, M\$50 million). It has the function of providing subsidies to small and medium enterprises participating in schemes in four areas, one of those areas being quality and productivity improvement.

### **Quality Improvement Practice (QIP)**

This program was established by SIRIM to help small and medium enterprises in their efforts to improve quality. Specifically, it is SIRIM's technical assistance provided with concessional service charges to those enterprises that satisfy certain criteria and are planning either to seek SIRIM product certification or quality system registration.

## **2.5 Performance of Certification**

### **Product certification**

As of May, 1992, 845 products and 423 factories had been certified. For product certification there was an increase of 56 certifications (8.2%) in 1990 and an increase of 88 (12.0%) in 1991. For 1992 the projection is for an increase of 63 certifications (7.7%), which is somewhat less than the number in 1991.

In Malaysia, there is a limited number of factories to which license was granted under the MS certification system, and most of those licenses were based on mandatory certification. It implies that the MS standards and standardization have not become well established in industry.

### **Assessment and Registration of Quality Systems (ARQS)**

QS-registered factories have increased in number; there were 80 as of May, 1992. As a result of the JICA Team's survey on various companies, it is found that there are many companies which are preparing to apply for the QS registration or are planning to apply for registration, so it is thought that the number of applications for the QS registrations will increase in the future, and the number of factories that are registered as having passed SIRIM's requirements will increase accordingly.

## **3. Testing and Inspection System**

### **3.1 Systems and Organizations**

SIRIM is the implementing body for the testing and inspection systems for industrial products relevant to the certification system, except for the three fields entrusted to the Rubber Research Institute of Malaysia (RRIM) for the testing of rubber and rubber products, the Palm Oil Research Institute of Malaysia (PORIM) for the testing of palm oil and palm oil products and the Forestry Research Institute of Malaysia (FRIM) for the testing of agricultural products.

In addition to carrying out testing and inspection relevant to the certification system these institutions also undertake contract testing on the basis of requests made by manufacturing firms and other enterprises. Further, laboratories in the private sector also carry out testing on a request basis. Manufacturing factories carry out in-house inspections, and laboratories which have been accredited under SAMM also carry out contract testing for outside clients.

**Testing and inspection of the MS Mark certification system**

SIRIM carries out testing and inspection to confirm conformity of applied products with required standards under the MS Mark certification system. The testing and inspection include an initial inspection of the factory manufacturing the subject product, which is conducted to ensure that the product is consistently produced in accordance with standards. Follow-up inspections of the certified factories are periodically carried out after such factories have been granted a license to use the MS Mark, to check the appropriateness of the quality control applied to the production, and testing of sample pieces of the product are collected during the follow-up inspections.

**Testing and inspection system under the mandatory certification system**

Under the mandatory certification system, SIRIM carries out testing for confirmation of conformity of products and also consignment tests.

**Laboratory accreditation scheme**

In November, 1991, SAMM (Skim Akreditasi Makmal Malaysia, or Laboratory Accreditation Scheme of Malaysia) was founded with the aim of accrediting laboratories and thereby authorizing the tests conducted by those laboratories. SIRIM is the implementing body for this system.

There were several laboratory accreditation schemes operated by different institutions respectively under ISO Guideline No. 25 or other bases. In August 1990, the government decided to establish a national laboratory accreditation scheme, under which the existing laboratories accredited under other schemes were to be re-assessed in line with the ISO 25 and then accredited as SAMM laboratories.

**3.2 Testing and Inspection Capacity of SIRIM**

SIRIM's testing facilities are inadequate and there is a shortage of certain equipment required for carrying out the test for the mandatory certification.

In connection with this problem of not being able to perform certain tests, there are also certain problems in the testing work done for consignment tests, so that in view of these problems there is some doubt about the efficacy of tests for the mandatory certification systems.

Further, there is an increasing necessity to set up testing laboratories at branch offices, because the testing demands are increasing in these regions along with the development of regional industry.

Replacement and reinforcement of testing equipment should be financed with government grants, since it requires large amounts of investment. It is desirable, however, that operation costs can be covered with the revenue accruing from test fees. The operation costs can be covered by the revenue to a considerable extent, but there is still room for further improvement.

### **3.3 Testing Capacity of the SAMM Accredited Laboratories**

RRIM mainly undertakes tests on rubber and rubber products, while administering an accreditation scheme for laboratories in the field of rubber testing. The RRIM accreditation scheme has been well implemented, bringing about substantial contribution to the MS Mark certification system in this field.

In the mechanical field there is only one accredited laboratory which undertakes tests on cement. Moreover as this is located in Sabah, no testing service is available for clients in Peninsular Malaysia. There are no laboratories at all which undertake mechanical testing on other products, and this causes constraints in intensifying the MS Mark certification system and the mandatory certification system.

In the chemical field there are four accredited laboratories carrying out analysis of wood preservative agents. These laboratories are in-house laboratories set up in the factories manufacturing wood preservative agents, most of which have been certified to use the MS Mark. However, these laboratories do not provide any testing service for outside clients. There are no accredited laboratories for other chemical products or electric appliances.

The accredited testing laboratories for rubber and rubber products, as reviewed above, are functioning well to provide testing services to outside clients as required by relevant industries, but these laboratories result in limited contribution to the MS Mark certification system and the mandatory certification system. Under this situation, only the SIRIM laboratories can undertake the testing for the product certification systems.

## **4. Metrology System**

The traceability system in Malaysia consists of the Measurement Centre (formerly named the National Metrology Laboratory) of SIRIM as the agency responsible for maintaining and administering national standards. The same body also maintains

and administers secondary standards. There is one SAMM accredited laboratory named Nusantara Technologies which carries out calibration services in the fields of pressure and length, while SIRIM is responsible for the calibration of general measuring devices. Also SIRIM as a part of its work in the field of the legal framework for metrology carries out calibrations of the measuring equipment in the possession of the verification centers of each state. SIRIM therefore constitutes the central organization relating to metrology in Malaysia.

## **5. Dissemination Activities for Quality Management**

### **5.1 Education for Quality Awareness**

#### **Quality education in school**

In Malaysia the shortage of industrial manpower is increasingly becoming serious as the industry continues a rapid expansion. It has triggered head hunting or job hopping of talented people, and this problem has discouraged many firms from providing training for their staff. This problem is especially serious regarding quality control engineers, because there are not enough to meet the demand.

Another issue is the large difference in the status between engineers and technicians in the current employment system of Malaysia. Many engineers are engaged in supervisory positions despite their limited working experience. This is a result of the shortage of engineers. Thus, education on quality awareness and basic principles of quality management in school is essential in order to develop human resources for quality management which is required for promoting industrialization.

At present, quality management education in universities is relatively well promoted in Malaysia. However, no education relating to standardization, quality or quality management is carried out in either the elementary, junior high or high school levels. Vocational training schools also have no training programs with regard to standardization and quality management due to limited training time provided for a course.

### **5.2 Dissemination and Guidance for Quality Management**

#### **Organizational set-up for enhancement and promotion of quality management at the national level**

The National Productivity Corporation (NPC), placed under the control of the Ministry of International Trade and Industry, is the public institution mandated to carry out promotion of total quality management, and this institution undertakes the



education of industry regarding quality management, and dissemination thereof, with government subsidy. Organizations in the private sector active in furthering quality management are IQCM (Institute of Quality Control, Malaysia) and in Penang, QRSP (Quality and Reliability Society of Penang).

Moreover, SIRIM pursues the establishment of quality assurance systems in industry including SMIs through its activities for establishment of standards, certification, testing, inspection, and calibration as well as implementation of other relevant schemes.

## **V. Recommendation on Measures and Actions to be taken for Enhancement and Promotion of Industrial Standardization and Quality Assurance**

*The following is the recommendation on measures and actions, together with the brief introduction of key issues, which are to be taken to achieve the aforesaid four thrusts for the enhancement and promotion of industrial standardization and quality assurance. Tables S-1 to S-3 show the recommendation classified by fields of activity, and Table S-4 shows a proposal of implementing bodies and budgetary/personnel requirement for the recommended action programs/projects, as well as the order of priority for implementation.*

### **Thrust 1: Enhancement of Inter-industry and Sectoral Linkages through Upgrading Technology and Quality of Local Firms**

#### **1.1 Encouragement and Support for the Undertaking of Quality Management by Local Firms, Particularly SMIs**

##### **1.1.1 Encouragement of Quality Management through the Expansion of Certification Systems**

###### **Recommendation 1: Establishment and Diffusion of Certification Systems for Government (and Public Agency) Procurement**

**Key Issues:** Goods and services needed by government agencies and public organizations are now procured under the administration of the Ministry of Finance. These government agencies and public organizations individually prepare their own specifications for use in tenders. These specifications are reviewed by a technical committee organized with the representatives of procurement officers of these agencies and organizations at intervals of two years, when the contract term terminates. These specifications relate to each specific product to be procured, but those are not applicable as common standards. In some cases, foreign or international standards are used in drafting the specifications, but since they are prepared for individual items, they are not used for others. The Ministry of Finance has a view that as the technology level of small manufacturers is low, it is often compelled to accept even lower quality products. At the same time, there is another view that the price for supplying high quality will be high, and rather than risk exceeding a budget, the level called for by the specifications has to be lowered.

**Recommendation:**

(1) Organizational setup for implementation

In view of the wide range of work fields, the degree of complexity and intricacy involved, it will be essential to have the organized cooperation of each related ministry and public organization so as to achieve a well balanced implementation. To this end it will be necessary to set up a Promoting and Steering Committee composed of representatives from each of the related ministries and institutions. It is desirable that this committee be led by the representative of a Ministry which possesses coordinating functions within the government. SIRIM shall act as the Secretariat. Under the Promoting and Steering Committee there should be technical committees organized to carry out examination of technical aspects.

(2) Drawing up of standard specifications for procurement by the government and public organizations

In many cases national standards do not stipulate detailed specifications of the products. However, in order to ensure the uniformity of specifications of the supplies for the government and public organizations a sufficient degree of detail must be specified to supplement the national standards. On the contrary, in some cases it will be more practical to give limitations on types or dimensions specified in the national standards. For the products having no MS Mark it is important to draw up standard specifications in line with the MS levels in order to promote standardization under this scheme.

The standard specifications should be drawn up by SIRIM working in cooperation with the procuring organizations concerned and the relevant industrial associations.

In cases where an MS standard exists but the technical levels of actual procurement specifications are lower than the equivalent MS, it is desirable that SIRIM draw up standard specifications through discussion with the procuring organizations concerned to find a level on which both or all parties can agree. Further, in cases where there is no MS serving as a reference, it should be judged whether the standard specification of the procuring organization can be used to draw up an MS or a standard specification.

There are firms which cannot apply for product certification because there are no Malaysian Standards. To this end, government resolution should be made to give priority of supply to the government and public agencies from firms registered in

accordance with the ARQS.

**Recommendation 2: Establishment of Certification System for Safety-related Automotive Parts**

**Key issues:** The automotive parts industry, at present, broadly consists of two groups of parts manufacturers, one group comprising those engaged in the OEM (Original Equipment Manufacturing) of component parts to be supplied to the mainstay automotive manufacturers, and the other engaged in the REM (Replacement Equipment Manufacturing) of replacement parts which are sold to repair markets. Whereas the former group manufactures comparatively high quality parts in conformity to standards and based on a quality control system indicated by the mainstay automotive manufacturers who are the main customers, the latter group mostly manufactures low quality parts with inadequate quality control. The replacement parts are used for repairs at independent automotive repair shops. Most of the repair shops are small holdings, lacking in quality consciousness, and tend to be price-oriented, and their customers also have more interest in price rather than the quality of replacement parts used for repairs.

Under such circumstances, the Ministry of Transportation has enacted a mandatory certification system for some automotive safety parts so as to assure safety of the quality, but the thus regulated control items are so far limited to only a few items including replacement parts.

Some Malaysian-made parts are being exported, but with the exception of those handled by foreign-affiliated automotive manufacturers or Proton, the quality of those parts is not assured. It is likely that the automotive parts industry may grow as an export industry in the future. Nevertheless, if the exportation of unreliable imitation parts continues, confidence may be lost in Malaysian parts, although it is not certain whether these parts are now being exported with clear indication of "Made-in-Malaysia".

**Recommendation:** This recommendation composes a part of a comprehensive action program for development of the standards used for safety-related automotive parts, and expansion of the use of the certification system, aiming at 1) providing technical standards for parts makers who are engaged in REM and thus have no access to appropriate technology, and 2) contributing to transportation safety through improvement of the quality of safety-related parts, and also contributing to protection of the environment, while 3) accelerating the preparation of guidelines for promoting the application of the ISO 9000 quality system within the automotive

parts industry. Through the implementation of this program, an efficient mechanism for maintaining coordination and close relations among the government agencies and industrial associations concerned can be instituted.

**Recommendation 3: Reinforcement of Assessors, Auditors and Inspectors for the Certification Systems**

**Key Issues:** The application for the ARQS and product certification will increase along with the spread of standardization. To meet this trend, it is essential to intensify and expand the work for certifications with increases of assessors, auditors and inspectors.

1) ARQS auditors

There is a need for the auditors to increase to 27 persons in 1995, and 56 in 2000. At present SIRIM has 10 qualified auditors. The above projection indicates the need to increase the number of auditors to a substantial extent in the future.

2) Factory inspector for the product certification

It is projected that there will be annually 200 applications for the product certification applied by 100 companies, resulting in an increase to 1,440 products and 720 factories certified under the product certification in 1995, and further to 2,240 products and 1,120 factories in 2000.

Accordingly there will be a need to have 30 inspectors in 1995 and 44 in 2000. At present SIRIM has about 20 factory inspectors. In order to meet the above, the number of inspectors should increase by 50% in 1995 and double in 2000, compared to the present.

**Recommendation:** It is recommended that a long term and phased plan be formulated for the reinforcement of personnel and that education and training programs be implemented in accordance with the plan. In case any difficulty is seen in recruiting required personnel of SIRIM, it is advisable to examine the possibility of establishing a registration scheme for qualified individual assessors, auditors and inspectors or establishing a professional organization for providing such services so that qualified experts can be utilized.

### **1.1.2 Promotion of Quality Management to fulfill Industrial Needs**

#### **Recommendation 4: Improvement of Level of Quality Management**

**Key Issues:** In Malaysia emphasis has been placed on the promotion of an internationally recognized quality system, namely that of ISO 9000 Series. The quality system based on ISO 9000, however, is only one of the tools for quality management. The key for successful application of quality management is establishment of company standards and improvement of them with participation of all employees, as well as actual application of practical quality management based on the effective quality system.

As for quality management, many firms at present have not gone beyond the stage of merely inspection, and they do not take necessary procedures to improve their company standards according to the results of the quality management. In fact many firms limit the functions of quality control to merely the screening out of defective products manufactured.

**Recommendation:** With recognizing limitation of the quality system which is based on ISO 9000 Series, more emphasis should be put on the promotion of "Total Quality Control (TQC)."

#### **Recommendation 5: Improvement of Training System on Quality Management**

**Key Issues:** There are some firms, although not many, where staff in charge of quality management are educated through in-house training programs. The staff of foreign affiliates are trained on quality management by participating in in-house training held by their parent company or by competent staff dispatched from the parent company to supervise the quality management. On the other hand, staff in charge of quality management in local firms have no opportunity for upgrading their expertise. Most of the training courses held recently were nothing more than an introduction to or just the basic principles of quality management and did not serve to guide the application of quality management to meet specific manufacturing processes. The highly appreciated courses are those on quality management provided for parts manufacturers by foreign affiliates engaged in electric/electronics and automobile industries.

**Recommendation:** A nation-wide training system for TQC will need to be set up, including possible utilization of training facilities owned by foreign affiliates by providing them with incentives to do so.

In practice, it is to provide training on quality management for specific manufacturing processes. These training courses can be held by foreign affiliates themselves for their subcontractors or associated vendors, or in association with manufacturers' associations or as a part of training programs of NPC. It is essential to promote these types of training.

NPC and other institutions have held various seminars and training courses regarding productivity and quality management. It is important to have follow-up contacts with participants to assess effectiveness of those seminars and training courses as a basis for improvement and intensification. It is recommended that such follow-up assessment be conducted on a regular basis by the sponsors or organizers of seminars and training courses.

**Recommendation 6: Establishment of Consultant Services specialized in the Application of Quality Management Practices**

**Key Issues:** Consultancy service will be one of the most effective measures to assist firms to apply quality management to their firms. Quality system consultants currently registered are qualified as consultants for quality systems based on ISO 9000. In addition to these consultants, there is a need for specialized consultants who provide consultancy services for application of quality management practices. The main function of the quality system consultants is to guide and assist firms in introducing quality systems based on ISO 9000 Series.

**Recommendation:** The expected function of the specialized consultants for quality management is to provide firms with technical guidance with regard to the establishment of company standards, application and improvement of these standards, and establishment of quality management systems which meet the manufacturing processes and production systems of their factories. In order to promote the application of effective quality management in factories, it would be necessary to provide comprehensive consultancy services packaging the orientation and guidance of the quality management system and techniques and advice on applicable process technology and management aspects.

**Recommendation 7: Need for Research on Quality Management Systems suited to Social and Cultural Characteristics, Management Behavior and Business Practices in Malaysia**

**Key Issues:** Every country has its own social and cultural characteristics, which are reflected also in management behavior and business practices in industries of the country. Thus, although the principle of quality management is common, for successful application to industries, the application method of quality management adaptable to each country should be developed to meet its own characteristics.

**Recommendation:** For successful promotion of quality management for application in industries, especially SMIs in Malaysia, it would be necessary that a competent institution undertake research work for identifying and devising such application methods of quality management adaptable to Malaysia.

**1.1.3 Promotion of Quality Management for Small and Medium-Scale Industries (SMIs)**

**Recommendation 8, 9, 10, 11 and 12: Implementation of Supportive Measures for Promotion of Quality Management for SMIs**

- 8:** Development of industrial standards or guidelines, which are used as the basis for SMIs to establish their company standards for application of quality management.
- 9:** Provision of incentives encouraging SMIs' investment in quality management.
- 10:** Provision of a tax credit on increased costs of SMIs as sub-contractors, resulting from the application of effective quality management.
- 11:** Research on application methods of quality management applicable to SMIs, and technical extension services and consultancy services, as well as financial assistance such as ITAF.
- 12:** Implementation of a comprehensive action program focusing on specific sub-sectors.
  - 1) Safety-related automotive parts industry (ref. Recommendation 2 and 49)
  - 2) Procurement by the government and public agencies (ref. Recommendation 1 and 50)



- 3) Rubber based industry (rubber glove industry, in particular) (ref. Recommendation 51)

#### **1.1.4 Establishment of a Central Organization for TQM Promotion**

##### **Recommendation 13: Establishment of a Central Organization for TQM Promotion**

- 1) Establish a National TQC Council to be led by the Minister of MOSTE and organized with membership drawn from private industries, professional organizations, universities and public sector agencies to plan, coordinate and implement a comprehensive program to promote and disseminate TQM practice in industry.
- 2) Establish or assign an institution which acts as the secretariat for the National TQC Council. It is recommended that the secretariat undertakes the promotion of TQM by itself as well as in association with other institutions.

#### **1.1.5 Access to Quality Management Information**

##### **Recommendation 14: Establishment of Facilities to support the Undertaking of Quality Management by Industry**

**Issues:** There is little data and there are few documents available for local firms, as the basis for upgrading quality management. In the libraries of NPC and SIRIM a considerable volume of overseas information is amassed. However, use is limited since the location of these libraries is inconvenient and also data and documents translated into Bahasa Malaysia are not available. The quality control staff have no trouble making use of the English documents, but they have to take extra time and effort to translate these into Malay since Malay versions of the documents are needed to provide operators with technical guidance on quality management.

**Recommendation:** It is recommended that access to information be facilitated as a part of the dissemination activities and that this be carried out by an independent new division of SIRIM as suggested in Recommendation 16.

At a regional level, such activities may be undertaken by regional quality centers which are under preparation jointly by NPC and SIRIM. At the same time, efforts should also be needed to organize private sector counterparts such as IQCM and QRSP, especially in the regions which cannot be covered by the regional quality centers.

## **1.2 Elevating General Awareness on the Importance of Standardization**

*In terms of strengthening the dissemination of MS standards, besides the enhancement of the certification system and quality management, important measures are as follows:*

- 1) Education on how to utilize the national standards in QC practice,*
- 2) Dialogue with industrial circles as a basis to develop standards which meet the needs of industry, and*
- 3) Facilitation and dissemination for easy availability of information for users.*

### **1.2.1 Encouragement of Positive Participation of Industrial Associations in Standardization Activities**

#### **Recommendation 15: Measures for Encouraging Participation of Industrial Associations in Standardization Activities**

**Recommendation:** As one of the measures for decentralizing the development of standards, relevant industrial and academic associations could be entrusted to prepare draft standards. In this event they will be paid some amount of remuneration and also given technical guidance by SIRIM's staff. This results in encouraging the associations to build up capabilities to carry out the development of standards. In actual practice it will be easier to involve those associations in the review and revision of existing standards at the initial stages and subsequently in development of the new standards. Reference to similar international or foreign standards for writing of draft standards will help save time and manpower resources.

*It is desirable to guide the industrial associations in a long term program of a ten-year span so that they will be able to develop association standards and provide member companies with technical assistance for development of company standards in the future.*

*Standardization activities in the industrial sector should be implemented by individual firms at the bottom level, in the form of company-level standardization which is carried out on the basis of company standards established with the participation of employees. The standardization activities of the associations take place above that level, being carried out on the basis of association standards established with the participation of member companies and other relevant authorities. Finally, the standardization activities on the national level unify all the activities based*

*on the national standards.*

*In this way, company standards are systematized into association standards, and then the association standards are systematized into national standards. Thus standardization in respective levels is integrated with mutual adjustment towards the nation-wide standardization.*

*By encouraging industrial associations to develop association standards, the following advantages are expected:*

- a) supplement areas which are not fulfilled by the adoption of foreign standards,*
- b) make standards development more easy,*
- c) develop positive participation of industries in standards development, resulting in encouraging their interest in standards,*
- d) avoid inclusion of unnecessary standards into the national standards, and*
- e) enable development of more matured standards by using them for a certain period.*

### **1.2.2 Institution of Nation-wide Activities for Dissemination of Standards and Standardization**

#### **Recommendation 16: Establishment of a New Division in SIRIM to Promote Standardization and Certification**

At present, dissemination activities of standards and standardization are undertaken by the Corporate Affairs Division of SIRIM as a part of its work, but there is no division exclusively in charge of dissemination activities.

In order to implement dissemination activities on the national level as proposed in the subsequent section, establishment of a secretariat will become necessary. Also to enhance the dissemination activities of SIRIM itself, it is recommended that a specialized division with a full-time staff be established.

Independence of this organization on a self-accounting basis should be considered in the future. It is also proposed that an information office of this division be opened in Kuala Lumpur.

Organizations and activities of the JSA (Japanese Standards Association) in Japan and that of the Korean Standards Association are good cases to refer to.

### **1.2.3 National Programs for Dissemination of Standards and Standardization**

**Recommendation 17: Proposals on national programs for dissemination of standards and standardization.**

1) Award system

MOSTE or MITI holds ceremonies to give awards to factories or personnel for excellence in implementation of company standardization and quality management.

2) Establishment of Standardization Promotion Month

### **1.2.4 Strengthening of Dissemination Activities by SIRIM**

**Recommendation 18: Education on Utilization of National Standards**

Hold lectures on essential and basic MS standards and seminars on standardization and quality management. Particularly for SMIs, conduct educational activities on how to promote in-house standardization and its utilization in quality management.

**Recommendation 19: National Assembly on Standardization**

As the foremost activity of dissemination, hold the National Assembly on Standardization around the 14th of October which is World Standard Day. It will contribute to the dissemination of standardization to have all those concerned with standardization in Malaysia attend and to have presentations of cases, symposiums, etc. On this occasion, it is desirable to hold a ceremony to award honors to factories and personnel for excellence in the implementation of standardization. Also it seems effective to have the Open Day of SIRIM correspond to this period.

**Recommendation 20: Improvement of Convenience for Users of Standards**

For convenience of users, broader and easier access to information and publications on standards, the following measures are proposed:

1) Improvement of the coding method for MS standards

It seems better to implement improvements to the coding method, with classification by industrial sectors like JIS, at the time when the number of MS standards reaches the level of 5,000–6,000 in future.

2) Implementation of publicity activities

It is recommended that monthly journals presenting information on progress of development activities of MS standards and certification systems such as MS Mark and Safety Mark be issued.

3) Establishment of sales channels of standards

Establishment of sales channels is recommended for the sake of easier approach to publications concerning standardization, MS standards, and quality management. Such sales channels should be nationwide covering not only Kuala Lumpur but also other local cities.

**1.3 Formation of Basis for Standardization and Quality Management by Means of Intensifying Development and Revision of Standards**

**1.3.1 Intensifying Development of Standards with Priority on Those required for Enhancement of Industrial and Technology Bases**

*The target is to establish 6,000 standards by the year 2000. In terms of the absolute number of sector-wise standards, those in mechanical engineering and information technology (IT) seem to lag compared with those for chemicals and pharmaceuticals, foodstuffs and agricultural, and consumer products. At the same time priority has been given to the development of product standards, more than basic standards, related to technical factors, testing and analyzing methods. Generally, upgrading of standards development ability is indispensable for the formation of a basis of standardization and quality management. It is advisable to select focal areas for development taking account of the industrial needs of the country and the manpower capacities available for standard development.*

#### **Recommendation 21: Areas to be focused on Intensifying Standards Development**

1) Standards relating to safety, hygiene, and environmental protection

First priority should be given to the development of national standards for safety, hygiene and environmental protection.

More specifically, priority fields for the development of product standards relating to safety, hygiene and environmental protection should be selected in due consideration of the industrial development strategies adopted in the nation. The following would be priority areas in Malaysia:

- a) Standards for automotive safety parts: The aim is primarily to contribute to traffic safety and, at the same time, raise productivity of the parts manufacturers by standardization, while providing technical standards to small and medium-scale ancillary parts manufacturers that results in the nurturing of local industries with necessary technology for promotion of linkages.
- b) Safety standards for electrical appliances: There are a number of mandatory standards relating to the safety of electrical appliances, but those standards are not sufficient yet. The development of those standards can bring the same effect as stated above.

2) Standards for procurement by government and public agencies

At present government agencies procure goods and services on the basis of tender specifications drawn for specific products. It is advisable to leave those specifications as the standards for government procurement, independently of national standards, and establish national standards for basic factors required for manufacturing products such as painting methods, measuring methods for strength, durability, etc. Those basic factors defined in the national standards will provide technical standards for manufacturing when tender specifications for government procurement are drawn up on the basis of those basic factors. For products that are the same, it would be effective to provide the grading of products in accordance with technical standards set at several grades so as to give business opportunities to small enterprises that are weak in technical capability while encouraging them to upgrade technical capability.

### 3) Standards relating to basic technical factors

In this context the areas of priority are:

- a) Basic standards used as a basis for quality management, those related to sampling methods, testing and analysis methods, etc.
- b) Standards in interface areas for keeping compatibility with international standards
- c) Standards on parts which are sold in the secondary market

As for the above standards related to industrial technology, priority should be given to the adoption of international or foreign standards prior to the development of Malaysian independent standards.

*Although various new technologies have been transferred to Malaysia, the development of national standards for those new technologies may be considered as the future task for Malaysia. In Malaysia it is uncertain yet to what level the Malaysian industry will build up technical capabilities to absorb and improve those transferred technologies. It seems too early to develop national standards related to those new technologies at the present level of technical capabilities of the industry, because it limits flexible response to continuous innovation of technologies. If standards are established at the level that is not adaptable by the Malaysian industry, these standards will remain unused. Therefore, the standardization in this field should be initiated with the adoption of international standards in response to the upgrade of the technical capabilities of industry in the country.*

#### 1.3.2 Rationalization of Establishment and Revision of Standards

**Key Issues:** The activities for the development and updating of MS standards concentrate on SIRIM. In order to achieve the target set for the development and revision of standards, SIRIM's professional staff in charge of standard development (about 20 at present) will need to be increased at least by 50%. SIRIM, however, is hardly in a position to expand the activities due to constraints in increasing required staff. The measures to be taken for intensifying the activities under this situation should be:

- 1) To adopt international and foreign standards, as much as possible, while limiting the independent development of Malaysia's own standards concerning essential areas. This will reduce SIRIM's workload for the development of standards.

- 2) To decentralize the development activities through commissioning the work for the development and revision of standards to outside organizations.
- 3) To simplify the procedure for establishment, revision and withdrawal of standards.

In addition to the above, promotion of development of association standards in parallel is also important.

#### **Recommendation 22: Positive Adoption of International and Foreign Standards**

The independent development of Malaysia's own standards should be focused on standards for consumer protection, safety, health and environmental protection which will provide the basis for mandatory certification. Voluntary standards should be established with the adoption of the ISO/IEC and also foreign standards such as the BS, CS, AS, or JIS to the maximum extent possible. The most practical method for the adoption of international and foreign standards would be, as indicated in the ISO/IEC Guide 3 and 21, to adopt those standards without modification and then make any revisions to meet the Malaysian conditions at the time of subsequent review.

The establishment procedures for MS standards are well established and there seems to be no room to rationalize. However, it appears that there is still some space for simplification of procedures in case of adoption of international and foreign standards. Specifically, the step of Preparation of Preliminary Draft Standard can be omitted. Accordingly, it seems that both the steps of Draft Standard Released for Public Comment and TC Deliberation on Comments after the Deliberation by TC may also be left out. By simplifying the procedures in such way, the deliberation period can be shortened to about six months from the normal period of one year.

#### **Recommendation 23: Commissioning of Establishment Work of Standards**

It is recommended that commissioning of the writing of draft standards to industrial associations or other institutions be initiated before setting up a system for strictly accrediting standard writing bodies. The SIRIM staff must provide appropriate guidance in order to gradually raise the capability of those associations and institutions for writing standards. In this case, the secretariat work will still concentrate on SIRIM since there will be no change in the procedure for the deliberation and approval of proposed draft standards. However, it may result in reducing SIRIM's work load because SIRIM's staff could be released from the preparation of draft



standards to some extent and also deliberation of proposed draft standards could be shortened as the capacity of the accredited standard writing bodies increases.

In Malaysia, one of the constraints is a limited capacity for writing draft standards. Commissioning the writing of draft standards could increase this capacity.

**Recommendation 24: Institution of Research Network undertaking Research on Technical Aspects required for Standard Development**

The development of standards requires basic technical data which can be produced as the output of research work. It is important to institute a network to undertake research required for the development of standards by utilizing the resources of SIRIM research centers, PORIM, RRIM and private testing laboratories. To this end, it is proposed that a special committee be established, which determines the subjects of research to be commissioned and institutes the undertaking of research, while preparing an adequate budget for commissioning of research work. Another task of the committee will be to make necessary preparations for the implementation of this scheme, including the setup of the research network and annual research plans.

**Recommendation 25: Commissioning of Work for the Updating of Standards**

The established standards need to be reviewed periodically to confirm the validity, and updated with necessary revisions or withdrawals to meet any changes in economic conditions and technological innovations.

If there are some constraints on the reviewing work due to limits of manpower, it is proposed that the review and revision of standards be commissioned to appropriate industrial or academic associations.

## **Thrust 2: Assurance of Credibility of Malaysian Products in Export Markets**

*The credibility of Malaysian products may be built in export markets through establishing the conditions that industry in Malaysia is carrying out quality management using internationally acceptable methods and internationally recognized standards, and that the testing institutions undertaking assessment of quality are those accredited with internationally recognized standards.*

*The adaptation of national standards to the international environment will be one of the important tasks to be tackled in the pursuance of standardization in Malaysia, since industrial development has been and will be led by the export industry based on foreign technology. The Malaysian authorities have already been taking several actions for this task to date. In response to the expected furtherance of internationalization in the European market promoted by the unification of the EC, exporters to the EC market will be required to adopt international standards and internationally recognized certification. Thus, the pursuance of internationally acceptable standardization will be the basic requirement for Malaysia. The industrialization has close connection with the globalization of international operations of manufacturers in the industrialized countries. Along with the expansion of their international operations, trade between Malaysia and its neighboring countries will also increase for parts, components and materials which complement each other. In view of this trend, Malaysia should take action to adapt Malaysian standards to international levels with a view to not only encourage the internationalization of the domestic industry but also to initiate the establishment of common standards with neighboring countries in connection with the AFTA.*

### **2.1 Upgrading of Quality and Technology through Intensification of Certification System**

#### **2.1.1 Restructuring of Certification System**

##### **Recommendation 26: Restructuring of the Present Product Certification System**

**Key Issues:** The product certification system in Malaysia is based on the ISO No. 5 Certification System. All fundamental elements set forth for this type of system are included in SIRIM's existing product certification scheme, and therefore the present system covers all requirements. Nevertheless, it has a complicated structure.

The present system comprises three types of voluntary certification systems, namely the MS Mark, the Certified Mark, and the Safety Mark systems, and the mandatory certification system applied to electric products, automotive safety components, fire-prevention equipment and oil stoves. However, distinction between the voluntary certifications and mandatory certifications is not necessarily clear, even though different marks are used. These two types of certifications that are different in nature are both based on MS standards which are basically voluntary standards. Further, for the mandatory certifications, whereas the domestic products are certified by means of tests and inspections in accordance with the MS Mark certification system, imported products that are essentially the same as the domestic ones are subjected only to the consignment tests on selected samples of the imported goods. Consignment tests do not include all items included in the MS standards; only several items are used. Hence there is a difference in the application of standards to domestic products and to imported products. Moreover, the systems are not applied to factories located outside of Malaysia.

**Recommendation:**

- 1) In order to clearly distinguish between the mandatory certification system and the voluntary certification system because the two differ in objective and nature, it is proposed that Malaysia adopt a safety product certification system enacted on a mandatory certification system and a separate MS Mark certification system on a voluntary basis, with the restructuring of the present system. This system should also be applied to factories abroad in the future. For the time being, however, it is necessary to consider measures which will be needed to effect transition from the present Control Label system.
- 2) A single MS Mark system should be adopted to give assurance of product quality in place of the present voluntary MS Mark, Certified Mark and Safety Mark certification system. Since the MS Mark and Certified Mark are based only on different types of standards, it should be easier to combine these two in the future by establishing more MS standards or adopting more foreign standards as MS standards. Moreover, since the current Safety Mark is extremely vague in status, this should also be incorporated into the New Safety Mark system based on the mandatory certification proposed above. The structure and certification procedures to be involved in the New MS Mark system could be the same as those used for the current systems. However it would be well to keep in view the carrying out of factory assessment based on the ISO 9000 Series (or at least the securing of a ISO 9002 level) as a future task to be addressed. Also the MS Marks should be publicized overseas.

## **2.1.2 Improvement and Intensification of Factory Assessment for Product Certification**

### **Recommendation 27: Elaboration of Criteria for Factory Assessment**

In comparison with ISO 9002 or the JIS system, the assessment criteria used for the product certification in Malaysia are more highly generalized. This may be appropriate in view of the broad range of differences in the characteristics of products to be certified. It may also be said, however, that assessment in the latter case places greater importance on use of the assessor's judgment. It is recommended (1) to elaborate the auditing criteria used for product certification in line with that for the ARQS, and also (2) to include criteria for assessing the qualification of quality officers in factories, and in-house standardization of factories in order to encourage continued efforts for improvement of quality at factories even after the certification has been granted.

### **Recommendation 28: Improvement in Qualifications of Quality System Auditors/Assessors**

The qualifying criteria for SIRIM auditors is higher than that under the ISO standard. It is noted, however, that in training of auditor candidates, emphasis is placed on acquisition of knowledge and understanding of quality systems, auditing techniques and the management of auditing, but not for the training related to quality management. When assessment is made of the conditions of a company's quality assurance system based on the ISO 9000 Series, the auditor's/assessor's expertise in quality management will be important. It is recommended to give training for auditor candidates with regard to quality management, so that more appropriate assessment can be done while encouraging the firm to make efforts for improvement of quality.

### **Recommendation 29: Specifying the Duties and Qualifications of Quality Officers of Firms**

Under the present product certification system in Malaysia, factories for which the certification has been granted are obliged to post quality officers. In view of the important duties carried out by the quality officers, it is recommended that the duties and qualifying conditions of such personnel in the certified factories be specified as a measure to support efforts to improve product quality.

### **2.1.3 Adjustment of the Existing Product Certification System to ARQS**

#### **Recommendation 30: Adoption of ISO 9000 in the Product Certification System**

There is a need to adjust the methods and practices for factory inspections being conducted under the product certification systems (i.e., the MS Mark, Safety Mark and Certified Mark systems in Malaysia) so that they are compatible with the assessment of the quality system based on the ISO 9000 Series (i.e., the ARQS in Malaysia). To this end the following measures are recommended.

- 1) In the future, factory inspection for product certifications should include the assessment of quality systems based on ISO 9001 and ISO 9002.
- 2) Factories which have been registered as certified based on ISO 9001 or ISO 9002 under the ARQS may be exempted from factory inspection when applying for product certification.

### **2.1.4 Mutual Recognition of Certification Systems**

#### **Recommendation 31: Strengthening of Mutual Recognition of Certification Systems**

It is needless to say that as a basic condition for mutual recognition, the system for assessment of the quality system of factories, on which SIRIM and the British Standards Institute have signed a memorandum, is the first step toward it. It would be effective, for the time being, if more memoranda such as this one were to be signed with institutions outside Malaysia, as a means of progressing toward establishing such recognition and eventually reducing expenses while improving efficiency. It is likely that regional or international meetings are going to be held, for the purpose of establishing the preconditions for mutual recognition, and it is hoped that Malaysia will participate in them.

### **2.2 Assurance of Credibility of Malaysian Products through Diffusion of an Internationally-recognized Quality Management System**

*Diffusion of a quality management system in accordance with ISO 9000 currently promoted in Malaysia is worth international recognition. In this respect, Malaysia is advanced in comparison with other countries. The following recommendation is to further the diffusion of the system.*

**Recommendation 32: Securing Quality System Consultants**

In the QSCRS, 11 companies and 18 individuals are registered, but they have not been able to meet the demand for consulting services, so it takes a long time before a consultant is available when one is needed. It is necessary to solve this problem as soon as possible.

If such a gap is confirmed to exist, then SIRIM could organize short training courses which would explain how to interpret the ISO 9000 Series and point out noteworthy aspects of this series. Participation in such courses should be made compulsory for registered consultants. Moreover, the annulment of registration should be considered for unprincipled consultants.

**Recommendation 33: Establishment of a Consultant Company Linked to SIRIM**

It is quite natural that a large body of know-how concerning the application for ARQS registration should have been built up in SIRIM through its activities as the implementing agency of the ARQS. Therefore if SIRIM itself were to carry out consulting activities for the ARQS it would greatly facilitate the firm's ARQS application, but this is obviously not directly possible since SIRIM is the institution which grants the ARQS certification. An alternative would be the founding of a consultant company related to the institution granting the certification in the manner practiced in Great Britain or Singapore. If such a consultant company were to be established, the following points would need to be kept in mind.

- a) The consultant would need to be completely independent in organizational and financial aspects.
- b) SIRIM would not be permitted for any reason to reveal to the aforesaid consultant data or information which had been obtained via the ARQS assessment.
- c) SIRIM would treat the aforesaid consultant on a par with other consultants and in no way accord any preferential treatment.
- d) The fact that this consultant was linked to SIRIM would not be advertised.

## **2.3 Testing and Inspection under an Internationally-recognized System**

### **2.3.1 Enhancement of Laboratory Accreditation Scheme (SAMM)**

#### **Recommendation 34: Administration of SAMM by an Independent Agency**

SIRIM is mandated for the administration of SAMM. However, since SAMM is the national laboratory accreditation scheme and SIRIM is one of the laboratories to be accredited under SAMM, an independent agency should be appointed for the administration of SAMM although laboratory assessment for the accreditation may be entrusted to SIRIM.

#### **Recommendation 35: Incorporation of Other Laboratory Accreditation Scheme into SAMM**

Several schemes for laboratory accreditation had been implemented individually by SIRIM, RRIM, PORIM, and IKM until SAMM was started. Some of the schemes have been incorporated into SAMM and the laboratories previously accredited under those schemes have been re-accredited in accordance with the assessment standards set in SAMM (ISO/IEC Guide 25). It is recommended that such steps be taken with regard to the other remaining schemes so that the SAMM can be implemented as the sole national accreditation scheme for laboratories.

#### **Recommendation 36: Authorization of Test Reports issued by SAMM Accredited Laboratories for Application for Product Certification**

When application for product certification of a product is made, an authorized test report of the product is required for certification. Under the product certification system, test reports authorized for certification are those issued by laboratories which the implementing agency of the product certification system has accredited or those issued by the laboratory which the certification agency itself operates.

A useful measure would be to accept test reports issued by the relevant laboratories accredited under SAMM. To this end it is recommended that this be authorized in the product certification system.

**Recommendation 37: Promoting International Recognition of Accredited Laboratories**

Malaysia should promote international recognition of the laboratories accredited under SAMM. To this end there would be three alternative steps as follows:

- 1) To promote mutual recognition of testing laboratory accreditation schemes:

This is SIRIM's effort to execute the Memoranda of Understanding (MOU) with the implementing agencies of the laboratory accreditation schemes in relevant foreign countries for mutual recognition of these accreditation schemes thereby mutually accepting test reports issued by testing laboratories accredited under the respective accreditation schemes. It must be noted, however, that there are not many cases which have been realized, although this is an ideal arrangement, because of difficulty in adjusting different practices applied by these agencies for laboratory assessment and also different levels of their assessment capabilities.

- 2) To promote mutual recognition between the Malaysian accredited laboratories and those in the foreign countries:

This is to promote the execution of MOU between the accredited laboratories in Malaysia including SIRIM and those in relevant foreign countries for mutual recognition of test reports issued by these laboratories. Expansion of these arrangements will bring about virtually the same effect as mutual recognition of laboratory accreditation schemes. In fact, there are a number of foreign laboratories having such arrangements with accredited laboratories in other countries.

- 3) To urge Malaysian laboratories to apply for accreditation in foreign countries:

This is to promote Malaysian laboratories accredited under SAMM to apply for accreditation schemes in relevant foreign countries thereby forming international networks of testing laboratories.

### **2.3.2 Reinforcement of Testing and Inspection Capability of SIRIM**

**Recommendation 38: Enhancement of Capability for carrying out Factory Inspection**

Inspection capacity depends on the capability of inspectors/assessors to assess adequacy of the management capability of the applied factory. Specifically, the



assessment capacity can be determined on the basis of 1) availability of experienced or qualified engineers who have capability to carry out the inspections/assessment of factories with a clear understanding of the aim of the inspection/assessment, and 2) availability of an adequate number of those engineers to meet the demand for inspections. Other aspects for determining inspection capacity are the management capability of the institution undertaking the inspection, to maintain an impartial inspection/assessment and also to provide inspectors/assessors with appropriate training to upgrade their capabilities.

**Recommendation 39: Securing Adequate ARQS Assessors**

It is necessary to arrange for the prompt increase in auditors, including assessors to be stationed in the branch offices. To this end, it is recommended an appropriate training program be implemented for staff in order to increase qualified assessors.

**Recommendation 40: Increase of Factory Inspectors for Product Certification Systems**

It is essential to increase the number of factory inspectors, including the inspectors who have to be stationed at branch offices in order to respond to increasing demands in these regions. It is recommended that an appropriate training program be implemented for staff who apply for the qualifications examination of inspectors so that the number of qualified inspectors can be increased as required.

**Recommendation 41: Practical Use of SAMM Accredited Laboratories for Tests required for Application of Product Certification**

It is recommended that wider utilization of SAMM accredited laboratories be promoted to carry out tests for the product certification which requires test reports issued by impartial testing laboratories.

***View on the Introduction of the Export Approval Scheme***

*The testing and inspection of products would be indispensable for export approval since it is a product certification system. For products produced at factories satisfying certain conditions such as those certified as to the quality system based on the ISO 9000 Series, the tests and inspections may be exempted for some items, but it would not be acceptable to exempt all tests and inspections.*

*If the export approval scheme is implemented at the outset, most of the small manufacturers would face difficulty, since most of them could not produce the required quality of products, while the leading manufacturers could continue to export their products. For example, in the case of rubber gloves, many of the small manufacturers are engaged in manufacturing low grade products which are still accepted in export markets. Complaints are often due to exporting low grade products as high grade ones either due to a simple mistake or mal-intention. It seems difficult to prevent the latter-motivated exports even with the export approval scheme.*

*Meanwhile costs for testing/inspection should also be taken into account, since they are inevitable in implementation of the export approval scheme.*

*The export inspection system requires several steps be taken for implementation. Hence the adoption of this system must be examined carefully. In view of these circumstances, our view is that it is better to initiate self-control among the manufacturers. At the same time, it is recommended that the effect and practice of the export approval scheme be examined, as well as any measures to be taken for assisting the upgrading of small manufacturers more carefully.*

### **Thrust 3: Coordination and Adjustment for pursuing Industrial Development while protecting Quality of Human Life**

#### **Expansion of Standard Development and Certification Systems aiming at Safety, Hygiene, Environmental Protection and Consumer Protection**

*In Malaysia the standardization related to the protection of environment and consumers is of a very limited scope, covering only a part of protective requirement such as those related to the safety of automobiles, and there are still many areas in which the standardization should be intensified so as to satisfy minimum requirements for such protection. Further, as the industrialized countries which are the main export markets for Malaysia are more strict in regulating industrial goods to protect the environment and human life, it will be essential for Malaysia to guide domestic industry to meet such requirements. These efforts will contribute to the expansion of exports, while upgrading technological capabilities of manufacturers so that they can cope with the requirements of export markets. If such action is not taken in Malaysia, it will adversely affect the export of Malaysian products and also restrict the elevation of awareness of quality management.*

Refer to Recommendation 2 and 21.

## **Thrust 4: Sustaining Industrial Competitiveness through Institutional Buildup of Technical Infrastructure**

### **4.1 Buildup of a Basis of R&D for the Future**

*In Malaysia the R&D of private industry is dependent largely on MNCs supported by their parent companies. Hence the R&D for new advanced technologies will not be beyond that of transferred technologies. It is essential to carry out R&D for improvement of existing technologies so as to conform with the Malaysian environment in terms of production, distribution and consumption. In this respect, R&D for standards development will provide this basis.*

Refer to Recommendation 24.

### **4.2 Undertaking of Long-term Human Development**

**Key Issues:** In Malaysia shortage of industrial manpower is increasingly becoming serious. It is also seen in the phases of strengthening quality management and recruiting SIRIM staff.

*The dissemination of the concepts and principles of quality management should be started in school. Therefore it is recommended a course on teaching basic knowledge of standardization and concept and principles of quality management be provided in the curricula of school. Another important issue is to provide effective training to lower grade graduate employees on quality management. Job-hopping, especially among the university/college graduate engineers is a serious problem obstructing the establishment of quality management systems in industry. This causes damage not only to individual companies but to the industrial sector as a whole since the competence of the employees will not be improved unless they can accumulate working experience and integrate this with the stock of company expertise. An increasing number of companies, irrespective of their scale, try to employ some 12SPM graduates and then nurture these through on-the-job and other training courses.*

*It is important to provide basic education in school with regard to fundamental subjects for quality management as well as awareness of quality. This is an important step for enhancing quality management in industry and eventually furthering industrial development in the future. Management of SMEs often comment that many of the seminars and training courses currently held are not useful for them.*

*Their staff are mostly graduates of 12SPM or lower, and have very limited knowledge on standardization and quality management. In many of those seminars and training courses, as participants need to have basic knowledge on standardization and quality management to some extent, lectures are often difficult for SME's management or staff to understand.*

*Another aspect often pointed out as impairing pursuance of quality management is the difficulty of communicating with operating personnel. This difficulty is of course partly linguistic but also results from the inability of operators to understand the principles and methods of quality control practices. It is concluded from the various information assembled from industry, that education in Malaysia is largely of a cramming, rote learning type and that aspects of creative or rational problem solving are given little emphasis.*

*University graduates and postgraduates tend to obtain the most important posts both in public and private sectors. The positive attitude of top management is the most important factor determining the undertaking of quality management in firms, but at the same time the middle management who draw up the concrete implementation plans and promote their realization, also share an important role. In order to nurture these personnel who will be engaged in large firms as well as SMEs, it is emphasized that education in universities/colleges be provided on basic knowledge of standardization and quality management in general, and in particular the statistical principles and their application, which are the basis of quality control.*

#### **Recommendation 42: Quality Management Education in Universities/Colleges**

In universities it should be made compulsory for relevant students in the first two years to obtain credits in studies of the basics of standardization and quality management and statistics. For students of the Sciences, instruction in the basic disciplines of applied statistics (experimental design, multivariate analysis, quality engineering) should be provided before graduation and competence gained in research and development and quality improvement.

#### **Recommendation 43: Introduction of Standardization and Quality Management Studies in School Curricula**

It is necessary to include standardization and quality management studies in the curricula of the early schooling phases (primary and secondary schools) so as to cultivate the correct understanding of these subjects and disseminate awareness of quality. In the higher levels of education the curricula should include the basic

principles and applications of statistics so that students can gain an understanding of how these are applied in actual practice. In vocational training schools training should be provided not only on specific manufacturing technologies and operational skills but also on the basic principles and application of standardization and quality management.

#### **4.3 Establishment of Facilities for Disseminating Quality Management**

##### **Recommendation 44: Establishment of Facilities for Disseminating Quality Management in Regions**

Refer to Recommendation 14.

#### **4.4 Establishment of an Evaluation System of Quality Management**

*Testing and calibration facilities may be classified by functions as follows:*

- 1) Testing facilities*
  - a) for certification testing*
  - b) for request-based testing*
- 2) Metrology/calibration facilities relating to industrial standardization and quality control*

*There is great need for the upgrading of metrology/calibration facilities, and the results of a questionnaire survey for the Study showed a high demand for calibration. Nevertheless it is still lower than that theoretically required because there are a number of manufacturers with insufficient quality awareness who ignore the importance of calibration.*

*The required upgrading of the metrology/calibration facilities include:*

- 1) Upgrading of the existing facilities at SIRIM Headquarters for improvement of precision;*
- 2) Installation of additional equipment at SIRIM Headquarters to meet increasing demand from the industry; and*
- 3) Establishment of basic calibration facilities at SIRIM branch offices to meet the demand for calibration in industrial centers.*

*The testing facilities for certification also need to be upgraded. The existing facilities are inadequate to carry out all testing on the items required by the present*

certification system. Besides SIRIM, existing laboratories accredited under SAMM, are also inadequate to carry out such tests.

*When the upgrading and expansion of SIRIM facilities are implemented as proposed, the facilities will be adequate to carry out all testing required for certification on electrical machinery and appliances. As for automotive parts, however, the facilities will be able to cover only a limited testing field even after the upgrading.*

*The request-based tests are carried out upon requests made by manufacturers. Manufacturers usually request SIRIM to carry out tests on prototypes of new products made on the basis of the specifications given by their customers, or test for the analysis of the causes of trouble. The facilities required for request-based testing can be covered mostly by the testing facilities for certification, once these are upgraded, essentially in Kuala Lumpur and Selangor areas. In other regions, the establishment of testing laboratories is necessary to meet the demands for testing in the basic field from the regional industries.*

*The projects for the upgrading and expansion of facilities are summarized in Table S-2. The projects recommended in the table include those of testing only. In order to draw up a program for the upgrading of metrology/calibration facilities, a detailed study will be required. As a detailed study on the metrology system is out of the scope of the present study, only a broad concept on the upgrading of metrology/calibration facilities is presented in this report.*

**Recommendation 45: Upgrading of Testing Facilities for Product Certification in the SIRIM Headquarters**

Refer to Table S-2.

**Recommendation 46: Establishment of Testing Facilities in Penang Branch Office of SIRIM**

Refer to Table S-2.

**Recommendation 47: Establishment of Testing Facilities in Johor Bahru Branch of SIRIM**

Refer to Table S-2.

**Recommendation 48: Implementation of a Detailed Study on Enhancement of Industrial Metrology Systems**

As for implementation of calibration services, the following are pointed out,

- a) the limited range of fields and accuracy of calibration, and
- b) the poor calibration capacity in the regions besides SIRIM Headquarters.

Due to increased precision requirements for production facilities along with industrial development, it is essential to carry out calibration of a high degree of accuracy in a wide range of fields. Therefore SIRIM, as the National Metrology Centre, must be capable of responding to such needs. At present there are limits to both the range of the industrial field and level of precision covered by SIRIM measurement equipment. Therefore the expansion of measuring equipment and the recruitment of related metrological engineers is an urgent task.

Further, the fields of calibration which can be actually carried out at the two centers of branch offices located in Penang and Johor Bahru (to be implemented in the very near future) are limited to electrical quantity, while there is no center for carrying out calibration in Sabah or Sarawak. Reinforcement of measuring facilities of the branch offices located in the provinces is desirable.

In any case, it is essential to conduct a detailed study from an overall standpoint of industrial metrology.

**Recommendation on Package Programs for Actions to be undertaken on Specific Industrial Sub-sectors and Business Groups**

Presented below are the recommendations for the essential action programs focusing on specific industrial sub-sectors or business groups. These programs are to be implemented in a comprehensive manner through the cooperation of the related agencies. It is desirable, moreover, that while emphasis of these programs is to be given to 1) the automobile parts industry, 2) SMIs that will be the vendors to the government and public agencies, and 3) the rubber glove industry, similar programs are promoted in other strategic industries through the cooperation of both governmental agencies and industrial circles.

**Recommendation 49: Program for Developing Standards and promoting Quality Management in the Automotive Parts Industry**

Refer to Recommendation 2. Outline of the program is presented in Table S-3.

**Recommendation 50: Program for Development of SMIs through Standardization of Products to be procured by Government Agencies and Public Corporations**

This program aims to develop standards of quality and performance for procurement by the government and public agencies, and of implementing certification systems so as to give guidance to SMIs for their development.

In this program, basic standards are to be established in place of standards for individual products so that such basic standards will be commonly used as technical standards among SMIs. These include standards for dimensions, strength and such methods of production as painting and welding as well as methods of testing products, etc.

In order to achieve this, it is recommended that a system be implemented to study standards and a supporting system be implemented to test products produced by SMIs. The above development of standards is to be entrusted to the competent government and public agencies, so that the activities for drafting standards can be expanded. Further, formulation and dissemination of guidelines for implementing the ISO 9000 quality system focusing on SMIs, taking into account the characteristics of SMIs, will help them to improve their quality management.

Outline of the program is presented in Table S-3.

**Recommendation 51: Program for Supporting the Rubber Based Industry, particularly the Rubber Glove Industry**

The rubber glove industry holds the largest share of exports among the rubber based industries, but it consists mostly of small producers.

The production process is relatively simple but there is considerable disparity in the quality of the products. Often this is caused not by the production process but by the quality of the raw rubber and additives. Although there are standards for raw rubber, they have been established for the raw rubber in general whereas more precise specifications are required for the raw materials for rubber glove produc-



tion. In actuality, as glove manufacturers do not possess equipment for testing, they have to accept the rubber supplied from their suppliers.

In order to correct problems arising from the raw materials, it is desirable to procure the rubber in accordance with standards established for adequate materials for glove production. These standards are not necessarily the national standards, but it is preferable to establish them as the national standards, considering that Malaysia is in a leading position both in supplying raw material rubber and in exporting rubber gloves.

Further, it is probable that in the future ISO 9000 will be used as the basis of quality control at the request of customers, because the rubber gloves are export products. However, the manufacturers in this industry face difficulty in introducing ISO 9000 quality systems with general guidance available at present, because most of them are small business enterprises. It is desirable to devise guidelines reflecting the scale and characteristics of the companies concerned.

Further, through the process of drafting standards and guidelines for introducing a quality control system by industrial associations, it will promote their involvement in standardization and quality control activities.

The program is outlined in Table S-3.

### **Monitoring of Implementation**

#### **Recommendation 52: Establishment of a Committee in MOSTE for Monitoring Implementation of Proposed Programs**

The above recommendations are necessary to be implemented not only individually, but in an integrated manner with overall coordination. Therefore, it is desirable to establish a permanent organization, which is responsible for monitoring the implementation and, if necessary, coordinates, assists, recommends and improves the programs. Since these recommendations involve many organizations including the government and private sector, this monitoring body should be the one which has the capacity for coordination among these organizations. In view of this, the monitoring organization is recommended to be set up at MOSTE in the form of a committee with membership from various ministries and relevant agencies. Engagement of experienced foreign experts will also be effective for successful implementation.





**Table S-1(1) RECOMMENDATION ON ACTIVITIES FOR ENHANCEMENT AND PROMOTION OF INDUSTRIAL STANDARDIZATION AND QUALITY ASSURANCE**

Activity area	Tasks	Recommendation	Detailed description in the text	Strategic Position in view of industrialization	Strategic position in view of industrial standardization and quality assurance	Outline of the recommendation	Recommendation No.	Relevant projects/ programs recommended
Development and Updating of Standards	Formulation of development goal of standards	Required number of standards to be targeted	3.2.2	I,III	B	After reviewing the industrial development status and the targeted number of MS standards development set by SIRIM, recommended to increase the standard development capacity.		
		Priority area for standard development	3.2.3	I,III	B	After reviewing the existing MS standards in view of standard fields, recommended the following fields as the priority area for the standards to be developed to support industrial development.  1) Standards related to safety, sanitary, and environment protection.  The following are the areas to be focused, among them, in view of industrial development strategy a) Standards related to automotive parts critical to safety b) Standards related to safety of electrical machinery and appliances	2,49 21	
		Formulation of annual plan for standards development		I,II,III	B	2) Standards related to products to be procured by government agencies and public corporations 3) Standards related to technological factors Recommendation to formulate short-, mid-, and long-term plan for standard development	1,50 21 24,25	
		Adoption of international, and foreign standards into MS more to practicable extent	3.2.4	I	B	1) Simplifying the procedure for adoption of international and foreign standards  2) Entrusting industrial associations, and academe, etc. to carry out selection of necessary standards to be introduced  3) Introduction of international/ foreign standards in keeping with development of domestic industry with regard to new technology areas such as information technology and new materials	22 23 24	
	Intensification of activities for standard development and updating	Decentralization of standard development	3.2.4	I	B	1) Promotion of accreditation of standard development organizations based on the accreditation procedure set in the cabinet paper  2) Recommendation on short-, mid-, and long-term decentralization process to be taken	23,24,25 24	Decentralization program of standard development
		Encourage participation of industrial associations in standard development and dissemination		I	B,C	1) Entrusting industrial associations to write draft standards  2) Encouraging development of association standards 3) Encouraging development of in-house standards by industrial associations for their member firms	15 15 15	Program for encouraging industrial associations to participate in standard development

Notes: Strategic position in view of industrialization;

I) Promotion of greater inter-industry and sectoral linkages through strengthening quality of local firms, II) Assurance of credibility of Malaysian products in export markets  
III) Promotion of technology development with protecting quality of human life, IV) Sustaining competitiveness through institutional buildup of technical infrastructure

Strategic position in view of industrial standardization and quality assurance;

A) Incentives encouraging industries to undertake to QM, B) Development of standards as technological basis for TQM  
C) Support to QM activities, D) Upgrading of testing system/facilities



Table S-1(2) RECOMMENDATION ON ACTIVITIES FOR ENHANCEMENT AND PROMOTION OF INDUSTRIAL STANDARDIZATION AND QUALITY ASSURANCE

Activity area	Tasks	Recommendation	Detailed description in the text	Strategic Position in view of industrialization	Strategic position in view of industrial standardization and quality assurance	Outline of the recommendation	Recommendation No.	Relevant projects/ programs recommended
Development and Updating of Standards (Cont'd)	Intensification of activities for standard development and updating (Cont'd)	Institution of research network required for standard development	3.2.4	I,III	B	Institution of research network of the existing R & D institutes to entrust them to carry out researches required for standard development	24	Program for instituting research network
		Continuous allocation of additional resources to SIRIM for standard development		I	B		3	
	Strengthening of standard dissemination	Intensification of promotional activities at the national level	3.2.5	I	A	1) Establishment of the center organization for disseminating standards (start with addition of new division to SIRIM)	16	
						2) Development of awarding system for factories and individuals of excellent standardization activities	17	
		Strengthening of SIRIM's activities for standard dissemination	5.2.2	I	B,C	3) Designation of standardization promotional month with intensive promotional activities	17	
			3.2.5			1) Dissemination activities for use of standards in QC	18	
Certification System	Clear definition and intensification of the system	Restructuring of the system	3.3.2	I,III	A	2) Improvement of services for users of standards		Comprehensive action programs
						a) Improvement of coding system of MS standards	20	
		Extension of the system	6.4.1	I,III	A	b) Intensification of publicity activities regarding standard development and certification system	17,19	
			6.4.2			c) Development of sales outlet network of standards in KL and regions	20	
	Strengthening of assessment system of the existing certification system	Adjustment of product certification system and ARQS	3.3.2	II	A	1) Integration of Control Label System into Safety Product Mark System	26	
						2) Integration of Safety Mark System (voluntary certificate system), and Certified Mark System into MS Mark System	26	
		Clearer definition of assessment criteria	3.3.3	I,II	A	Intensification of existing certification system and/or establishment of new system as a measures to provide strategic industry with incentives to implement QC, and to ensure safety, consumer protection, and environment protection		
						a) Automotive parts related to safety	2,4,9	
		Ensuring number of qualified assessor	3.3.3	I	C	b) Goods to be procured by government and public agencies	1,50	
						Adoption of quality system assessment of ISO 9000 series in product certification system	30	
						1) Defining function and qualification of quality officers of firms	27,29	Training program
						2) Inclusion of assessment of in-house standardization in the assessment for certification	27	
						1) QC training for SIRIM staff candidated for quality system assessor	28	
						2) Training of quality system assessor	29	
						3) Training of factory assessor for product certification	29	



**Table S-1(3) RECOMMENDATION ON ACTIVITIES FOR ENHANCEMENT AND PROMOTION OF INDUSTRIAL STANDARDIZATION AND QUALITY ASSURANCE**

Activity area	Tasks	Recommendation	Detailed description in the text	Strategic Position in view of industrialization	Strategic position in view of industrial standardization and quality assurance	Outline of the recommendation	Recommendation No.	Relevant projects/ programs recommended
Certification System (Cont'd)	Promotion of certification systems	Nurturing of QC system consultant	3.3.4	I	C		6,32	
		Establishment of a consulting firm having relationship with SIRIM	3.3.4	I	C	Provision of SIRIM's know-how on QC through the consulting firm	33	
	Internationalization of certification systems	Promotion of international recognition of ARQS	3.3.5	II	A	1) Promotion of bilateral mutual recognition	22,31	
						2) Active participation to international conferences on mutual recognition	22,31	
Testing and metrology system/ facilities for industrial standardization	Strengthening of SAMM accreditation system	Establishment of independent body for system operation	4.1.2	IV	D		34	
		Integration of existing accreditation system of testing labo into SAMM		IV	D		35,41	
		Adoption of SAMM in certification systems operation		II,IV	D		36	
		Promotion of international mutual recognition of SAMM		II,IV	D		37	
	Strengthening of testing capacity	Strengthening of capacity of testing for certification purpose	4.1.3	IV	D	1) Increase in testing capacity of SIRIM HQ for supporting MS Certification System and Mandatory Certification System (especially, to meet the future expansion of mandatory certification system for automotive parts)	38,45	Program for upgrading testing facilities for certification system
						2) Training of testing staff	39	Testing staff training program
		Expansion of capacity for request base testing	4.1.3	IV	D	Increase in testing capacity of SIRIM regional labo for request-base testing demand (covering basic testing items only)	40	Program for upgrading facilities for consignment testing
	Strengthening of industrial metrology system	Strengthening of metrology and calibration capacity of SIRIM HQ	4.2.2	IV	D	Establishment of independent body for operation of metrology center	14,44	
		Strengthening of metrology and calibration capacity of SIRIM's regional labo		IV	D	1) Expansion of calibration capacity of SIRIM in Penang	46,48	
						2) Expansion of calibration capacity of SIRIM in Johor Bahru	47,48	
		Establishment of reference standards capacity		IV	D	3) Expansion of calibration capacity of SIRIM in Sarawak	48	





Table S-1(4) RECOMMENDATION ON ACTIVITIES FOR ENHANCEMENT AND PROMOTION OF INDUSTRIAL STANDARDIZATION AND QUALITY ASSURANCE

Activity area	Tasks	Recommendation	Detailed description in the text	Strategic Position in view of industrialization	Strategic position in view of industrial standardization and quality assurance	Outline of the recommendation	Recommendation No.	Relevant projects/ programs recommended
Encouragement of quality improvement, and QC promotion	Promotion of educational and encouragement activities for quality consciousness	Strengthening of promotional activities for encouraging quality consciousness of business management	5.1.1	I,IV	A,C	Improvement of contents of QC seminars	5	
		Introduction of quality related curriculum	5.1.2	I,IV	A	1) Implementation of basic curriculum of quality control in collage level education 2) Introduction of quality consciousness education in high school level and lower	42 43	
	Strengthening of supporting activities of QC promotion for businesses	Institution of organizational structure for TQC promotion	5.2.1	I,IV	C	Institution of organizational structure for TQC promotion with the following function:  1) Formulation of national plan of QC promotion, and its coordination among relevant organizations 2) Registration of qualified personnel for QC guidance to ensure resources 3) Research on QC application method applicable to Malaysian society and businesses 4) Implementation of QC promotion activities Provision of spaces for QC promotion activities in regions	4,5,13 4,5 7 14 44	Program to establish the center organization
		Establishment of Regional Quality Center(s), and development of its function	5.2.1	I,IV	C			
		Nurturing of quality system consultant		I	C		6	
		Formulation of industry-wise guideline for implementation of ISO 9000	3.3.3	I	C	Encouraging industrial associations to make guide lines for implementation of ISO 9000 quality system taking into account the characteristics of their industry	30	
	Promotion of QC among SMEs	Provision of incentives and support of comprehensive program		I,III,IV	A,B,C,D	Comprehensive action in the strategic industry areas	8,9,10,11,12,49,50,51	Comprehensive action programs
All areas	Successful implementation of the recommendations	Establishment of the system for monitoring implementation				Establishment of permanent committee at EPU with membership from various Ministries and relevant agencies	52	



**Table S-2 PROJECT FOR UPGRADING TESTING FACILITIES**

Testing Field	Facility	Objective	Recommendation No.	Contents	Estimated cost required	Implementation Program			Relevant programs
						Short-term	Mid-term	Long-term	
Certification testing	SIRIM HQ	Upgrading of testing facilities required for operation of new MS Mark system and new Product Safety Mark System	38	1) The existing testing capacity of SAMM accredited labos is limited and hard to expect its contribution to the operation	Approx. M\$20.4 million	1) Development of laws and regulations to transfer to the new system	1) Commencement of testing	1) Study on possible addition and revision of certified products	Training program for recruited testing staff
				2) Testing of products regulated by the existing mandatory certification systems. These facilities can cover most of products to be included in the future. 3) Imported products are assumed to be tested at the labo accredited by SIRIM in the shipping country 4) Testing of electrical field can be covered by the planned upgrading 5) Testing of automotive parts field will require additional facilities than planned, if certified products are increased in the different field.	Required space: 1,500m2	2) Formulation of list of required facilities 3) Design of labo 4) Financial arrangement 5) Construction of labo 6) Formulation of training program 7) Recruitment of testing 8) Publicity activities among industries	2) Implementation of training 3) Promotion of mutual recognition with labos abroad 4) Participation to CB system	2) Implementation of training 3) Accreditation of labo under CB system 4) Procurement and installation of additional facilities	
Testing for request-base testing	SIRIM HQ	To meet the future increase in demand for request-base testing		1) No additional facility required with facility upgrading planned as above					
				2) Request-base testing of special case is assumed to be handled by the existing R&D centers of each field	None				
	Penang labo, SIRIM		40	1) Facilities mainly for electrical testing 2) Testing of special type is handled by SIRIM HQ	Approx. M\$7.92 million Required space: 1,500m2	1) Formulation of list of required facilities 2) Design of labo 3) Financial arrangement 4) Construction of labo 5) Publicity activities among industries	Commencement of testing	Procurement and installation of additional facilities	
	Johor Bahru labo, SIRIM		40	1) Facilities mainly for mechanical testing 2) Testing of special type is handled by SIRIM HQ	Approx. M\$7.76 million Required space: 1,500m2	The same as above The same as above	The same as above The same as above	The same as above The same as above	



Table S-3(1) PACKAGE PROGRAM FOCUSING ON SPECIFIC INDUSTRIAL SUB-SECTORS

Activity area		Program	Strategic position of the Program				Contents
			Provision of incentives	Standards development as technological basis	Support to QC activities	Upgrading of testing system/ facilities	
(1) Program for developing standards and promoting quality management in the automotive parts industry							
Development and Updating of Standards	Development of standards in the key area of strategic industrial development	Development of standards relating to automotive safety parts		X			Develop standards required to upgrade quality of automotive parts in replacement equipment market
	Increase in standard development capacity	Encourage participation of industrial associations to standard development and dissemination		X			1) Entrusting standard development to industrial associations
		Establishment of safety standards for automotive parts	X	X			2) Encouraging development of organization standards 3) Encouraging development of in-house standards by industrial associations to their member firms 1) Establishment of law/ regulatory system as a basis of transportation safety and environment protection 2) Formulation of safety standards of automotive parts based on the above law/ regulatory system 3) Formulation of technological standards based on the above safety standards
			Ensuring R&D capacity for development of safety standards of automotive parts		X		
Certification System	Intensification of certification system	Introduction of certification system for automotive safety parts	X				Introduction of product certification system regarding safety related automotive parts, and popularization of the system to the general public
Testing and Metrology System/ Facilities for Industrial Standardization	Strengthening of testing capacity	Upgrading of testing facilities required for testing of automotive safety parts				X	Addition of required facilities for operation of the certification system
Encouragement of quality improvement, and QC promotion	Promotion of QC based on ISO 9000	Formulation of guide line for implementation of ISO 9000 specific to automotive parts industry			X		Encourage industrial associations to make guide lines for implementation of ISO 9000 quality system taking into account the characteristics of their industry



Table S-3(2) PACKAGE PROGRAM FOCUSING ON SPECIFIC INDUSTRIAL SUB-SECTORS

Activity area	Program	Strategic position of the Program				Contents	
		Provision of incentives	Standards development as technological basis	Support to QC activities	Upgrading of testing system/ facilities		
(2) Program for development of SMIs through standardization of products to be procured by government agencies and public corporations							
Development and Updating of Standards	Development of standards in the key area of strategic industrial development	Promotion of standardization of products procured by government agencies and public corporations		X			1) Standardization of product specifications used in procurement of government agencies and public corporations
	Increase in standard development capacity	Encouragement of participation of industrial associations in standard development and dissemination		X			2) Development of basic standards used in formulating the above standards
		Ensuring R&D system for standard development		X			1) Entrusting drafting of MS standards to the relevant government agencies and public corporations
Certification System	Intensification of certification system	Establishment of new certification system applicable to the products to be procured by the government agencies and public corporations	X				2) Encouraging development of organization standards
Testing and Metrology System/ Facilities for Industrial Standardization	Strengthening of testing capacity	Upgrading of testing facilities required for testing the above products				X	Entrusting R&D required for formulating specifications of procured products to the existing R&D institutes
Encouragement of quality improvement, and QC promotion	Promotion of QC among SMEs	Formulation of guide line for implementation of ISO 9000 specific to SMEs			X		Decision of use of the above standards by government agencies and public corporations for their procurement
(3) Program for supporting rubber based industry (particularly rubber glove industry)							
Development and Updating of Standards	Development of standards in the key area of strategic industrial development	Development of standards for raw material rubber specific to rubber glove industry		X			Addition of required facilities for operation of the certification system
	Increase in standard development capacity	Encouragement of participation of industrial associations in standard development and dissemination		X			Development of rubber standards specific to rubber glove industry as their raw material
		Ensuring R&D system for standard development		X			1) Entrusting drafting of MS standards to the industrial association
Encouragement of quality improvement, and QC promotion	Promotion of QC based on ISO 9000	Formulation of guide line for implementation of ISO 9000 specific to rubber glove industry			X		2) Encouraging development of organization standards
							Entrusting R&D on standards specific to rubber glove industry to the existing the R&D institute
					X		Encourage industrial associations to make guide lines for implementation of ISO 9000 quality system taking into account the characteristics of the industry







Table S-4 IMPLEMENTING BODIES AND BUDGETARY/PERSONNEL REQUIREMENT FOR RECOMMENDED ACTION PROGRAMS/PROJECTS (1)

Recommendation	Implementing Bodies	Budgetary / Personnel Requirement
<p>© 1 Establishment and diffusion of certification systems for government (and public agency) procurement</p> <p>© 2 Establishment of certification system for safety-related automotive parts</p> <p>3 Reinforcement of assessors, auditors and inspectors for the certification systems</p> <p>4 Improvement of level of quality management</p> <p>5 Improvement of training system on quality management</p> <p>6 Establishment of consultant services specialized in the application of quality management practices</p> <p>○ 7 Need for research on quality management suited to social and cultural characteristics, management behavior and business practices in Malaysia</p> <p>○ 8 Develop of industrial standards or guidelines, which are used as the basis for SMIs to establish their company standards for application of quality management</p> <p>9 Provision of incentives encouraging SMIs' investment in quality management</p> <p>10 Provision of a tax credit on increased costs of SMIs as sub-contractors, result from the application of effective quality management</p>	<p>* Promoting &amp; Steering Committee (to be set up)</p> <p>• SIRIM (Secretariat)</p> <p>* Technical Committee (to be set up under MITI)</p> <p>• SIRIM / NPC</p> <p>* SIRIM</p> <p>* NPC</p> <p>• SIRIM</p> <p>* NPC</p> <p>• SIRIM</p> <p>* NPC</p> <p>• SIRIM</p> <p>* MITI / MOF</p> <p>* MITI / MOF</p>	<p>• 3 years program: cost of survey; cataloging and drafting specifications: M\$ 500,000</p> <p>• Assignment of SIRIM staff</p> <p>• 2 years program: cost of survey; guidance; training and seminars; and employment of external experts: M\$ 500,00</p> <p>• Assignment of SIRIM / NPC staff</p> <p>• Annual budget for trainings</p> <p>• Assignment of trainers</p> <p>• Annual budget for activities at NPC / SIRIM: M\$ 100,000/annum</p> <p>• Assignment of NPC / SIRIM staff</p> <p>• Annual budget for activities at NPC / SIRIM</p> <p>Assignment of NPC / SIRIM staff</p> <p>• Annual budget for research at NPC / SIRIM: M\$ 100,000/annum</p> <p>• Assignment of NPC / SIRIM staff</p> <p>• Annual budget: M\$200,000/annum</p> <p>• Assignment of SIRIM Staff</p>

(Notes) © New actions to be undertaken with top priority ○ Actions to be undertaken with priority

Table S-4 IMPLEMENTING BODIES AND BUDGETARY/PERSONNEL REQUIREMENT FOR RECOMMENDED ACTION PROGRAMS/PROJECTS (2)

Recommendation	Implementing Bodies	Budgetary / Personnel Requirement * (part of Recommendation 7)
11 Research on application methods of quality management applicable to SMIs, and technical extension services and consultancy services, as well as financial assistance such as ITAF	* NPC / SIRIM	
12 Implementation of a comprehensive action programs focusing on specific sub-sectors	(Refer to Recommendation 1,2,51)	
© 13 Establishment of a central organization for TQM promotion	* TQM Council (to be set up under MOSTE) • Secretariat (to be appointed: SIRIM or NPC) * NPC / SIRIM	• Annual budget for activities: • Launching grant: M\$ 10 million • Annual grant: M\$ 2 million/annum • Assignment of staff
14 Establishment of facilities to support the undertaking of quality management by industry	* SIRIM	• Annual budget for activities • Annual grant to associations: M\$ 1 million/annum • Assignment of staff
○ 15 Measures for encouraging participation of industrial associations in standardization activities		
© 16 Establishment of new division in SIRIM to promote standards and standardization	* SIRIM	• Annual budget for activities: • Annual grant: M\$ 1.5 million/annum • Assignment of staff (5 persons) • Annual budget for activities: M\$ 1 million/annum • Assignment of SIRIM staff
© 17 Proposals on national programs for dissemination of standards and standardization	* MOSTE / MITI • SIRIM	
18 Education on utilization of national standards	* SIRIM	• Annual budget for activities
19 National assembly on standardization	* SIRIM	
20 Improvement of convenience for users of standards	* SIRIM	
21 Areas to be focused on intensifying standards development	* SIRIM	
22 Positive adoption of international and foreign standards	* SIRIM	
23 Commissioning of establishment work of standards	* SIRIM	• Annual budget for activities
○ 24 Institution of research network undertaking research on technical aspects required for standard development	* SIRIM	• Annual budget for activities: • To use IRPA grant

(Notes) © New actions to be undertaken with top priority ○ Actions to be undertaken with priority

Table S-4 IMPLEMENTING BODIES AND BUDGETARY/PERSONNEL REQUIREMENT FOR RECOMMENDED ACTION PROGRAMS/PROJECTS (3)

Recommendation	Implementing Bodies	Budgetary / Personnel Requirement
25 Commissioning of work for updating of standards	* SIRIM	• Annual budget for activities
© 26 Restructuring of the present product certification system	* SIRIM	• Annual budget for activities
○ 27 Elaboration of criteria for factory assessment	* SIRIM	(for 27-29): M\$ 500,000/annum for 3 years
○ 28 Improvement in qualifications of quality system auditors/assessors	* SIRIM	• Assignment of staff
○ 29 Specifying the duties and qualifications of quality officers of firms	* SIRIM	• Annual budget for activities
30 Adoption of ISO 9000 in the product certification system	* SIRIM	• Assignment of staff
31 Strengthening of mutual recognition of certification systems	* SIRIM	• Annual budget for activities
32 Securing quality system consultants	* SIRIM	• Assignment of staff
33 Establishment of a consultant company linked to SIRIM	* SIRIM	• Annual budget for trainings
34 Administration of SAMM by an independent agency	* SIRIM	• Assignment of trainers
35 Incorporation of other laboratory accreditation schemes into SAMM	* SIRIM	• (to be studied in details)
36 Authorization of test reports issued by SAMM accredited laboratories for a application for product certification	* SIRIM	• Annual budget for trainings
37 Promoting international recognition of accredited laboratories	* SIRIM	(for 38-40): M\$ 800,000/annum
○ 38 Enhancement of capability for carrying out factory inspection	* SIRIM	• Increase of staff
○ 39 Securing adequate ARQS assessors	* SIRIM	• Annual budget for trainings
○ 40 Increase of factory inspectors for product certification systems	* SIRIM	• Increase of staff
41 Practical use of SAMM accredited laboratories for tests required for application of product certification	* SIRIM	• Annual budget for trainings
		• Increase of staff

(Notes) © New actions to be undertaken with top priority ○ Actions to be undertaken with priority

Table S-4 IMPLEMENTING BODIES AND BUDGETARY/PERSONNEL REQUIREMENT FOR RECOMMENDED ACTION PROGRAMS/PROJECTS (4)

Recommendation	Implementing Bodies	Budgetary / Personnel Requirement
42 Quality management education in universities/colleges	* MOE	
43 Introduction of standardization and quality management school curricula	* MOE	
44 Establishment of facilities for disseminating quality management in regions	(Refer to Recommendation 14)	
45 Upgrading of testing facilities for product certification in the SIRIM Headquarters	* SIRIM	<ul style="list-style-type: none"> <li>• Total Budget: M\$ 25 million</li> <li>• Installation of Equipment (Approx. M\$ 20.4 million)</li> <li>• Expansion of buildings (1,500 sq.m)</li> <li>• Increase of staff</li> </ul>
46 Establishment of testing facilities in Penang Branch Office of SIRIM	* SIRIM	<ul style="list-style-type: none"> <li>• Total Budget: M\$ 10 million</li> <li>• Installation of Equipment (Approx. M\$ 7.92 million)</li> <li>• Expansion of buildings (1,500 sq.m)</li> <li>• Increase of staff</li> </ul>
47 Establishment of testing facilities in Johor Bahru Branch of SIRIM	* SIRIM	<ul style="list-style-type: none"> <li>• Total Budget: M\$ 10 million</li> <li>• Installation of Equipment (Approx. M\$ 7.76 million)</li> <li>• Expansion of buildings (1,500 sq.m)</li> <li>• Increase of staff</li> </ul>
48 Implementation of detailed study on enhancement of industrial metrology systems	* SIRIM	<ul style="list-style-type: none"> <li>• Budget for studies: M\$ 500,000</li> <li>• Assignment of staff</li> </ul>
49 Program for developing standards and promoting quality management in the automotive parts industry	(Refer to Recommendation 2)	
50 Program for development of SMIs through standardization of products to be procured by government agencies and public corporations	(Refer to Recommendation 1) * SIRIM	

(Notes) © New actions to be undertaken with top priority ○ Actions to be undertaken with priority

Table S-4 IMPLEMENTING BODIES AND BUDGETARY/PERSONNEL REQUIREMENT FOR RECOMMENDED ACTION PROGRAMS/PROJECTS (5)

Recommendation	Implementing Bodies	Budgetary / Personnel Requirement
© 51 Program for supporting the rubber based industry, particularly the rubber glove industry	* SIRIM	<ul style="list-style-type: none"> <li>• Annual budget for activities: 2 years program: cost of consultancy and training: MS 400,000</li> <li>• Assignment of staff</li> </ul>
52 Establishment of committee in MOSTE for monitoring implementation of proposed programs	* MOSTE	

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