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**A Systems Enquiry Within Public Health Care  
In Malaysia**

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for the award of  
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# **TEXT BOUND INTO THE SPINE**

## **Abstract**

The overarching reason for studying the Malaysian Public Healthcare system is to investigate service delivery in all its forms. This research study will explore information management approaches applied to strategic, policy and operational requirements from the level of the Ministry of Health, Malaysia (MoHM) through to the level of a State Hospital. In fact, six levels of recursion can be identified and at each level the interaction of information management systems (IMS) with information and communication technologies (ICTs) are explored. The research is underpinned by its primary aim, this is to investigate the current IMS at the MoHM and suggest its advantages and limitations.

To address the aim of the study requires the use of Beer's Viable Systems Model (VSM), here principally used in its diagnostic mode of enquiry. The strength of the VSM is its ability to model multi-recursive systems. Data and information that comprise the research inputs were gathered via questionnaire survey (441 responses, representing a response rate of approximately 71.13%), semi-structured interviews (with five top management officers of the public health system), document analysis, and personal observations.

Findings reveal that the MoHM does not have the requisite variety to enable the successful realisation of an effective and efficient IMS. From the VSM diagnostic enquiry, issues raised concern infrastructure, 'info-structure', and various aspects that relate to the human elements of the system.

It is clear from the findings that the scope of the IMS, as well as its widespread adoption throughout MoHM and beyond, need to be addressed to allow further integration of information-based activities. An information architecture is urgently required to accommodate the technological change suggested. By combining these conclusions, service delivery at MoHM will be greatly enhanced.



## **Dedications**

I dedicate this work and feel a deep sense of gratitude for the memory of  
my beloved parents (May Allah Redeem Them)

*Allahyarham Haji Mat Taib bin Lebai Muda*

*and*

*Allahyarhamah Habsah binti Abu Tach*

who formed part of my vision and instilling in me the good things and a desire to reach higher and to achieve my best. The struggle and utmost efforts of my parents still provides a persistent inspiration for my journey in this life. They laid a precious foundation for me, never lived to see yields of their son eventual achievement in reaching towards this life's culmination path.

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## **List of Abbreviations**

<b>BPR</b>	<b>Business Process Reengineering</b>
<b>BOR</b>	<b>Bed Occupancy Rate</b>
<b>CIO</b>	<b>Chief Information Officer</b>
<b>CT</b>	<b>Computed Tomography</b>
<b>DGoH</b>	<b>Director General of Health Malaysia</b>
<b>DSS</b>	<b>Decision Support System</b>
<b>EMR</b>	<b>Electronic Medical Record</b>
<b>GITIC</b>	<b>Government IT and Internet Committee</b>
<b>GNP</b>	<b>Gross National Product</b>
<b>HIS</b>	<b>Health Care Information System</b>
<b>ICT</b>	<b>Information and Communication Technology</b>
<b>ICTSC</b>	<b>ICT Steering Committee</b>
<b>IM</b>	<b>Information Management</b>
<b>IMRoM</b>	<b>Institute for Medical Research of Malaysia</b>
<b>IMS</b>	<b>Information Management Systems</b>
<b>INTAN</b>	<b>National Institute of Public Administration of Malaysia</b>
<b>IS</b>	<b>Information Systems</b>
<b>ISO</b>	<b>Information Systems Officer</b>
<b>ISSP</b>	<b>Information System Strategic Plan</b>
<b>IT</b>	<b>Information Technology</b>
<b>MAMPU</b>	<b>Malaysian Administrative Modernisation &amp; Management Planning Unit</b>
<b>MIS</b>	<b>Management Information System</b>
<b>MoHM</b>	<b>Ministry of Health Malaysia</b>
<b>MRI</b>	<b>Magnetic Resonance Imaging</b>
<b>MSC</b>	<b>Multi Media Super Corridor</b>



<b>NGO</b>	<b>Non-Governmental Organisation</b>
<b>NITCM</b>	<b>National Information Technology Council of Malaysia</b>
<b>PAC</b>	<b>Public Accounts Committee</b>
<b>PM</b>	<b>Project Management</b>
<b>PSCoM</b>	<b>Public Service Commission of Malaysia</b>
<b>PSDoM</b>	<b>Public Service Department of Malaysia</b>
<b>R&amp;D</b>	<b>Research &amp; Development</b>
<b>RL</b>	<b>Recursion Level</b>
<b>SG</b>	<b>Secretary General of MoHIM</b>
<b>SHD</b>	<b>State Health Department</b>
<b>THIS</b>	<b>Total Hospital Information System</b>
<b>VSM</b>	<b>Viable System Model</b>
<b>WHO</b>	<b>World Health Organisation</b>

## **Chapter One: Introduction**

### **1.1 Background Context**

The Ministry of Health in Malaysia (MoHM) is one of the largest Government agencies in terms of its size and scope of services provided in the health care sector. The MoHM employs over 109,000 people (Ministry of Health Malaysia 2003c) comprising:

- 62,576 employees in the category of Paramedic and Auxiliary group;
- 35,810 employees in the Support and Common User group; and,
- 10,654 employees in the Management and Professional group.

Thus, MoHM has many disciplines other than those related to health care service provision. Under the Malaysian national development plan, the objective of the public health service is to continuously improve the health status of individuals, families and communities in Malaysia (Economic Planning Unit 2001a). To achieve its specified objectives, the MoHM is focused on services such as medical care, health care, research and development (R&D), support services (engineering), management (human resource and management), and finance (accounting and financial management). Service provision is predicated upon the efficient and effective use of information that has an infrastructure capability to cater for communication across organisational and geographic boundaries.

Brittain and Abbot (1993) describe information as a valuable resource that needs to be managed in much the same way as any other resource would be managed. While information management (IM) is a structured and well-defined activity pertaining to collecting, generating and disseminating of information, this study will extend this definition to include information use by the stakeholders of the health care system (defined below).

Even though a large amount of money has been allocated for the procurement of information and communication technologies (ICTs), utilisation of computers is mostly still at the very basic level of functionality within MoHM, that is use of word processing, e-mailing and presentation tools. Only a small number of applications have been developed, for example, to cater for generating information within specified units or divisions within MoHM. Issues of information disintegration, redundancy, overload, and inaccuracy are voiced during formal and informal discussions among the ICT users. It is these issues, as well as the needs of current non-users, that this study will capture and explore to design an information management system (IMS) that is 'fit for purpose'.

Looking at the present ICT scenario in the MoHM, by applying the existing capability to meet the designated policy, it is highly likely that the organisation needs to re-engineer its work processes. Among the essential factors is the seamless integration of ICT in work processes and procedures. This intention needs to be viewed from a wider perspective, within the context of revamping IMSs in the public health care sector. Nevertheless, as has been mentioned by Butcher (1998), the health care manager has a considerable need for information but often has considerable difficulty in obtaining it. From previous experience, difficulty in accessing the required information at the right time is a common phenomenon and much of the information may be incomplete or out of date. Therefore, the availability of 'good information' will be of great help for strategic considerations of public health care providers. Key attributes for good information include relevance, accuracy, timeliness, completeness, accessibility and use of appropriate visualisation methods.

The role of MoHM as information provider must be reviewed and attuned to the trends and dynamism of the sector, the impacts to the organisation, and national interest. Hence, the role, and scope of information management within public health care must be aligned towards assisting and facilitating strategic management (at the Ministerial and National levels).

Thus, this study has a role in the provision of information for diagnosing and recommending systems in the public health care sector, and will focus on the following:

- The work culture being practised at every level of the organisation;
- Quality management systems and their practice;
- Management and policy matters (including style, acceptance of changes, technology, and innovation);
- Level of competency in information management; and,
- Investment in ICT including infrastructure and application development, the role and influence of ICT and perception on the usage of ICT as a threat or meaningful tool to complement tasks and duties.

In addition, related subjects in information security, such as privacy, confidentiality, rules, and regulations, standards and policies, will also be explored. Relevant methods and techniques including critical success factors, technology impact assessment, and risk analysis (if deemed applicable) will also be taken into account during the study.

As a public agency the MoHM must conform to the Government's policy, particularly towards providing a high quality and efficient Civil Service. Currently, capability in handling information efficiently is the prime indicator in assessing the success of an organisation. It follows that possession of a sound IMS is fundamental to the successful functioning of the MoHM. Furthermore, information and statistics derived from the health care sector are regarded by the Malaysian Government as an important component in formulating national economic development. The requirements of the Government's central agencies such as the Economic Planning Unit, the Implementation and Co-ordination Unit, the Treasury, and the Department of Statistics should be taken into account, when designing any IMS.

The subject of the research is also in line with the Malaysian government's efforts in fostering the knowledge-based economy (k-economy), which was initiated in 1996, as a new platform in fostering economic development. The Third Outline Perspective Plan



2001-2010 (Economic Planning Unit Malaysia 2001b) specifies that the concept of the k-economy has the potential to contribute to a significant part of economic growth and wealth creation. ICT will be the fundamental enabling tool with human capital as the nucleus of k-economy. Therefore, the Government gives the citizen every opportunity to excel in acquiring, generating, communicating and exploiting knowledge and technology for the benefit of the organisation and the nation. This research study will complement these efforts in generating the k-economy initiatives, as it will provide added value to existing knowledge practice and procedures. The eventual target is to provide an efficient and effective IMS for the public health care sector.

The key stakeholders of this study are as follows;

- Personnel who work in the Ministry at Head Office:
  - The office of The Secretary General of MoHM and Deputies Secretary General;
  - The office of The Director General of Health and Deputies Director General; and,
  - All Division and Unit heads.
- At the State levels:
  - The office of The State Director of Health and Deputies State Director of Health.
- At local levels:
  - The office of The Director of Institutions; and,
  - The office of The Director of Hospitals.

## 1.2 Aims and Objectives

Following on from the background context, which steer the requirements for the effective IMS with respect to issues of ICT as an enabler tool and capability of information provision practice in the organisational complexity of the MoHM into this research, the aims of the research are as follows.

**Aim 1:** To investigate the existing IMS at the MoHM using an information driven perspective.

- Aim 2:** To use appropriate systems-based approaches for the organisational analysis, to demonstrate inter-relationships between identified entities in the system of interest, wider system, and system environment.
- Aim 3:** To develop a systems model to cover strategic management requirements in the MoHM.

From the above aims, the following objectives emerge.

- Objective 1:** To study the information needs, information flows and management procedures within the proposed system-based model in context of the Malaysian national interest. (Aim 1, 2, and 3)
- Objective 2:** To carry out a literature review of previous findings to provide guidance and direction for this research investigation. (Aim 1).
- Objective 3:** To investigate existing IMS practice and procedures at the various levels of management in the MoHM. (Aim 1).
- Objective 4:** To use a system-based methodology to procure diagnostic indices of the current IMS. (Aim 2).
- Objective 5:** To collect and analyse the information requirements of specified groups of management at the MoHM, in order to gain a management perspective towards the proposed systems-based model. (Aim 3).
- Objective 6:** To identify best practice in IMS design by investigating the Health Care Provision in identified countries. (Aim 2 and 3).

### 1.3 Plan of Thesis

Chapter Two, Malaysian Context, provides the context of the research in terms of geography, administration practice, and development of ICT programmes in Malaysia. Chapter Three describes the philosophical of research methodology and methods to be adopted in the research programme. It includes use of several research instruments for the data collection and data analysis. For the primary data collection, questionnaires and interviews will be adopted together with personal observation. Document analysis will be used to capture the secondary sources. The compilation of significant MoHM issues from previous studies will be highlighted in Chapter Four. This chapter also gives a description of current health care information management operations of various countries and within the Public Health Care Provider of Malaysia. Analysis of the surveys conducted (via questionnaires, observation, and document analyses) will be discussed in Chapter Five. Chapter Six describes the theoretical issues of management cybernetics through the adoption of the Viable System Model (VSM) approach as the system methods and tools. Chapter Seven investigates the present public healthcare system using the diagnostic mode of the VSM. The discussions of the findings from the overall study are described in Chapter Eight, and the final chapter (Chapter Nine) offers appropriate conclusions and recommendations for future work.

The roadmap for the development of ideas throughout the study is shown in Figure 1.1 (The structure of research roadmap) below. Clearly, the linkages between the various components of this research can be seen together with the intended logical flow of argument.

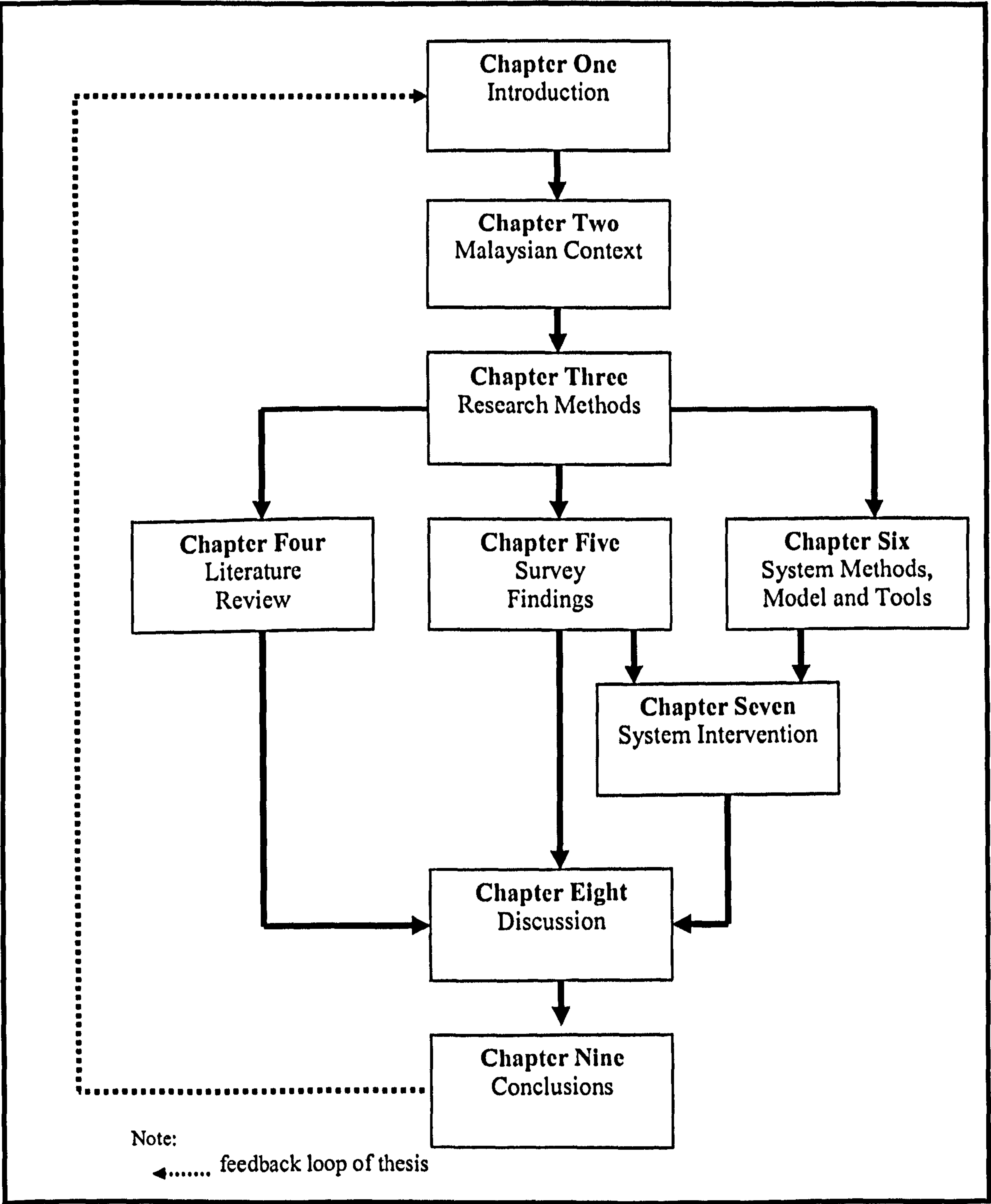


Figure 1.1 The structure of research roadmap



Chapter Two: Malaysian Context

2.1 Background

This chapter explains the Malaysian context in which this study is immersed. Section 2.2 describes the general features of Malaysia; Section 2.3 investigates ICT development in Malaysia; Section 2.4 drills down to ICT developments in the Civil Service; and summary of the discussion appears in Section 2.5.

2.2 Malaysia In General

Malaysia lies in the heart of Southeast Asia and comprises two major land masses facing each other, separated by about 750 kilometers of the South China Sea (details are reflected in the map in Figure 2.1). Peninsular Malaysia, which is located at the tail-end of the Asian continent shares a land frontier with Thailand to the north and a maritime boundary with Singapore to the south. The East Malaysian states, Sabah and Sarawak, share the Borneo Island with the Kalimantan region of Indonesia to the south, Brunei Darussalam to the northwest of Sarawak, and maritime borders with the Philippines. Malaysia covers an area of 329,733 square kilometers.



Figure 2.1 Map of Malaysia



Malaysia is a tropical country, subject to maritime influences and the interplay of wind systems originating in the Indian Ocean and the South China Sea. The weather is warm and humid throughout the year with an annual rainfall of 2,032 to 2,540 millimeters. The average daily temperature throughout Malaysia varies from 21°C to 32°C with a relative humidity of 80% (Ministry of Foreign Affairs Malaysia 2001).

The total population of Malaysia (as of 2003) was 25.05 million, with the average annual rate of population growth at 2.6%. Males outnumber females by a ratio of 104:100 (MoHM 2004a, p.2). Due to the country's economic growth, a bigger percentage of the population (i.e. about 62%) live in urban areas. The economically productive population, categorised as persons aged 15-64 years, form 62.9% of the total population. Life expectancy is 70.2 years for males and 75.0 years for females.

Malaysia is a Federation of thirteen states; Perlis, Kedah, Pulau Pinang, Perak, Selangor, Negeri Sembilan, Melaka, Johor, Pahang, Trengganu, Kelantan, Sabah, and Sarawak, and three Federal Territories; Kuala Lumpur, Labuan, and Putrajaya. Malaysia is under the rule of a parliamentary democracy with a constitutional monarchy, with His Majesty the Yang Di Pertuan Agong as the Supreme Head of the Federation.

Malaysia is a multi-racial and multi-religious society consisting of Malays and other indigenous ethnic groups, which make up 62% of the population, Chinese (26%), Indian (8%), and other minority groups and non-citizens (3%). Malay is the official language of the country, although English is widely spoken. Malaysia practices freedom of worship with Islam as the official religion. Buddhism, Hinduism, and Christianity are the other main religions.

The current structure of the government is made-up of three main levels:

- Federal Government, comprising of 33 Cabinet Ministers and 28 Ministries (Office of the Prime Minister of Malaysia 2005).

- State Government, headed by each State's Chief Minister; and,
- Local Government, headed by District Officers, who run the administration of each District in the country.

## 2.3 ICT Development In Malaysia

The government of Malaysia has recognised ICT as an important enabling tool to support economic growth, as well as enhancement of the quality of service in the administration. Realising the enormous potential of ICT, the Government has made a serious effort to facilitate greater adoption and diffusion of ICT within its economic development plan. With such encouragement and support from the Government, investment in the ICT sector grew at a rate of 9.2% per annum, from RM3.8 billion<sup>1</sup> in 1995 to RM5.9 billion in 2002 (Economic Planning Unit Malaysia 2001a, pp.364-366). The official statistics reflect the serious commitment of the Government, whereby a substantial amount has been allocated to the public sector, totalling RM532 million, representing 9.0% of the total national ICT expenditure. The manufacturing sector obtained 20% of the total ICT expenditure in 2000. To spur further growth, the Government has budgeted a total of RM2.6 billion for ICT procurement in its agencies for the period 2001 to 2005 (Economic Planning Unit Malaysia 2001a, p.615).

### 2.3.1 ICT Penetration

A study conducted in 1998 about the usage of ICT revealed that the use of ICT was most prevalent for administration, payroll, and finance functions

"representing about 28% compared with 7% using ICT for control and production processes"

(Economic Planning Unit Malaysia 2001a, p.364).

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<sup>1</sup> RM, an acronym for the Malaysian currency, Ringgit Malaysia.

Table 2.1 compares the relevant indicators of ICT usage in Malaysia between 1995 and 2000. The number of PCs installed rose from 610,000 in 1995 to 2.2 million in 2000. The ratio of PCs per 1,000 population rose from 29.5 in 1995 to 95.7 in 2000. In terms of internet usage, the data in Table 2.1 shows that the number of internet subscribers increased from 13,000 in 1995 to about 1.2 million in 2000, reflecting a rate of growth of 145.2% per annum.

Indicator	1995	2000
Personal Computers (units installed)	610,000	2,200,000
Personal Computers Per 1,000 Population	29.5	95.7
Telephone Lines Per 1,000 Population	161.07	204.76
Telephone Subscribers	3,332,447	4,650,410
Mobile Phones	700,000	2,265,000
Number of Internet Subscribers	13,064	1,157,384
Number of Internet Users	30,000	4,000,000

Source: Economic Planning Unit Malaysia 2001a, p.367

Table 2.1 Comparison between selected indicators of ICT usage in Malaysia  
(1995 and 2000)

Various factors have been linked to the internet penetration rate (Hassan 2002, p.30; Ratnathicam 2003; Economic Planning Unit Malaysia 2001a, pp.366-368; Xue 2005), including:

- Strong support form the Government in terms of financial allocation and other incentives to ICT-based sectors, including enhancement of service capacity of the Internet Service Providers (ISPs);
- Approving the operation of additional ISPs to cope with the demand from new subscribers; and,

- The effectiveness of the various campaigns and promotional efforts to encourage the public to use ICT and the internet.

Among the examples to promote the public ICT use were the National Internet Literacy Campaign via the mainstream media and broadcasting agencies, telecentres included provision of training services on the use of PCs and the internet, and enhancement of the ICT curriculum at learning institutions. Despite the phenomenal growth, the overall penetration rates remain low, in 2000

“9% of the population for PCs and 7% for the internet”

(Economic Planning Unit Malaysia 2001a, p.366).

Official statistics reveal a digital divide phenomenon between States. In 2000, Kuala Lumpur and Selangor registered the highest number of internet subscribers per 1,000 population, at 103.9 and 84.9 respectively. Compared to this, the States of Sabah and Kelantan had the lowest ratio, at 10.3 and 12.5 respectively (Economic Planning Unit Malaysia 2001a, p.366).

### 2.3.2 National ICT Agenda

To streamline the Malaysian national ICT agenda, the Government has set up the National Information Technology Council of Malaysia (NITCM) in 1994. The NITCM is chaired by The Honorable Prime Minister of Malaysia, and comprises prominent members representing the public, private, and community-interest sectors, and functions as a think tank that advises the Government on overall ICT strategy. The National Information Technology Agenda (NITA) was launched in December 1996 by the NITCM (Xue 2005). NITA provides the foundation and framework of utilising of ICTs to transform Malaysia into a developed nation, consistent with the Vision 2020<sup>2</sup>. This vision

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<sup>2</sup> Vision 2020 refers to a national agenda that sets out specific goals and objectives for a long-term development plan in order to achieve a developed country status for Malaysia by year 2020.



is to transform Malaysia into an information society, then to a knowledge society and finally to a value-based knowledge society, by focusing on the development of people, infrastructure, infostructure, and application systems.

Another important step in harnessing the progress of the multimedia industry for the interest of generating economic development was the establishment of the Ministry of Energy, Communications and Multimedia in 1994. It was later renamed the Ministry of Energy, Water and Communications in March 2004. The main thrust of the Ministry's role is to facilitate and regulate the growth in the ICT sector. To facilitate this role, a special body, the Malaysian Multimedia and Communications Commission (MMCC) was set up in 2001 when two related legislations came into effect - the Communications and Multimedia Act 1998, and the Malaysian Communications and Multimedia Commission Act 1998.

### **2.3.3 Multimedia Super Corridor (MSC)**

Realising the importance of ICT as a catalyst in national development, the Malaysian Government in 1996 launched the Multimedia Super Corridor (MSC) (Economic Planning Unit Malaysia 2001b). The MSC is aimed to revolutionise the way business is conducted and nurture the Vision 2020 that was embarked upon in 1991. The MSC, the best-known element of the Malaysia ICT strategy, was designed to unlock the full potential of multimedia by integrating cyberlaws with world class ICT applications, through which ICT companies were invited to establish their ventures. The types of companies invited to the MSC are those related to computer hardware and software, system integrators, ICT R&D ventures, and those relevant to telecommunication network service provision (Mohan & Raja Yaacob 2004).

The MSC is a 15 kilometres wide by 50 kilometres long zone which starts from Kuala Lumpur City Center (KLCC) in the north, to Kuala Lumpur International Airport (KLIA) in the south. Inside the zone sits two of the nation's landmarks, Putrajaya and Cyberjaya. Putrajaya is the new administrative capital of the Malaysia Federal

Government. Cyberjaya is an 'intelligent city' for location of multimedia industries, research and development (R&D) centres, a multimedia university, and operational headquarters for multinational companies focusing on multimedia technologies. From an information perspective, the MSC is supported by a high capacity telecommunication network infrastructure built on a 2.5-gigabit to 10-gigabit per second fibre optic backbone. This backbone connects the MSC to Japan, other Asian countries, the USA, and Europe, and is capable of supporting extensive public administration, education, and business applications. Total development cost of the project including the infrastructure costs of KLCC, KLIA, and Putrajaya is valued at between US\$15 billion and US\$25 billion (Mohan & Raja Yaacob 2004).

The Government set up a 'one stop agency', the Multimedia Development Corporation (MDC), to manage and promote the MSC. The MDC mission is to create the best environment to attract and facilitate the investment of local and multinational companies to pursue their investment in the MSC (MoHM 1997). In the effort to jump start the evolution of the MSC, seven flagship applications have been launched. These are Electronic Government, Smart Schools, Telehealth, R&D Clusters, National Multi-purpose Smart Card (My Kad), Borderless Marketing Services, and Worldwide Web Manufacturing.

In the Government's effort towards fostering the development and utilisation of electronic applications, new laws and policies have been designed and enforced, while various practices in public service bureaucracy have been reviewed. In this respect, several cyberlaws were enacted which have had an impact on the adoption of electronic transactions. The acts that have been implemented are the Digital Signature Act 1997, the Computer Crime Act 1997, the Telemedicine Act 1997, and the Communication and Multimedia Act 1998 (Economic Planning Unit Malaysia 2001b, p.613).

The implementation of MSC however was hit by the regional economic and financial crisis which affected several Asia-Pacific countries in mid-1997, which also caused a currency crisis and stock market crash in those countries. Malaysia, prior to 1998

experienced an annual growth of the gross domestic product (GDP) of 8%, in turn the economic growth drastically reduced to negative 2% in 1998. This scenario inevitably affected the development of MSC implementation (Hassan 2003, pp.36-38; Ratnachicam 2003).

## **2.4 ICT Development In Public Service**

The Government foresees that economic growth will be steered by knowledge-based (k-based) activities, whereby, knowledge becomes a commodity to be commercialised. In the k-based economy, the public sector will provide the enabling and supporting environment for the private sector to nurture the growth in the k-based economy (Economic Planning Unit Malaysia, 2001b, pp.120). Knowing the fact that a knowledge-rich civil service is integral for the effective functioning and successful development of the k-based economy, reviewing the role and performance of the public sector is a fundamental issue (Malaysian Administrative Modernisation and Management Planning Unit 2003). Under the Malaysian Government's knowledge-worker initiative, the adoption of ICTs is expected to transform the ability and agility of the work force to adapt to the changing needs of public service provision.

In formulating the plan, the Government envisaged that the public sector will continue to play a facilitative role and act as a catalyst for the private sector to spearhead the development of the k-based economy. In this regard, the public sector has to reinvent itself by using advanced ICT and multimedia technology and adapting its operational processes within the context of the k-based economy. Therefore, it is crucial that the Government, being the largest single sector of the economy, streamlines all its ICT activities of its agencies in tandem with the national agenda (Economic Planning Unit Malaysia, 2001b, pp.151-152).

Hierarchically, as shown in Figure 2.2 and discussed in the earlier section, NITC is the highest governing body of the overall ICT development in Malaysia. Meanwhile, the performance and progress of agencies in the public sector is supervised and co-ordinated



by the Government IT and Internet Committee (GITIC), which is chaired by the Chief Secretary to the Government of Malaysia and Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), an agency of the Prime Minister's Department which acts as the Secretariat.

At the implementation level, each of the Federal Ministries are required to form their own ICT Steering Committees (ICTSC) to oversee ICT programmes. The chairperson is the Chief Executive Officer (CEO), i.e. the Secretary General (SG) of the Ministry. However, the ICTSC of the MoHM is co-chaired by the SG and the Director General of Health (DGoH).

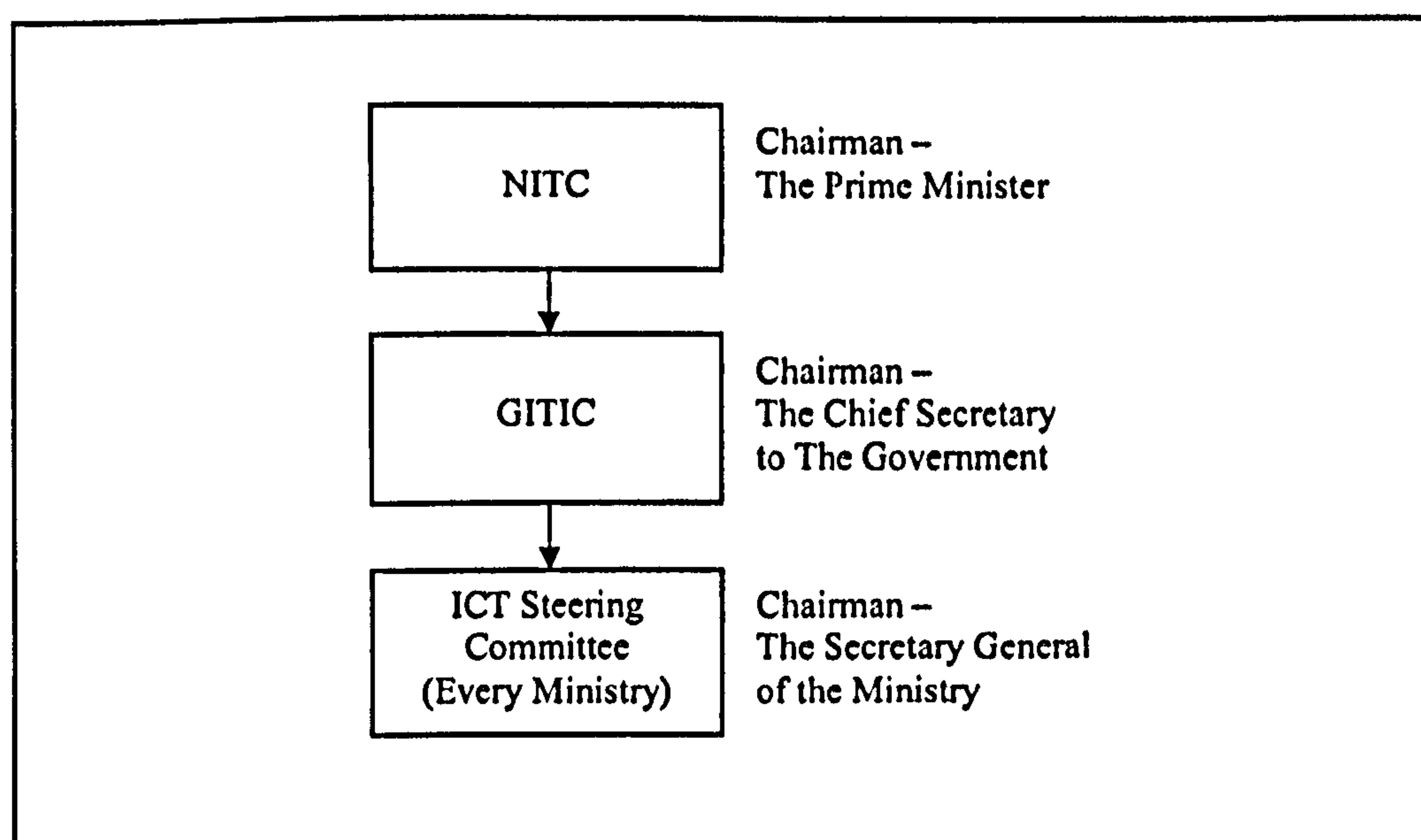


Figure 2.2 Hierarchy of co-ordination bodies of ICT development in Malaysia

### 2.4.1 Organisational and Manpower

Within the context of implementation of ICT programmes, the setting up of an ICT Division is crucial. To this end, each agency is required to submit their proposals to MAMPU that should cover organisational issues and scope of responsibility of such a

Division. Subsequent to MAMPU and GITIC endorsements, pertinent actions will be taken to create the Division: a budget set (subject to Federal Treasury approval); and, staff recruited (under the jurisdiction of the Public Service Department of Malaysia (PSDoM) and the Public Service Commission of Malaysia (PSCoM), respectively). At present, the total strength of Information System Officers (ISOs) managed by the PSDoM for all government agencies is 1,500 (Perjasa 2005).

Under normal circumstances, ICT Divisions at the public agencies are managed by ISOs with support from Assistant ISOs. The Director at the ICT Division is selected by the PSDoM from the senior ICT management officers. To achieve maximum leverage of the ICT provision, in 1999 all Directors of ICT Divisions of the Federal Ministries were officially appointed by the Chief Secretary to the Government as Chief Information Officers (CIOs). Their responsibilities include to plan and co-ordinate programmes to ensure a more integrated and sustained approach to the implementation of the ICT agenda within their respective Ministries (Economic Planning Unit Malaysia 2001a, p.616).

The public sector implemented various training programmes to enhance the motivation of public sector employees. The National Institute of Public Administration (INTAN), being the training arm of the public sector, carries out ICT awareness programmes in preparing employees for the electronic working environment.

## 2.5 Summary

This chapter has introduced the context of the study and placed it in its Malaysia geopolitical setting. Whereas the study focuses on ICTs and their application to the health care sector, more general statements are made here that indicate the wider adoption of advanced technologies. Emphasis has been placed on Government initiatives to draw in high technology organisations to the MSC between Kuala Lumpur City Centre and its airport (KLIA). It is hoped that these initiatives, as well as others will help to drive the k-economy for which the MoHM must play its part.

Clearly, the adoption of technologies in the various sectors will have their own timetable, with perhaps the financial sector being an early adopter. It will be argued in subsequent chapters that to address health demands, the MoHM should follow this lead at a close distance. However, as will be seen, there are successes and failures in the adoption of ICTs in the public health care system.

## **Chapter Three: Research Methods**

### **3.1 Overview**

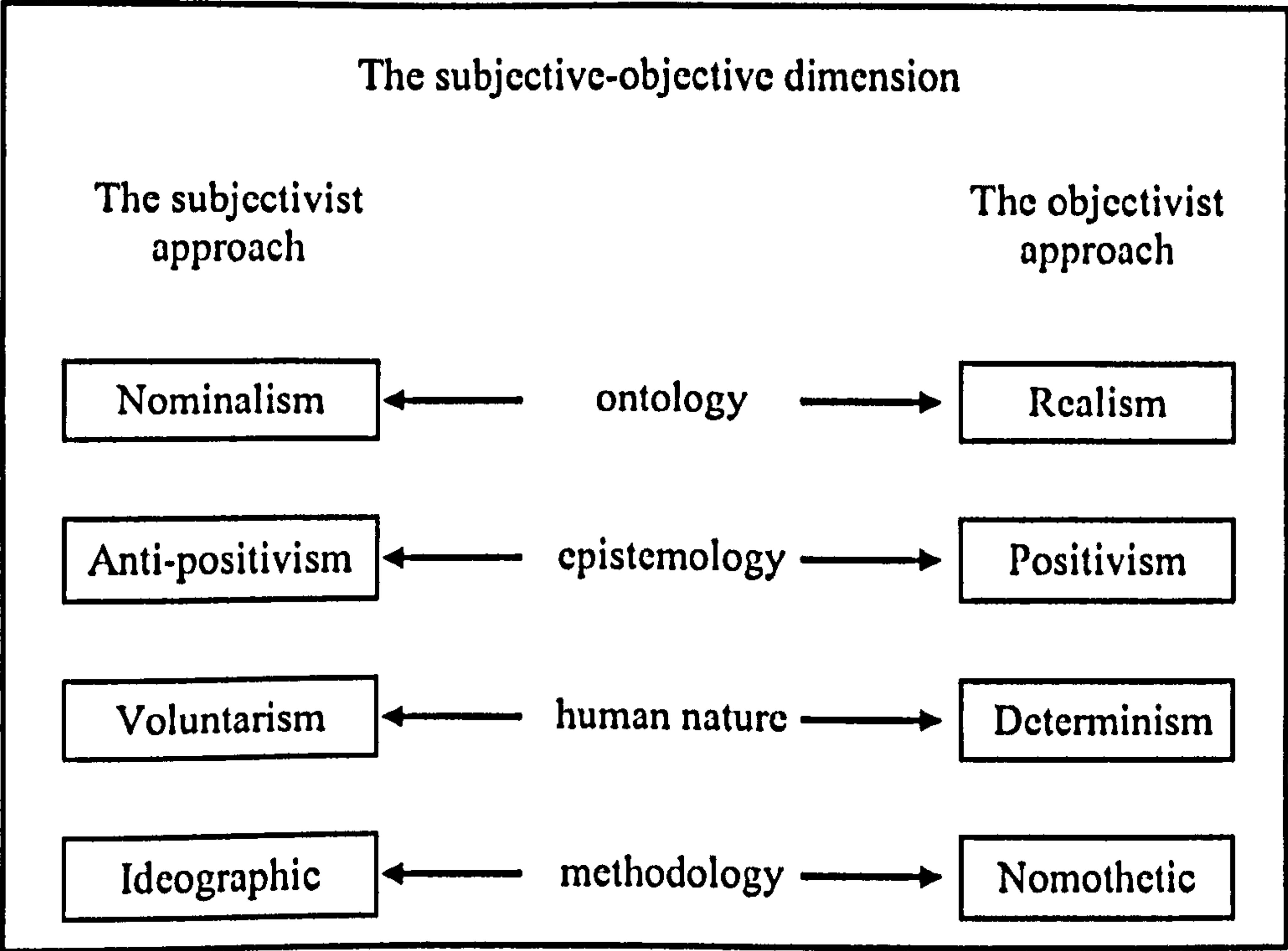
This chapter discusses the research methods used in the study and is divided into five sections. The philosophical of research methodology is discussed in Section 3.2. Section 3.3 discusses about research strategy undertaken. Section 3.4 introduces aspects of research methodology and to be followed by Section 3.5, the data collection methods employed in the study. The research instruments themselves are described in Section 3.6 and the data analysis techniques used are indicated in Section 3.7. Finally, Section 3.8 provides a summary of the chapter.

### **3.2 Philosophy of Research Methodology**

Understanding of the philosophical issues of systems science involve four major areas of discussion; ontology, epistemology, methodology, and the nature of man (Flood and Carson 1990; Burrell & Morgan 1979; Jackson 2000). The following discussion is generated from the summary given in Figure 3.1 below. The explanation of the four sets of assumptions is classified via the 'subjective-objective' dimension. This provides the first dimension in the Burrell and Morgan framework.

Ontology relates to a theory associated with what the world is or contains about the nature of reality. This theory belongs to two opposing opinions: realism which emphasises that reality is external to the individual and imposing itself on individual consciousness, which is a given factor; and nominalism which states that reality is a product of individual consciousness and of individual cognition.





Adapted from Burrell & Morgan 1979, p.3

Figure 3.1 A schematic diagram for analysing assumptions about the nature of social science

The epistemological debate is about,

“...how an individual begins to understand about the grounds and forms of knowledge he can obtain”

(Flood & Carson 1990, p.269).

The arguments belong to two groups of opposing factions,

- Positivism: knowledge is hard, real, and capable of being transmitted in a tangible form; and,
- Anti-positivism: knowledge is soft, more subjective, spiritual, or even transandental-based on experience, insight, and personal nature.

The ideas of viewing the nature of man, particularly the relationship between human beings and their environment, can be distinguished into two groups of opinion as indicated below.

- **Determinism:** man is mechanistic, determined by situations in the external world; human beings and their experiences are products of their environment and they are conditioned by their environment. The relevant assumption relates that knowledge is something that can be acquired; and,
- **Voluntarism:** man has a creative role and free will; man is the creator of his environment, he is voluntaristic, and the assumption towards knowledge is something that is personally experienced.

### Methodology

“...is concerned with our attempts to investigate and obtain knowledge about the world in which we find ourselves”

(Flood & Carson 1990, p. 269).

Having conceptualised the philosophical issues will contribute enormous understanding for the methodology to be adopted in this research. Likewise, as stated by Burrell & Morgan, the other three sets of assumptions defined above have direct implications of a methodological nature, and

“...different ontologies, epistemologies, and models of human nature are likely to incline [social] scientists towards different methodologies”

(Burrell & Morgan 1979, p.2).

Burrell & Morgan (1979) also mention that researchers can subscribe to ‘hard’ or ‘soft’ methodological approaches, as

“...quantitative information tends to be viewed as hard data, whereas qualitative data tend to be viewed as soft”

(Patton 1984, p.56).

If we have a hard, objective view of the external world, then nomothetic ideas lead to that methodologies are based on 'systematic process and technique'. If we adhere to an experimental view of a subjective world then 'ideographic principles' lead to an understanding of the way an individual creates, modifies, and interprets the world. The experiences are seen as unique to a particular individual rather than general and universal views.

Furthering this discussion, Jackson (2000) mentions that for the purpose of scientific research, methodology concerns the study of the principles of research methods used, in the sense that

“...it sets out to describe and question the methods that might be employed (in the research)”

(Jackson 2000, p.11).

Here, method refers to the specific ways procedures, models, tools, and techniques are used to investigate the situation of interest, which is always present when thinking and making observations about reality (Case 2000).

For example, in this research, the use of the VSM in the system intervention (see Chapter Seven) is to diagnose the current situation of the IMS at the MoHM and suggest how the MoHM organisation might be designed. In this case, research methodology establishes the principle behind the use of such a model which is embedded within the system dynamics method.

Qualitative data, which leads to the use of soft methods is an example of an ideographic methodology. This research adopts an ideographic approach as a semi-structured interview the fact finding tool. Similarly, quantitative, hard methods belong to nomothetic methodology chosen by using the questionnaire survey for the primary data collection technique.

Hence, the terms methodology, method, model/technique/approach are interrelated in a hierarchical relationship to one another (Jackson 2000).

### 3.3 Research Strategy

Each of the techniques adopted in the research methods is described to explain its purpose and application to the research. Those techniques are listed as steps in the order they are conducted.

- To develop the research framework, as a boundary to identify the scope and identify the limitations of the research area (see Chapter Four);
- To explore the relevant literature to provide a wider understanding of the research area. Furthermore, the reviewed literature enables the questionnaire construct and interview questions to be developed. The literature review spanned the body of journals, abstracts, books, and other references including electronic resources. Searches for the literature guided by the variables defined in the research framework (see Chapter Four);
- Document analysis: to explore non-publicly published documents and materials regarding the research areas at the identified organisations (see explanation below);
- To collect primary data through the defined techniques adopted (see below for details). Subsequently, data analysis and empirical findings will be presented in Chapter Six;
- To gain and in-depth insight of the problem situation, upon completion and with the support and feedback of the primary and secondary data, (activities stated above), further organisational and operational investigation of the MoHM will be carried out using system-based approach, the diagnostic mode of the VSM (to be discussed in Chapter Seven). Diagnostic mode will be carried out from the MoHM operational level to the hospital medical ward activities, through six levels of recursion. The theoretical aspects of management cybernetics including the VSM is explained in Chapter Six; and,



- Overall findings and relevant suggestions from the research are highlighted in Chapter Eight, which reflect the significant contribution of the research.

### 3.4 Research Methodology

To study the effectiveness and to enhance the present IMS of the MoHM requires much effort through the scientific research processes. Research is generally conducted in the spirit of inquiry, which relies on facts, experience and data, concepts and constructs, hypotheses and conjectures, and principles and laws (Amaratunga et al. 2002).

The research process should be preceded with the issue of well-defined scientific principles of methodology into the limelight. As has been discussed above, research methodologies are considered to be systems of explicit rules and procedures upon which research is based. However, so far there is no perfect research methodology, as there is no universally agreed methodology (Eldabi et al. 2002).

Philosophies of science and methodologies have been engaged in a long-standing epistemological debate about how best to conduct research. This debate has centred on the relative value of two fundamentally different and competing schools of thought or inquiry paradigms: positivism and anti-positivism (Burrell & Morgan 1979; Flood & Carson 1990) and logical positivism and phenomenological (Amaratunga et al. 2002).

Those opinions provide a number of philosophical assumptions, however, the work undertaken has to be sensible in the methods and decisions based on the propose of research, the questions being investigated, and the resource available. Because the paradigm of choices recognises that different methods are appropriate for different situations (Amaratunga et al. 2002).

Following this, the epistemological stance for the research has to be established and to be followed by the choice of research methods; the preferences that lead the researcher to

choose the appropriate research techniques including the consideration on whether the research will proceed inductively or deductively. Case (2002) explains that for an inductive approach,

“...the researcher will examine particular instances and reason toward generalisation...”,  
“...most qualitative methods tend to be inductive in nature.”

Whereby the deductive approach

“...proceed in the opposite fashion, reasoning from the general to the particular”  
(Case 2002, p.165).

The philosophical preference chosen for the primary, empirical data collection adopted a positivist-quantitative methodology in the early stages to determine the needs of the study for the generalisation of the respected issues in every agency of the MoHM. Furthermore, quantitative data help establish causal explanations and fundamental laws, and generally reduces the *whole* to the simplest possible elements in order to facilitate analysis (Easterby-Smith et al. 2002).

During the later stages, phenomenological-qualitative method was adopted in this study in order to investigate in more depth and to build a clearer understanding of the research area. It was carried out using a semi-structured interview technique. The use of inductive-qualitative paradigm at the later stage were useful,

“...when one needs to supplement, validate, explain illuminate, or reinterpret quantitative data gathered from the same setting”

(Amaratunga et al. 2002, p.22).

By forming an understanding of the situation beginning from a particular nature, a better understanding of the nature of the situation in a systematic manner can be achieved by proceeding to general principles. Thus, by using a mixed methodology in the same

research phenomenon will provide strength in gaining information through the concept of *triangulation*. This consists of making inferences and in drawing conclusions of the research (Amaratunga et al. 2002, p.23; Easterby-Smith et al. 2002, p.146). Another reason is that use of both methods can satisfy the conflict between inductive organisational studies which are *data-rich, theory poor*, and deductive studies, *data-poor, theory-rich* (Jones 2000), in addition to provide more perspectives on the phenomena being investigated (Easterby-Smith et al. 2002). There are strengths and weaknesses of both qualitative and quantitative methods which can be compensated through the use of mixed methodologies.

In this research, the conclusions drawn from the empirical data, i.e. the primary and secondary data, are very useful during the system diagnostic activities at the various recursion levels of the MoHM (see Chapter Seven).

### 3.5 Primary Data Collection Methods

This section will elaborate further about various elements related to the primary data collection, particularly on interview and questionnaire methods. Since an aim of the research is to investigate existing practice and another is to propose the development of a systems-based model of IMS for the Public Health Care Provider of Malaysia, opinions from the defined population sample will be fundamental for research direction.

As suggested by Mendes (1996); Amaratunga et al. (2002); Easterby-Smith et al. (2002), interviews and questionnaire surveys are appropriate methods to find out what people think and has been adopted in this study. Furthermore, the questionnaire survey has been identified as the most appropriate research method to collect information about expectations, values and attitudes of the staff members of the MoHM (Bell 1999). Semi-structured interviews, on the other hand, offer the opportunity to establish a rapport with the interviewees, and help to explore and understand complex issues (Sekaran 1992). In addition, there is an opportunity for the interviewer to clear up misunderstandings, or

even gather data from those not fully literate in the meaning of the questions (Black 1999).

In the adoption of interviews and questionnaires as the methods used for primary data collection, the availability of resources, particularly the time factor against the tasks to be completed, has been taken into consideration. Nevertheless, adherence to relevant ethical issues such as obtaining informed consent from all respondents, voluntary participation, full explanation of the intention of the survey, and maintaining individual confidentiality were crucial during this exercise.

Adoption of these data collection techniques require consideration of the following issues.

### **3.5.1 Sampling**

The population sample involved a selected number of Officers from various management levels within the MoHM. Selection criteria were based on the Officers' functional responsibility and involvement in the handling, acquiring, and management of the Ministry's information for strategic, tactical, or operational purposes.

- **Interviews**

For the interviews, the survey involved a selection of high ranking Executive Officers within the strategic management group who were the 'decision makers' in MoHM. In more detail, the strategic management group includes:

- **The Secretary General**

Being the CEO of the MoHM, the scope of discussion will investigate the whole scenario of the information management (IM) of the Ministry including any inter-Ministerial requirements.



- **Undersecretary of Human Resource Division**

This division is responsible for the management of personnel related matters such as recruitment, career development, and retirement.

- **Director of Medical Practice Division**

This Officer is in charge of the overall medical related services of the MoHM which covers hospitals, clinics and health centres. The interview session may uncover issues in information management pertaining to provision of medical care services.

- **Director of Planning and Development Division**

This division is responsible for overall formulation, planning, monitoring, implementation, and evaluation of health facilities and health information.

- **Undersecretary of Information and Communication Technology (ICT) Division**

ICT Division is responsible for co-ordinating and implementing any ICT projects for the Ministry.

- **Questionnaire**

The principle of a broad range of participation is important for the collection of exhaustive opinions within MoHM. In considering this principle, the following sampling approach was applied to the questionnaire survey.

- **Sampling Method**

The population sample for the questionnaire survey was selected from the Officers in management positions. As suggested by De Vaus (2002), non-probability techniques for selection of the sample are more appropriate and efficient than methods using probability techniques, as the population is widely dispersed. This is similar to the characteristics of the population of this survey, i.e. office locations of the MoHM are distributed nationwide. Thus, the non-probability quota sampling approach was suitable and has been adopted for this survey. De Vaus (2002) also emphasised that

the quota sampling method is aimed at producing representative samples. As such, the quota characteristics were organised as explained in the next sub-section.

- **Sample Size**

All categories of serving Officers at the various locations of the MoHM formed the sample according to Table 3.1.

Location	N	Percentage
MoHM Headquarters	111	30
State Health Departments	93	25
Districts Health Offices	37	10
State and District Hospitals	74	20
Public Health Institutions	37	10
Public Health Clinics	19	5
Total	371	100

Table 3.1 Breakdown of questionnaire sample distribution

The division of the sample is correlated to strategic activity at each level of public health care provision. Total sample size was based on a formula developed by Krejcie and Morgan (quoted in Sekaran 1992, p.253; see Appendix 1). The Krejcie and Morgan table provides a general scientific guideline for determining the size of a sample for a given population to achieve statistical significance for any results. It is simple to use and requires no calculation. In accordance to the official release of the MoHM, as of 31-12-2002, population size of this study was 10,654 (MoHM 2003c), hence, 370 was the suggested minimum sample size to achieve statistical

“...representativeness of the sample for generalizability”

(Sekaran 1992, p.252).

To be compliant with efforts to ensure the selection of a representative sample, the sample used in this study represents various categories of personnel such as Medical Officers, Administration Officers, Health Technical Support Professionals, Clinical Scientists, and Medical Technologists (Bell 1999).

### 3.5.2 Piloting

Since the purpose of a pilot exercise is to get the 'bugs' out of the instruments (Bell 1999), preliminary analysis was done through piloting the research instruments. The pilot questionnaire and interviews aided the clarity of the wording, content, and format of the questions used. For the interview, prior to the survey, a peer review exercise was carried out in addition to seeking opinions from experienced researchers. The questionnaire was implemented in two stages; the initial stage used the participation of 15 peers in order to share their experience in the development of the survey questions. This was carried out from July to August 2002. This process was followed by a number of respondents from the 'real' sample to evaluate their understanding and pertinence of issues raised. The second stage of piloting was performed from August to September 2002.

All the pilot questionnaires were distributed by a contact person - a Senior Officer at the MoHM, to a list of 21 identified respondents together with a covering letter which explained the objective of the trial. The importance of their response was recognised. To elicit this response, respondents were requested to complete a set of questions provided. Through piloting the questionnaire different categories of staff responded to the same questions from which the variety of interpretation of the questions emerged. All comments, suggestions, and understanding derived from the pilot were evaluated in formulating the content of the questionnaire used in this study.

The compilation list of comments and suggestions from the pilot questionnaire are shown in Table 3.2.



Question		Suggestions/Comments Received	Action Taken
Number	Original variable description		
1	Age	Instead of an open answer, ranges of values should be provided	A 5-year range of values with a lower bound of 'less than 21 years' and upper bound of 'above 55 years' are provided in ascending order.
5	Departmental rank	Reword to 'Current departmental position'	To be changed accordingly.
7	Length of service	Ranges of values option should be provided	A 5-year range of values with a lower bound of 'below 1 year' and upper bound of 'above 30 years' are provided in ascending order.
8.	Your nature of work with respect to organisation's information management	The nature of work with which you are involved in your organisation's information management work	The nature of work with which you are involved in your organisation's information management activities.
19	Which of the following is/are constraints for information to flow smoothly?	Which of the following is/are constraints for information to flow smoothly in your organisation?	To be changed accordingly

Question		Suggestions/Comments Received	Action Taken
Number	Original variable description		
21	Level of your knowledge in ICT	How do you rate your level of knowledge in ICT?	How do you rate your level of knowledge in ICT at present?
22	Have you ever attended any course/workshop on ICT provided by your organisation	Have you ever attended any training programme on ICT provided by your organisation?	Have you ever attended any ICT training programme provided by your organisation?
24	If given the opportunity, are you interested to attend any ICT training courses?	Are you interested to attend any ICT training courses?	Are you interested to attend any ICT training courses?
29.	Please relate the following factors to the situation of the library services in your organisation	Please relate the following with library services in your organisation	Please relate the following with library services in your organisation

Table 3.2 List of comments and suggestions of questionnaire pilot

3.5.3 Official Clearance

An official written acknowledgement was enclosed with the Supervisor’s endorsement letter and forwarded to the SG of the MoHM to seek his official approval to conduct the survey (see Appendix 3). With written permission granted, proof of official support encouraged staff participation and response to the survey conducted.

### 3.5.4 Data Confidentiality

All survey data collected should be treated as confidential with access to primary transcripts restricted to the researcher (Oppenheim 1992). In accordance with this statement and the normal ethical procedures of Loughborough University, each interview respondent received a verbal explanation of data confidentiality and an appropriate written statement was included in the first paragraph of the covering note sent with the questionnaire (see Appendix 3).

Sekaran (1992) argues that assuring confidentiality of information provided by respondents leads to an expectation of less biased responses. Further, in this study the MoHM is subject to Malaysian Government rules and regulations under the Official Secrets Act. Thus, obtaining official clearance and a written endorsement from the SG of the MoHM, was an essential factor in obtaining a high response rate.

## 3.6 Research Instruments

This section will discuss the instruments used for the data collection. Other than the primary data collection technique described in the above section, secondary data collection via document analysis will also be adopted in this study.

### 3.6.1 Interviews

The qualitative research interview adopts a semi-structured interview approach and was conducted according to an interview guide that was provided to each interviewee in advance. The interview guide comprises a list of related questions, a covering letter stating the objectives and purpose of the interview, and an endorsement letter from the SG of the MoHM. A schedule for each interview session was fixed during the researcher's personal visits to each interviewee's office. The purpose of semi-structured interviews is to elicit reliable information from the explicit explanations that took place



during the interviews. In addition, this technique also provides an opportunity to justify what is

“...said between the lines”

(Kvale 1996, p.32).

- **Rationale**

The intent of this investigation was to explore information pertaining to the information management (IM) at the MoHM from five senior officers selected. While the questionnaire survey required feedback from the stipulated set of questions, the semi-structured interview gave more latitude to the respondents allowing them to talk about matters that are significantly related to the research. There was also an opportunity to seek further clarification about related matters and this enabled respondents to exhibit their knowledge which elicited more in-depth information (Briggs 1986). Several critical factors relevant to the research emerged from this process.

Face to face interviews are a time-consuming exercise, primarily due to dealing with an indifferent attitude or non-conformance to the agreed schedule. Therefore, throughout the research study, this technique only involved five senior officers within the strategic management group of the MoHM, as mentioned above. Throughout the interviews, with the guidance of the lists of provided questions, they managed to share some valuable information that gave a wider perspective about the IM scenario in the Ministry. Details of each interview session conducted are as shown in Table 5.2 (see p.76).

- **Process**

Face to face semi-structured interviews were conducted according to the schedule that was agreed upon by the interviewees and carried out in their own offices. Four officers agreed that the conversations could be tape recorded. Information gathered was transcribed, and provided a qualitative balance to the questionnaire. Contemporaneous notes were taken in the one session that was not tape recorded.

- **Scope of Questions**

Generally, the scope of the questions discussed during the semi-structured interviews were as follows:

- Overview of existing practice in IM of the Ministry within the context of information flow, ICT involved, and organisational issues;
- Level of satisfaction with the existing system;
- Likely impact of ICT implementation toward changes in work practice and culture;
- The level of compliance to the policies and rulings decided by the Federal Government to be adopted by the public agencies in IM;
- Anticipation of the impact and implications on the future changes in Government policy, such as privatisation of public health care; and,
- Inter-Ministerial and cross-sectoral contribution and requirements of IM, in the health care sector.

### **3.6.2 Questionnaires**

- **Rationale**

The purpose of the questionnaire survey is to gather information from a population sample, whereby all responses were accumulated and analysed. The list of questions asked was pertinent to the subject of the research. Questionnaires are regarded a good way of collecting information quickly. During the implementation phase, a conducive relationship was forged with identified contact officers for the distribution of the questionnaires to the prospective sample population, and provided a measure to increase the response rate.

- **Process**

A self-administered questionnaire was mailed or handed personally to the identified contact officers. They were required to distribute the questionnaire to the specified category of officers in their organisation. Each questionnaire also had a covering letter that introduced the researcher, intention, and objectives of the survey (see Appendix 3).

All questionnaire related activities were handled personally during the field visit at the MoHM from January 2003 to March 2003. Detailed activities performed under this technique are as explained in sub-section 5.2.1 (see pp.74-76).

- **Design**

The questionnaire was rich enough to be fit for purpose, i.e. fulfilling the objectives and needs of the research study. The inclusion of issues and list of the questions raised in the questionnaire survey were initially derived from the literature, see Chapter Four. The review process involved two stages of pilot tests. Outcomes from these processes were given due consideration and incorporated into the questionnaire.

The questionnaire comprised mostly closed questions, whereby respondents were required to choose among a set of provided alternatives, or to specify their own relevant responses under the “other (please specify)” category. Closed questions can elicit factual as well as attitudinal replies and they are also easier and quicker to respond to as respondents are to be offered a choice of alternative replies (Hassan 2003). In this survey, all items using nominal or ordinal scales were designed as closed questions (Sakaran 1992). Furthermore, it allows all answers to be coded according to the indicative coding structures, as in the prepared questionnaire codebook which was applied during the data coding step.

Since open-ended questions are time consuming to complete and analyse (Oppenheim 1992), they were included only at the end of the questionnaire survey. This was intended to enable respondents to

“state overall comments or suggestions pertaining to the issues discussed in the questionnaire”

(De Vaus 2002, p.99)

in their own language and offer their own ideas. This mechanism offers respondents the opportunity to contribute additional opinions to be included in the survey.



The questionnaire comprised 45 main questions, grouped into seven logical sections, with 93 variables altogether. As explained in Table 3.3, 60 questions used a nominal scale of measurement, while 33 questions used the ordinal scale; the questionnaire itself can be viewed in Appendix 2.

Page Number	Number of Questions	Number of Nominal Scale	Number of Ordinal Scale
1	5	4	1
2	11	10	1
3	12	11	1
4	10	6	4
5	10	7	3
6	10	9	1
7	5	1	4
8	9	3	6
9	8	2	6
10	5	2	3
11	8	5	3
Total	93	60	33

Table 3.3 Questionnaire - Summary of scales used

The ordinal scale of measurement included the attitude scale technique to assess respondents' indication toward a particular issue, as in the commonly 5-point Likert-type scale:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly agree.

In addition, some questions such as:

- “Overall how do you rate your satisfaction in getting response from the external agencies?” (Q.12);
- “How do you rate your level of knowledge in ICT at present?” (Q.21);
- “How often do you visit the library?” (Q.27); and,
- “How do you know what the role of Information Systems Officers (ISOs) is within the MoHM?” (Q.32)

used a rating scale approach that enabled the respondent to choose the relevant scale for answering the particular question (Sekaran 1992).

The sequence of sections used in the questionnaire enabled a logical flow of acquiring the respondents’ ideas and opinions on a range of relevant issues, to be initiated from easy and factual questions (De Vaus 2002).

### **Section A – Personal Information**

This section represented by (Q.1) to (Q.12) consists of questions related to personal information to justify the formation of sample characteristics with respect to personal and organisational demographic data including organisational details and the respondent’s employment background. Responses in this section were used subsequently to cross-tabulate with appropriately chosen variables to respond to the respective data analyses.

### **Section B – Your Experience In Information and Communication Technology (ICT)**

This section was represented by (Q.13) to (Q.17) and consists of questions related to the respondents’ practical experience in ICT, and the distribution of ICT systems in their work place. The purpose was to generalise the distribution of ICT facilities and implementation of overall ICT programmes of the MoHM. The answers to these questions were useful to determine respondents’ experience and level of competency in the use of computers and communication technologies.

### **Section C – Structural Perspective**

The questions asked under this section were relevant to Objective One of this research study, to obtain answers about the use of information as a commodity. The questions were important to assess the information needs and information flow of the present IMS practice. This section comprises sub-section C1 (Information Content), to gather feedback about the appropriate content of the health care information systems; and sub-section C2 (Information Flow), which gathered data about the existence of constraints and other identifiable barriers. The responses to these questions helped to determine the level of expectation in the content development of the system, and to examine the organisations' present work-based procedures.

### **Section D - Information Culture**

The purpose of this section was to obtain information about a potential skills gap, the perceived need for training, and use of library services as a catalyst. The answers to these questions helped to identify and determine the respondents' level of ICT knowledge, and capacity of ICT training, together with information provision services infrastructure and usage at each level of organisation. In this regard, relevant questions were asked in the following sub-sections; D1 (Training) and D2 (Library Information Service Provision).

### **Section E - Resource Perspective**

The purpose of this section was related to several objectives of the research study and obtains information about the existing practice of resource management, industrial relations, manpower requirements, and also to gauge the respondent's level of understanding and exposure to the ICT activities of the Ministry. The responses to these questions helped to determine the effectiveness of overall ICT management of the MoHM including organisational, staffing, and empowerment, in addition to staff members' involvement and the success rate of ICT activities.

### **Section F – Policy Perspective**

This section was divided into sub-sections F1 (Procedures) and F2 (Standards). The purpose of this section was to explore the respondents' understanding of the formulation,



development, dissemination, and enforcement of information procedures and standards. The questions in this section were relevant to Objective Three of this study. The answers to these questions helped to determine the respondents' perception about the existing practice in the adoption of ICT policy within the context of IMS procedures and standards.

### **Section G – Technological Perspective**

The questions in this section are pertinent to Objective Three and Objective Five of this study, and to obtain information about usage and perceived need for ICT as an enabler of IM. This section was divided into sub-sections G1 (Interoperability) and G2 (Infrastructure Requirements). The purpose of the questions examined the respondents' level of understanding about the integration aspect of ICT development, such as the evaluation and perceived impact of any ICT implementation, investigated the present practice in the distribution of ICT facilities, and identified potential constraints in the ICT programme. The responses to this section helped to determine issues related to the potential gap in the development and implementation of the ICT activities.

#### **3.6.3 Document Analysis**

With the aim to furnish data collection valuable for this research study, searches were carried out to identify information from MoHM and other Government information sources. The purpose of document analysis was to supplement information gathered from the interview and questionnaire surveys, and other secondary data sources. Information gathered from organisational documents could be used to assist in giving a complete scenario of the organisation's activities. The information involved was in the form of publications, newsletters, pamphlets, seminars, conference proceedings, and reports. The sources may have been circulated for internal use only or published for the use of general public. In order not to contravene the Malaysia Official Secrets Act, only contents of non-classified documents were accessed.

Related documents published by the following agencies were searched:

- **The MoHM and its agencies**

Various kinds of documents related to health resources, project planning, development, and acquisition of financial resources for all programmes and activities are published by the MoHM and its agencies. Documents involved were, for example, Ministerial circulation letters on policy and procedures, annual reports from various agencies, and management summary reports.

- **The Federal Government of Malaysia, other Ministries and Agencies**

There are various circulation letters issued by the Government's central agencies such as the PSDoM, Treasury, and MAMPU which are related to this research study. Furthermore, various documents which relate to policy and procedures applicable to Government agencies, issues on the national ICT agenda, programmes and development, national economic and development plans were also searched.

- **Other agencies such as Non-Governmental Organisations (NGOs), private entities and individuals**

Relevant documents to this study were also found in a variety of non-environmental sources. Various privately-based resource centres were accessed and appropriate searches performed.

### **3.7 Data Analysis**

The data that were collected in the survey were analysed according to predetermined specifications. For the questionnaires, quantitative analysis was employed using standard statistical tools from the SPSS package. The focus was on identifying relationships in the data and the factors to be evaluated. Various related analyses were carried out, such as in the form of descriptive statistics (e.g. frequencies, cross-tabulations) and analytical statistics (e.g. using the Chi-square tests). Qualitative data which was generated from interviews information was analysed using *ATLAS.ti*<sup>TM</sup> software for qualitative cluster analysis.

Chapter Five discusses the analysis of data generated within this study.

### **3.8 Summary**

A justification of the research methods used in this study are predicated upon the philosophical approach taken. Hard and soft approaches are combined that are based on nomothetic and ideographic interpretations respectively. This combination of mixing qualitative and quantitative data proved a useful way forward for dealing with primary and secondary data collection. These empirical data will give crucial support in terms of direct evidence used in VSM diagnosis (see Chapter Six for further details).



## **Chapter Four: Literature Review**

### **4.1 Overview**

The previous chapter discussed the research methods to be used in this study, this included a critical appraisal of the systems intervention using Beer's Viable System Model. The critical appraisal theme continues in this chapter, as it explores the literature that underpins the issues prevalent within the Ministry of Health Malaysia (MoHM). Section 4.2 presents the contexts of information management (IM) and the public health care system. Section 4.3 provides evidence that describes the current scenario of public health care in Malaysia and Section 4.4 investigates in more details the MoHM issues. The chapter concludes with a summary of the important points on which the logical flow of argument throughout the thesis is based.

### **4.2 Context**

The analysis is based on the literature, through which the following issues are discussed:

- Relevant concepts;
- Role of the MoHM as a prominent public health care provider; and,
- Scope of review.

Even though the focus of the research is on public health care systems, it will examine the health system from the various perspectives including private and community health care. It will also use a holistic overview to enable a clear understanding of the issues. However, to ensure that the objectives of this study are met, the focus will be within the perspective that is pertinent to the MoHM management requirements.

### 4.2.1 Information Management (IM)

Today's information-related activities are embedded within three concepts, Information and Communication Technology (ICT), Information Systems (IS), and Information Management System (IMS). Willcocks (1995, p.18) and Ammenwerth et al. (2003) define these concepts in the following way.

- ICT refers to resources which comprise hardware, software, and communication network technologies as core components;
- IS refers to the information processing activity which is designed to comply with the information needs of the organisation; and,
- IMS involves the process of managing the specified information needs which includes the involvement of human factors and technologies adopted.

Information is a precious asset for any organisation, including its use as an integral part of any health care management system. It is sought and used throughout the entire decision-making process. Management of information therefore, requires the involvement of managers at all levels in order to provide the maximum value to the health care systems. IM is vital and supports the organisation in its bid to remain competitive in the public health care environment (Huotari et al. 2001). The effective strategy and action plan must be tuned towards supporting overall health care activities of the MoHM and to serve the needs of various categories of users.

Brittain & Abbot (1993, p.5) and Kamm (1995, p.317) mention that the basic principle of the IM is to manage information resources of an organisation, requiring the involvement of managers at all levels in order to gain maximum value, particularly to promote the integration and adaptation of the organisation.

It was recognised that the context of IM nowadays always implies the interdependence of computers and telecommunications as a strategically valuable organisational asset (Ragu-

Nathan et al. 2001; Bouthiller & Shearer 2002). The content of the system encompasses a broad range of activities for integration purposes rather than the previous narrowly specified and separated approach that was widely practised. However, Brittain & Abbot (1993) say that direct involvement and commitment of top level management has proved to be the critical success factor, along with an accurate description of system requirements that can be clearly defined by the system designer. The ultimate goal is to ensure that information in an organisation is stored, accessed according to the designed information flow, and analysed according to the need. These are the core issues to measure the success of a system implementation in any organisation (Bouthiller & Shearer 2002; Choo 1998, p.28).

#### **4.2.2 Public Health Care**

In most countries, public health is regarded as an important sector in terms of financial and manpower resources. Health care in particular encompasses both the preventive care (public health activities), curative care (clinical activities) and administration including financial and human resource aspects of restoring and maintaining individuals and populations in a state of good health (Norris & Brittain 2000; Memel et al. 2001).

In this research, the public health care provider is referred to as the organisation that provides health care services, and is responsive to the role of the MoHM in particular. There are various health care systems adopted by each country such as publicly funded (socialised system) as in the United Kingdom (UK), insurance based health systems as in the United State of America (USA), and mixed (public and insurance) which is being practised in Malaysia. MoHM is responsible for the coordination and supervision of all health care activities, and is the largest public health care provider. In addition, military and teaching hospitals are operated by the Ministry of Defence and the Ministry of Education respectively, but will play no part in this research study.



### 4.2.3 Health Care Information Management

Reliable and timely information is very important for effective decision-making. Within the health care management system two major areas of decision-making can be identified (Atkinson et al. 2002):

- The decisions of clinicians related to patient-based management, such as the processes of diagnosis, prognosis, treatment, and discharge; and,
- The decisions that involve health care management services.

Like any other IMS, the importance of computer support is essential to support IM in the health care sector. However, the use of ICT tools must be justified in order to improve the way in which information is collected and provided for the sake of the system functionality (Richards & Smith 1994; Chen & Gough 1995).

The implementation strategy of the system needs to take into account the requirement to provide information resources for the purpose of health care policy-making, which is among the prime interests of strategic managers in the public health care provider (Carter 2000). Overall information services must be able to provide improved and affordable access to the users towards increased effectiveness in the delivery of health care services. Good management of information can improve the quality, effectiveness, and efficiency of patient care. A conducive working atmosphere can be further generated by systems for systematic filing and recording, with an electronic system replacing manual systems. Eventually, this may even allow clinical staff to spend more time with patients, which means, a larger number of patients can be treated, increasing staff efficiency (Wyatt 1995).

### 4.3 Ministry of Health Malaysia (MoHM)

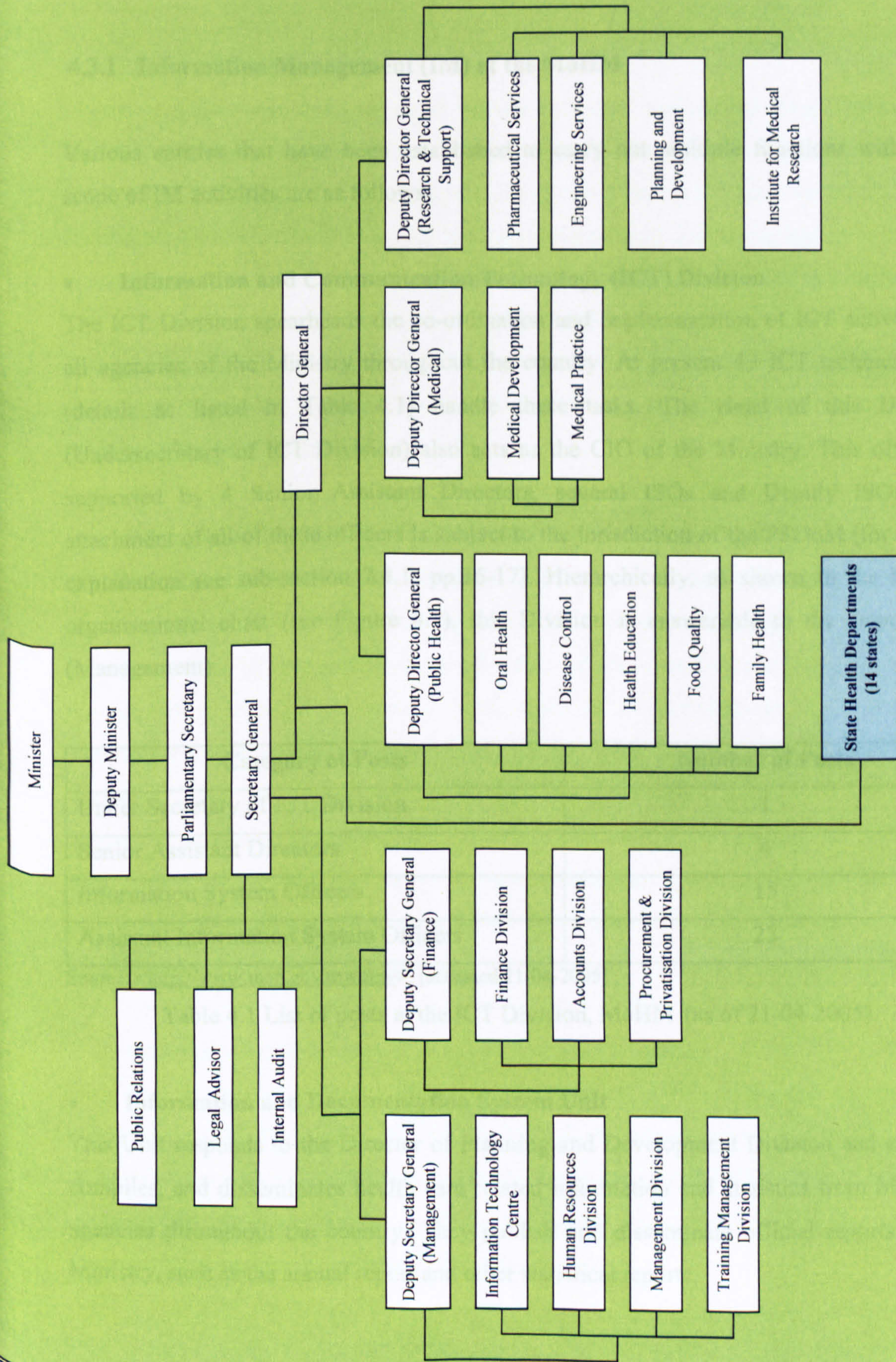
Under the Federation of Malaysia, the health care service is under the jurisdiction of the MoHM. The MoHM has a role to advocate, regulate, and supervise; the MoHM is also obliged to provide public health care by co-ordinating programmes and activities of the health care sector in Malaysia with other public or private agencies and non-governmental organisations.

Similar to the Federation administration system of Government, the hierarchy of administration of the MoHM is divided into the various organisations hierarchically, such as at the Head office, States, and Districts. The Controlling Officer of the Ministry is the SG who supports the Minister in the day-to-day operation of the Ministry. This post is traditionally held by administrative and diplomatic corps officers. The DGoH, being the highest health professional in the civil service of Malaysia, is responsible for streamlining and managing the provision of public health care services for the whole country.

As shown in the organisational structure in Figure 4.1, specific activities have been established to support functions of the respective programmes. The chart explains functional responsibility of various divisions in the Ministry. In carrying out the stipulated scope of service, there are four functional programmes which are the core business of the Ministry: Management programme; Public Health programme; Medical Care programme; and; Research and Technical Support programme.

Details of these programmes appear in Chapter Seven (see section 7.4, pp.144-147).





Source: Ministry of Health Malaysia 2004b

Figure 4.1 Organisational structure of The Ministry of Health Malaysia



4.3.1 Information Management (IM) at the MoHM

Various entities that have been established to carry out multiple functions within the scope of IM activities are as follows:

• Information and Communication Technology (ICT) Division

The ICT Division spearheads the co-ordination and implementation of ICT activities of all agencies of the Ministry throughout the country. At present 43 ICT technical staff (details as listed in Table 4.1) handle these tasks. The Head of this Division (Undersecretary of ICT Division) also acts as the CIO of the Ministry. This officer is supported by 4 Senior Assistant Directors, several ISOs and Deputy ISOs. The attachment of all of these officers is subject to the jurisdiction of the PSDoM (for further explanation see sub-section 2.4.1, pp.16-17). Hierarchically, as shown in the MoHM organisational chart (see Figure 4.1), this Division is answerable to the Deputy SG (Management).

Category of Posts	Number of Posts
Under Secretary of ICT Division	1
Senior Assistant Directors	4
Information System Officers	15
Assistant Information System Officers	23

Source: <<http://www.moh.gov.my/ptm/>>, [accessed 21-04-2005]

Table 4.1 List of posts at the ICT Division, MoHM (as of 21-04-2005)

• Information and Documentation System Unit

This Unit responds to the Director of Planning and Development Division and collects, compiles, and disseminates health care related information and statistics from MoHM’s agencies throughout the country. They publish and disseminate official reports of the Ministry, such as the annual report and other statistical reports.



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Category of Posts	Number of Posts
Under Secretary of ICT Division	1
Senior Assistant Directors	4
Information System Officers	15
Assistant Information System Officers	23

Source: <<http://www.moh.gov.my/ptm/>>, [accessed 21-04-2005]

Table 4.1 List of posts at the ICT Division, MoHM (as of 21-04-2005)

- **Information and Documentation System Unit**

This Unit responds to the Director of Planning and Development Division and collects, compiles, and disseminates health care related information and statistics from MoHM’s agencies throughout the country. They publish and disseminate official reports of the Ministry, such as the annual report and other statistical reports.

- **Library Services**

Library facilities have been set up at various locations, such as the Head Office, State Health Departments, hospitals, and training colleges. As a result of the absence of a centrally co-ordinated function, the operation of every library is under the control of the Head of respective offices. Evidence from document analysis suggests that only libraries at the headquarters, Kuala Lumpur Hospital, and the Institute for Medical Research of Malaysia (IMRoM) are managed by the professional librarians, while the rest are managed by junior clerical staff. The service of the professional librarians in the government agencies is under the jurisdiction of the centrally controlled body, The National Library of Malaysia (Baba 2002).

- **Information Technology (IT) Units (at three public hospitals)**

At present, there are only three hospitals (Kuala Lumpur Hospital, Selayang Hospital and Putrajaya Hospital) that have their own IT Units to support the day-to-day business operations. Each of the units is manned by ISOs, doctors, and nurses and answerable to the respective Directors of each hospital. Each of the hospitals is equipped with a computer network and application system, the so called the Total Hospital Information System (THIS), which was procured separately and implemented by different ICT vendors. The technical specification was such that each of the component systems in THIS were developed on various platforms and operating systems, different file formats and structures were used, and information from other existing health care IS of the MoHM was integrated into the system.

- **Information Technology Unit of the Accounts Division**

This Unit is led by a Senior ISO with the support of two ISOs and several other operational staff. The main role of this Unit is to complement the function of the Accounts Division, which handles the staff payroll and related financial administration and activities of the Ministry. As shown in the MoHM organisational charts, the Accounts Division is answerable to the Deputy SG (Finance).



### 4.3.2 Information Flow of the Ministry of Health Malaysia

Information flow is an important attribute in organisational design. For the MoHM, the flows themselves can be superimposed on top of an organisation flow chart (see Figure 4.2 below). Clearly, the Minister of Health sits at the top of the organisation hierarchy and is answerable to the Public Accounts Committee (PAC) and fields questions in the Malaysian Parliament. The Minister is supported by the Secretary General (SG) and Director General of Health (DGoH). The former liaises with external agencies (Government and Non-Government) and through his Deputies to Head Office, Public Health Care Institutions, and Divisions; whereas the latter has no remit with external agencies.

The Divisions and Head Office are responsible for the State Health Departments (SHDs) who themselves filter the information down to individual hospitals, health clinics, and health offices.

Thus, the information flow follows the hierarchical organisation from the Minister to individual hospitals. Of course, information flow is a two-way process: directives and decisions will flow down, and reports of activities flow up the hierarchy to inform decision-making processes. A feature of this information flow model, is that any external request for information must be channelled through the SG's office.

The activities shown in Figure 4.2 will be discussed further in Chapter Seven.

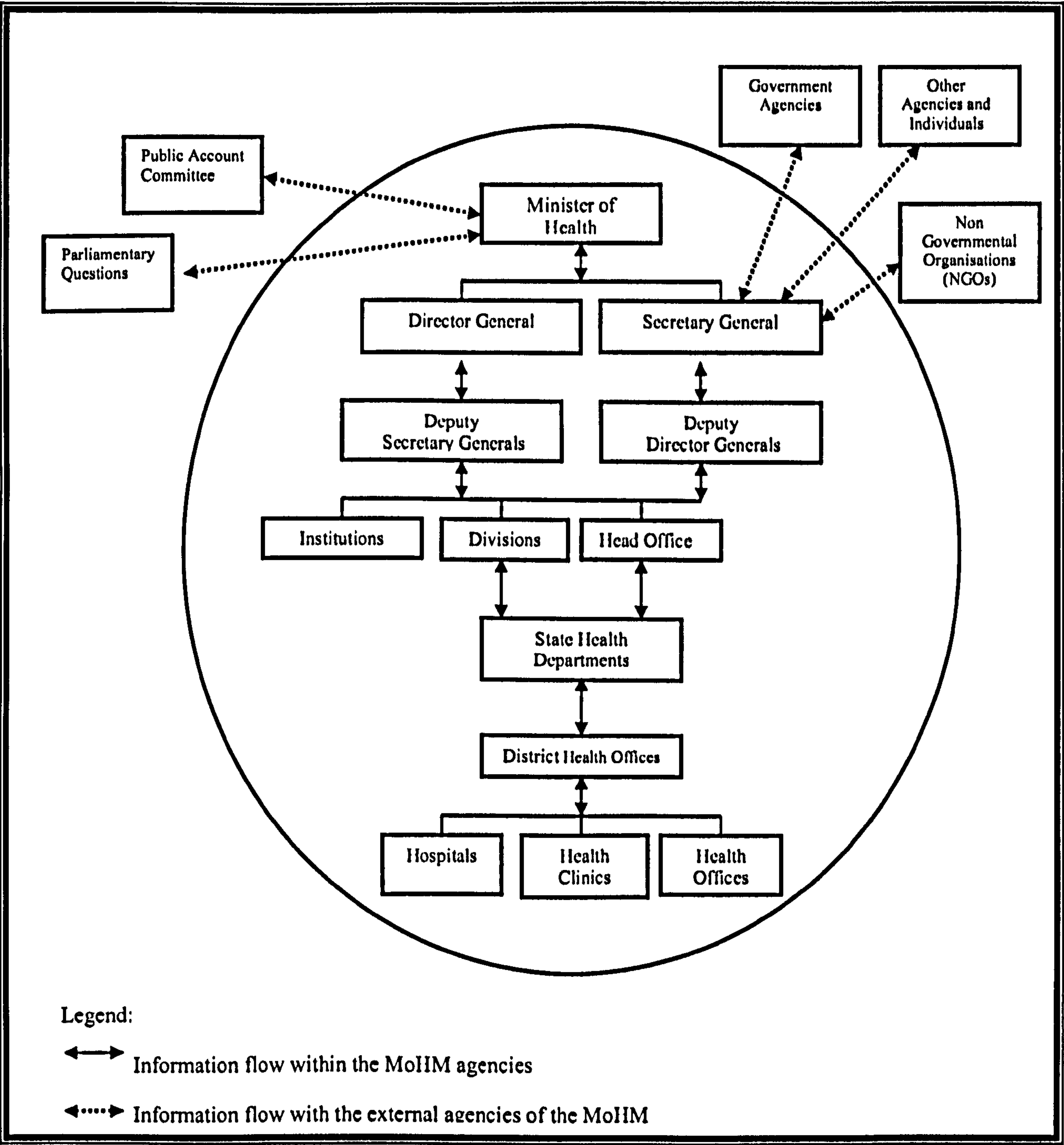


Figure 4.2 The Ministry of Health Malaysia - Information flow



## 4.4 Scope of Review

A literature-based model of five different perspectives is proposed which covers the scope of this review. This model is complemented by personal observations and informal discussions with health managers in the MoHM. These perspectives are:

- Structural Perspectives, Information Content and Information Flow;
- Information Culture, Training Needs and Library Information Services Provision;
- Resource Perspectives, Organisational Aspects and Manpower;
- Policy, Policy Procedures and Standards; and,
- Technological Perspectives, Interoperability and Infrastructure Requirements.

Each perspective can be split into two 'factors', as shown in Figure 4.3. It is these factors that will be investigated as component parts of the literature review.

### 4.4.1 Structural Perspectives

Information Content and Information Flow are the relevant subjects under this issue.

- **Information Content**

The main purpose of an IMS is to allow access to relevant information whenever it is needed. In the case of the content development, the involvement of the user is crucial, as the information must meet the requirements of the targeted users. In addition, some users are involved in setting up policies and decision-making processes (Atkinson et al. 2002), therefore content development is a joint process between users and system designers. In this respect, a study by Protti (2003) relates the successful joint ventures of 'MedCom' in Denmark and 'HealthLink' in New Zealand. Meanwhile, management's involvement is critical to provide vision and commitment for the system development (Salaun & Flores 2001).

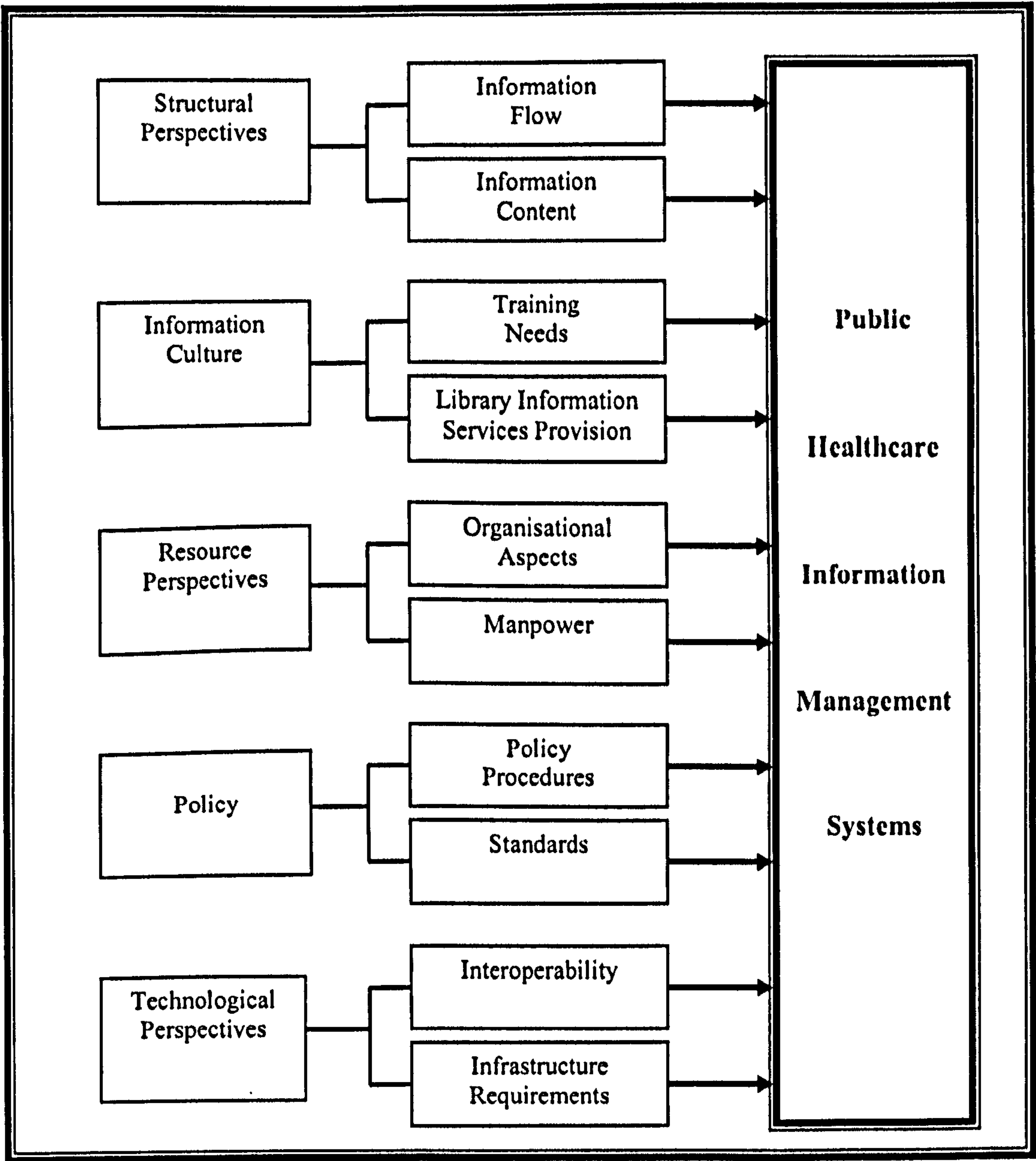


Figure 4.3 The conceptual diagram of MoHM issues

In actual fact, health care information should be conveyed in an understandable manner to allow for a wide understanding and use by various categories of users. Therefore, the system must emphasise the quality of information content, attributes of which are relevancy, currency, and accuracy. In addition, the process of accessing the relevant information must not be time consuming (Wood & Wright 1997). From a wider perspective, the health care IMS should be able to anticipate the user's needs, rather than



simply reacting to events as when the needs arise (Masys 2001). In enhancing the system's usage, Schonberg & Safran (2000) remind us that the content of information should be well-presented and informative, since the information is gathered over time and from various sources that use different formats. Hence, the system is intended to be intelligent by making relevant information available when and where it is needed. Furthermore, users in the health care systems are not passive recipients and the existence of a large, unified data store of related information is a great advantage (Edejer 2000).

The emergence of the internet has significantly affected the process of health care information delivery, especially its capability in handling multimedia information (Memel et al. 2001). In relation to the nature of the service, demands for various kinds of digital images such as X-rays, computed tomography (CT), Ultra-Sound, and Magnetic Resonance Imaging (MRI), in addition to text, are important to decision making in the health care service delivery (Coiera 1998). However, the massive amount of information from web-sources, which is continuously growing, becomes a challenge to internet users. It has made it a difficult task to search for specific information. For instance, information generated from a search engine offers little help in finding relevant and in some cases, accurate information. In fact, information searching via the internet can be a laborious task, and not always successful (Zhu et al. 2001).

With regard to empowering users, Martin (2001) suggests that a proper strategy needs to be employed to turn information into knowledge while ensuring transparency to all users. This can be achieved by providing services through tailoring available information to the need of each group of users. In relation to that, Liaw & Huang (2002) reckon that an effective and interactive user interface is a key factor in providing users with the ability to arrange and locate the particular pieces of information that are of their interest. Nicholas et al. (2001) argue that the system needs to provide an avenue to enable it to foster an active interaction between patients and doctors. With respect to the quality of content, the key to success for an organisation's IMS service delivery lies in its ability to transform the information on the differing perceptions of the issue or problem into knowledge and to use it effectively within the perspective of aggregate health care delivery management

purposes (Janes 1998). Therefore, the system requires integrated content to be useful and add value. A holistic perspective is essential for successful implementation of a Total Health Care IS, accommodating stakeholders' requirements for the utilisation of clinical, technical, financial, and managerial nature of the service (Griew et al. 1999; Stetson 2001; Atkinson et al. 2002).

Meanwhile, inter and intra organisation information aggregation within the context of information sharing has been analysed by Zhu et al. (2001) and Bakker (2002). Inter and intra organisational content is about more than sharing of information, rather it is about providing opportunities for discovering and sharing of experiences and also to develop knowledge for future requests (Procter et al. 2002).

Information sources from the private health care sector must also be included, as this sector accounts for a significant proportion of the total health care services of the country (Jayasuriya 1999). However, developing countries in particular, experience that information from the private health care sector is rather insufficient and outdated. This will eventually affect the targets to be used in monitoring the overall health care programmes of Malaysia.

Evidence-based health care practice requires appropriate ICTs and decision-support systems (DSS). This will undoubtedly highlight the need to pursue broader information and communication skills among health care personnel, either to support service delivery or to manipulate information for health care management (Coiera 1998). In complementing the health care service, the DSS needed should be able to provide health care personnel with the systems to respond beyond the capability of rule-based systems. Current systems are able to respond to a limited set of rules but still not enough to help health care personnel deliver service efficiently. Most doctors expect a system to be intelligent, such as to be able to suggest alternative diagnoses, investigations, and highlight areas of particular risks rather than limited to diagnose illnesses only (Thornett 2001).



In summary, previous studies illustrate the related issues faced in implementing a large-scale IMS and the importance of understanding further analysis and interpretation, both in content and context of the situation for the establishment of an effective system. Since the IMS of the MoHM is in the early stage of IT adoption, it provides an opportunity to learn from system failures and therefore to define appropriate information content of the required system. However, situations like the MoHM implementation should also be concerned about barriers to success such as language, context, up-to-date content, and technical support.

- **Information Flow**

An information flow model can be designed to incorporate information about activities between the organisational functions and the information repositories in the organisation's business process (Kock & Murphy 2000). In this respect, the emphasis is that the model conforms to the workflow which ensures that the constituent tasks within the system are performed at appropriate points in the overall process.

By nature, information in any organisation, including health care systems, flow vertically and horizontally. A vertical flow of information is needed to make senior management aware of the needs of the operational functions, while horizontal flow of information is necessary to achieve general intra organisation communication (Anderson, Vimarlund & Timpka 2002).

Sweetland (2000) argues for smooth information flow within and across the health care sector, with technology enabling retrieval and visualisation of the required information at the right time. This means that stability in information infrastructures is crucial, together with the standardised IM strategies and associated IM procedures. There is increasing stress on people's capacities to recognise and articulate their information needs, in terms of accessing and making decisions at the time about the appropriateness of what they receive, and to exploit the information which they deem to be of use and relevance. Foster (2000) indicates that human skills are still important in the system, as specific information is valuable for a particular individual due to the relevance it may have. In

relation to this, Grimwood & Simmons (1998, p.68) mention that information handling skills should not be under-estimated.

Coiera (1995, p.43) cites that in a complex environment like health care, there are many types of information that need to be prioritised, as countless decisions have to be made. Particularly, survival of patients may rely on the accuracy of information. Meanwhile, Fitch et al. (2000) relate to the usability of the system in terms of its easiness to enable a user to operate it successfully. In the health care environment, more attention should be given to validate the human-computer interactions aspect, through which information flow occurs, to ensure the system delivers to users' interests and needs.

Duncan et al. (1995, p.86) examine the effect of information sharing and efficiency in information flow. Even information originated from outside the health care sector can contribute to the enhancement of health care activities. The development of laser technology, has been identified as an example, whereby it was initially developed outside the health care environment, but was quickly adopted within the health care in a variety of surgical applications.

A person's state of health can be determined by many factors, one of which is the timely use of relevant information available. To produce this information at the right time in the right place requires co-ordinated response from both senders and receivers (National Committee On Vital and Health Statistics, USA 2000).

Even though free information flow is vital to the success of health care service delivery, Oppenheim (1997) argues that several factors have been linked to the constraint factors. Office politics, pertaining to the importance of giving and withholding of information and the unwillingness to share information are among the two prominent factors. Parnell (2001) mentions that technology and the internet actually exacerbate the problems to find the right information rather than streamlining information flow within their organisations - for example, more than 80% of internet content is unstructured, such as in *.doc* and *.pdf*



formats, which are more suitable for individual purpose as organisational users tend to use information in the structured formats (Parnell 2001).

The relationship between information flow and organisational workflow has been discussed in the literature. Botha & Eloff (2001) describe that in business process engineering (BPR), IM will primarily be used for facilitating the flow of information. Meanwhile, within a workflow system, ICTs have also been recognised as a dominant factor aimed at the automation of the business processes. Kettinger et al. (1996) emphasise that this feature will be more significant in the future, as the organisation will be networked across functions and therefore information flow will be designed around business processes rather than functional hierarchies. This finding has a direct implication on bureaucratic systems such as those employed in the MoHM.

#### **4.4.2 Information Culture**

The information culture that is, the way that information is used with respect to time, person, and distributing within the MoHM, is such that the value of information is not always recognised. Given the push towards knowledge economy (k-economy) in Malaysia, this lack of awareness may be a crucial factor in the success or failure of Government initiatives. Two ways in which information awareness can be generated are via understanding the skills gap in existing personnel which leads to the establishment of training needs; and an audit of what information can be currently provided. Thus, this section expands upon 'training needs' and library information services provision'.

- **Training Needs**

Any organisation that intends to improve the IMS needs to allocate a sufficient budget for training as any deficit can hinder the system ability to deliver quality customer service. Furthermore, new technology and systems will not yield their anticipated return if the Management Information Systems (MIS) Division is not prepared to support them. More important, MIS employees will always need to be adequately trained to update their

knowledge and understanding to stay current with the latest developments in computers and technology. Otherwise, one cannot expect staff members to deliver support, provide solutions, and achieve strategic objectives as they are not well prepared (Lang 2001).

For the end users, Norris & Brittain (2000) argue that the purpose of training is to enhance users knowledge in using ICT, as almost all the workforce in the health care sector is involved with activities such as collecting, recording, processing, disseminating, and archiving of patient information. Furthermore, differences of skills and expertise among the staff need to be controlled, whereby, through training, a uniform work practice can be introduced for their work practice adoption. Scheiber et al. (1998) and Bauer (2002) note that, even among the health care professionals, their computer knowledge are suspicious, therefore, very basic training needs to be provided to assist them in searching and using of the systems.

The implications of IMS training are enormous. Ball & Douglas (2001) reveal a drastic reduction of errors as a result of an effective training regime. Nowadays, there are various modes of training that can be chosen, such as traditional method of face-to-face or distance learning and virtual classrooms (Carlile & Sefton 1998). The emergence of the internet contributes to the increased availability of on-line courses from a global range of institutions, together with appearance of just-in-time training (allowing selection of training programmes when they are needed).

Lang (2001) emphasises that all training needs to be evaluated and assessed effectively, by considering the long-term needs of those that are being trained. In addition to enhancing skills and knowledge, the evaluation and assessment should envisage that training aims to equip staff with future knowledge requirements and career development skills.

In summary, a study by Norris & Brittain (2000) is relevant to the environment of the MoHM in tandem with the strategy to outsource training programmes. However, a detailed study needs to be carried out prior to full adoption. The issue raised by Lang



(2001) provides an initial idea for further study as the review and evaluation of training are rarely practised.

- **Library Information Services Provision**

In its traditional appearance, a library is considered to be a centre for the collection of books, journals and other references need by the health care and technical professional in order to obtain information conveniently. It also provides an area where doctors and staff can meet and discuss their work, and a stimulus for continuing medical education (Wood & Wright 1997; Pearson & Rossalt 2001). While in the learning process, libraries play a practical role in sharing valuable resources by bringing people and ideas together to serve for a social and intellectual role.

Therefore, the role of the library strongly supports educational and information purposes and is an institution that contributes significantly to the development of knowledge. This is further reflected through sharing of respective resources with other institutions, the most familiar form being the inter library loan (Feather 2000, p.184). Over and above these issues, libraries should also contribute to raising the awareness of their users regarding the availability of information and guiding them in finding the required information (Ren 1999).

The existence of web-based libraries, such as the NHS National Electronic Library for Health (NeLH) in the UK and the National Library of Medicine (NLM) in the USA, are examples of two prominent models that connect users with virtual sources of knowledge. This indicates that the e-library is an essential source of information for both health care professionals and other users. Health care professionals in particular, consider access to evidence-based information sources and other medical databases such as MEDLINE® essential in performing their duties (Pearson & Rossalt 2001). The related impact is that the e-library provides a meaningful platform towards nurturing patient empowerment, as the wider public can now access almost all the information that the health care professionals have, which was previously shielded.

In principle, the common aim of an e-library is to provide easy access to best current knowledge, in addition to improving health and health care for patient choice and clinical practice. Therefore, the development of e-library must be seen in a wider spectrum within the context of the multi-sectoral and global information society. Hence, health care information needs to be integrated with information in other sectors of the economy, such as in the UK NHS where it is linked to the education and public libraries (Gray & Lusignan 1999). An e-library allows people to access materials simultaneously regardless of their physical location. However, in reality to date, e-library services in most cases are still regarded as a complement to, rather than a substitute to, the role of the existing libraries, including the established models such as NeLH and NLM (Toth et al. 2000).

The traditional role of health care librarians is to provide information required by the health care professionals in the scope of managing the libraries and organising incoming information (Pearson & Rossalt 2001). However, the convergence of ICT by the introduction of digital systems presents new challenges for the librarians and library services. Access to information rather than stock holding will become increasingly important. Within the context of promotion of the knowledge-based organisation, they have a greater role to be played such as educating users regarding issues of awareness and to encourage the increase of information and systems use (Ren 1999). While, in uplifting the image of information-proficient organisations, their role are more on advisory and counselling. Overall, they must be competent and skilful in linking users with the health care IMSs and be able to evaluate the importance of information beyond its original intended use (Dearstyne 2001).

Wood & Wright (1997) cite that librarians must be sensitive about the type of documents needed by the officers and at the same time must be able to promote the service available. For example, many studies reveal that a large percentage of health care professionals are not health library users and that their information needs are met outside the health library (O'Connor 2002). Therefore, a concerted effort is needed to enhance the service level provided whereby users need to know how to identify the best evidence from the mass of



published research and how to synthesise complex information to make it more usable (Lancaster 2000).

Overall, the health care librarians role is moving towards helping health care IM users to develop an information-based culture, by providing support for the increasing needs of information (Pearson & Rossalt 2001). Given that the librarians of the future may need to have considerable computer-based information retrieval skills, the terms *Cybarian* and *Digitarian* have been used to describe the functional role (Rashbass 2000).

For the MoHM, the experience of the established systems as mentioned in the studies above can be used as a guideline for the formation of a proper health care library services. Studies by Wood & Wright (1997) and Pearson & Rossalt (2001) provide a basis for further analysis as the current situation, namely the library infrastructure, role and responsibility of the existing library service at the MoHM justify this statement. While the study by Rashbass (2000) sparks the interest for the future outlook of the relevant model of health care library system and service.

#### **4.4.3 Resource Perspectives**

Organisational Aspects and Manpower are two issues to be discussed further.

- **Organisational Aspects**

In any health care organisation, by nature of its service, is a place where multidisciplinary of professions are unintentionally divided by their own defined role. However, interdependence of team members is a key factor in achieving their common purpose in delivering health care service. Cozens (1998) argues that multidisciplinary team working is seen as a way to tackle the potential fragmentation in delivering and improving the quality of service. There is evidence from his study that working in multidisciplinary teams enhances an organisation's effectiveness and eventually produces better outcomes.

The principle of which this finding is based is related to the mutually exclusive yet collectively exhaustive approach to the formation of multidisciplinary health teams. Clearly, this approach extends the scope of professional indemnity thereby reducing the risk to the patient of adverse events. Most health workers enjoy the conducive atmosphere of working in such teams, and as a consequence morale and staff motivation are high.

In relation to that, the development of capable team leaders is an essential ingredient of health care service. The need to stress strong leadership is that it will bring further collaboration between various professions in this sector (US Department of Health & Human Service 2001). It has been recognised that the most important missing ingredient, which could accelerate and co-ordinate progress of the development of IMSs, is strong leadership. This lack of leadership in the health sector contributes to the lag implementation of ICTs compared to the banking and airline sectors (Forman 2002). An example of this lack of leadership is apparent in the MoHM, where administrative and financial systems have been implemented yet patient-facing systems have had their implementation delayed.

Stewart (1996, p.48) identifies several reasons for difficulties in reaching understanding between doctors and managers due to the existence of various sub-cultures, hence, differences in role, differences in training and experience, competition for scarce resources, differences in relative power, and personality clashes. For example, in general, a doctors' primary role is to treat individual patients and managers are responsible for maintaining expenditure within budget and to ensure services are delivered.

The perception among health care professionals is that managers with their business approach might propose changes by influencing government. This situation actually occurred when the Government of Malaysia tried to corporatise the public health care service, which was strongly opposed by the Malaysian Medical Association (MMA 1999a, p.11). After the doctors gain popular support from the public, the plan was eventually scrapped indefinitely.



The existence of such differences, if not properly treated, might dampen the performance of the sector and the IMS in particular. In fact a study by Johansson et al. (2001) revealed health care operatives still viewed ICT as primarily an instrument to control their routine work. This can be interpreted as being the main reason of a lack of confidence in ISOs, who will be taking over the health care officers role as legitimate authorities in the health care services.

However, with main focus is to deliver the best health service possible, where diversity of skills and multifunctionality should be capitalised and exploited for the sake of the service (Cozens 1998). Together, all professions have the potential to create synergy which could be an effective driver for the improvement in the IMS (Sutherland & Dawson 1998). Protti (2003) emphasises that mutual understanding of the variety of work in any collaborative effort is essential. In IMS development activities for example, it is important to adopt participative decision-making processes, through fostering effective relationships which are based on 'earned influence' rather than 'conferred authority', so that a conducive working atmosphere tends to prevail.

To have an impact within the organisation, the Division Head, the CIO, should report directly to the Chief Executive Officer (CEO) of the Ministry (Kroenke 1994, p.608). Even though the prominent traditional task of a CIO is to bring more collaborative technologies into being, however, a more challenging role is to get staff members to work in a co-ordinated manner (Hagland 2000b). Organisationally, the ICT Division should be integrated functionally to accommodate all related activities, such as technology, dissemination, collection, and management (Kroenke 1994, p.608).

The potential impact of these studies on the MoHM can be described in the following way:

- Agree with Cozens (1998) about the existence of a gap in the relationships between the different professions in the Ministry, which affects the delivery of service;

- Up to a point, the study by Sutherland & Dawson (1998) can be incorporated directly into the MoHM situation. Further work however, is required before full adoption; and,
- Although the work of Kroenke (1994) provides adequate theory, its practice in a Malaysian setting requires much more study. The main reason for this is that any organisational restructuring is under the jurisdiction of the Central Agencies of the Malaysian Federal Government such as the PSDoM and Treasury.

- **Manpower**

The ICT Division is the primary source of the IMS in the health care organisation. It is responsible to ensure that the organisation uses such technology to accomplish its goals and objectives. That responsibility breaks down into two major functions, to develop, operate, maintain, and manage the systems and to acquire technology and to facilitate its transfer to appropriate applications (Kroenke 1994).

MIS specialists who handle the functions of the Division are not homogenous (Norris & Brittain 2000) and their specialty varies such as in systems design, database management, networks, and documentation activities (Reel 2000). From the study, Gibson (2001) finds that the common scenario in the public health care organisations is that the level of computer literacy among the staff members is low. Many of them have little exposure and limited access to computers, therefore, their discomfort is often extreme when discussing such ideas (Bowns et al. 1999). Therefore, Dearstyne (2001) mentions that promoting usage of ICT among the staff members is among the key tasks of ISOs and must be done strategically. Any strategy should take into account that health care users have different information needs, consequently they differ in the amount of support that they need (Kroenke 1994). The management groups must also be aware of their responsibility, such as ongoing support to the IMS. Therefore, senior management in particular must play a supportive role and to encourage their junior staff to participate actively in the new system (Dearstyne 2001).



Bowns et al. (1999) describes experiences in established health care systems, such as the UK NHS, and showed that a specific problem with the implementation of IMS projects was largely due to insufficiency of the skilled MIS personnel. In addition, lack of awareness among the staff led to the capability of the IMS not being appreciated (Gibson 2001). In avoiding these experiences, Bowns et al. (1999) suggests that the organisation needs to establish a strong base of internal Information System Officers (ISOs) officers to manage and maintain IMS in a sustainable way. Meanwhile, Gibson (2001) believes that IMS development needs to address the participation from various backgrounds, working together to produce an integrated solution. He further emphasises that ISOs should take the leading role in IMS projects to achieve an effective and proactive service. However, this statement must be viewed within the context of senior management commitment in promoting efforts towards information sharing for the common interest of the organisation and not information hoarding practice.

Lang (2001) urges that being the pivotal catalyst in the IMS activities, MIS staff need to enhance their skills and knowledge by keeping abreast with the changes in the technology and business of the organisation. In addition, good communication skills is a principal trait when considering customer service improvements, as poor interactions with users can kill the overall perception of the IMS reputation.

In summary, for the situation at the MoHM, studies by Gibson (2001) can form a basis for a deeper analysis of the manpower issue. Meanwhile a study by Dearstyne (2001) can be adopted subject to the further analysis and endorsement of the management of the MoHM.

#### **4.4.4 Policy Perspective**

Information policy is about the mechanisms used to control information, and the effects of applying these mechanisms in real practice (Burger 1993, p.6). During the initial stage of policy formulation, various considerations should be given as to whether to include an analysis of organisational needs, discussion of informational issues, setting of clear

direction, and links information resources management based on the priorities of the organisation (Dearstyne 2001). Due to the importance and wide use of ICT in IMSs, Wilson (2001) suggests that organisations need to institute a policy on appropriate use of this technology to avoid the potential misuse of information. In addition, Kelly (1998) highlights the privacy issue and suggests the needs for further research.

In the case of the MoHM, the effectiveness of the IMS at a policy level will be greatly affected by the capabilities of senior management to understand the issues related to its implementation. The principle of IMS policy must be in line with the overall policy of the MoHM as well as the Federal Government. Thus, the main aim is towards the improvement and effectiveness of IMS for the benefit of the overall national health care sector.

Therefore, policy needs to be viewed mainly to serve for the following purposes:

- As a barrier for any potential threat to the effectiveness and success of the system;
- As a guide in actions orientated towards integrated system implementation; and,
- As a catalyst for system performance.

- **Policy Procedures**

Policy procedures are related to the use of standards (see below) and other aspects such as, training, security, and quality. The key to managing IS is resource management, where the resources are human, technological, and infrastructure. In this respect, we have now entered an age where the automatic delivery of relevant information to each of us on an individual basis is beginning to revolutionise work processes. The main purpose about implementing related procedures is to educate users in dealing with health care information. In addition, they can contribute to the improvement of the quality of information and to guard against misuse of data.



The main area that needs special attention in formulating IMSs procedures is information security and privacy of transmitted information (Hill 1994, p.11; Henderson & Synder 1999). The MoHM is responsible for developing or revising its procedures and processes to protect information and the storage from any undesired possibilities (Stetson, 2001; Vermeulen & Von Solms 2002). For this reason, the analysis found in Chapter Seven will focus on the factors related to information threats, security plans, and enforcement of procedures with regard to how these factors will contribute towards effective health care IMSs.

The common expectation is that the primary role of the health care IMS is to complement the delivery of health service system. In addition, the system should be able to fulfill the increasing need in health care information safety by concentrating on six key factors; safety, effectiveness, patient-centered, timely, efficient, and equitable.

Information security and confidentiality have become the two most highly concerned issues (Fuller 1997). The MoHM, with the initiative of the ICT Division should develop proper information security and confidential policies and procedures that protect databases and health care information under the jurisdiction of the Ministry. To protect an individual patient's information, Henderson & Synder (1999) suggest that comprehensive privacy policies need to be developed. Among the matters to be addressed are the appropriate level of information privacy protection that should be accorded to public and organisations, the type of information that can be revealed, who is authorised to access what, and what should remain under the official control.

Several studies agree that human factors are vital for the success factor in the effective implementation of the security procedures. Vermeulen & Von Solms (2002) emphasise the importance of the right etiquette of the ICT usage due to the growing value of information as a business asset. Hence, the protection of data and information is as important as the protection of the IT infrastructure of the organisation. They further cite that in addition to providing physical and technical protection, it is also necessary to

ensure that all users of information act in a certain prescribed manner when using IT systems and information derived from them.

Support from senior management in a hierarchical managerial structure such as that found in MoHM is crucial for the effectiveness of dealing with IS security issues. They should no longer be regarded as an IS issue *per se*, but rather be included as a part of the management structure of the organisation. Hence, IS security issues need to be translated into an organisational commitment and be allocated appropriate resources (Fuller 1997; Vermeulen & Von Solms 2002). As far as information security procedures are concerned, technology issues should be an item to be considered. The procedures must emphasise network protection, such as the adoption of public-key cryptography to encrypt data communication transmissions and to detect unauthorised changes to data transmitted over networks (Ball 2002). Organisations also have to take precautions to protect the physical security of information resources and to provide for the ability to completely recover information and systems if a disaster occurs (Fuller 1997).

In summary, the MoHM needs to adopt extra effort to enhance the security features of the IMS. Studies show that there is an enormous gap in existing practice in IS protection standards. However, all procedures and standards to be developed must be consistent with the set of instructions issued by the Federal Government's central agency, i.e. Malaysian Administrative Modernisation and Management Planning Unit (MAMPU).

- **Standards**

Standards need to be formulated to provide a guideline for the design, implementation, maintenance and improvement of the IMS. This is important because of the complexity and variety of health care practices together with dealing with critical data and information. With the growth in applications of automated IS and the accompanying network infrastructure both within and outside of organisations, an effective IMS is becoming increasingly dependent on the adoption of international standards such as ICD-10 or pseudo-standards (HL7). The use of these standards aid the development of a



formal quality system to control the deliverable of the intended IMS (Information Management Steering Committee on Information Management in the Commonwealth Government 1997). This study will discuss standards that encompass to the IS strategic planning (ISSP) issues.

The ISSP is a master plan for the organisation and outlines the overall IMS plan. Among its objectives are to manage the limited resources by avoiding misallocation of resources, reducing mistakes in setting priorities, and reducing delays in systems delivery that may affect the operational activities (Ragu-Nathan et al. 2001). Thus, with emphasis on workflow investigations, there is likely to be a reduction in administrative costs and burdens on the health care organisations (Stetson 2001).

The effectiveness of the ISSP relies on the scope of the design plan, including forecasting factors and external factors to synchronise the strategy. This is likely to contribute to the business strategy of the organisations (Cerpa & Verner 1998).

#### **4.4.5 Technological Perspectives**

Interoperability and Infrastructure Requirements are two important issues that need to be discussed further.

- **Interoperability**

Several reasons have been identified that cause the disintegration of the health care IS. Forman (2002) relates to the practice of agencies within the Ministry that acquire systems that only address internal needs and are rarely able to interface with other systems. Tsiknakis et al. (2000) explains that due to the complexity of health care activities, the key challenge facing the system developers is to provide a new IS dimension that is able to integrate heterogeneous data.

With the wide use of ICT in health care practice, health care professionals will find that for the effectiveness of the delivery of services, they will be required to share their knowledge and expertise with all users such as health managers and administrators, health care professionals, patients, and the wider population.

Interoperability and integration also needs to be justified from the flexibility point of view. There are cases, where the systems acquired by the health care providers are difficult to tailor to local circumstances or such changes would incur significant additional costs. In most cases, only the original suppliers can undertake amendments to the software. Therefore, flexibility to meet users' expectation of the system deliverables is regarded as a key success in the health care IMSs.

- **Infrastructure Requirements**

In a large organisation such as the MoHM, the necessity of setting up the Health care Information Highway is crucial in linking the system to health offices. The distributed IS, through intranets and extranets, will link the host system to all remote offices via appropriate telecommunication networks. Therefore, the organisation needs to subscribe to a high speed data line to support the transfer of large quantities of multimedia health care data such as 'telehealth' and 'smartcard' systems. This technological infrastructure will be widely used in the health care sector in future (Tsiknakis et al. 2000).

Hagland (2000a) discusses the capability and potential of the embedded-chip smart card, which can hold a tremendous amount and variety of information other than text form, such as fingerprints and retinal scan. This infrastructure is useful in emergency cases, by allowing authorised staff to pass the card into a special reader, bypassing the usual requirement of a personal identification number (PIN) code to access the patients' data. However, even though this system may be suitable in a developed country, due to various constraints, this system may not be appropriate for a developing country.



Costs in acquiring computer systems are burdensome, for the developing countries in particular, they should maximise the usage of the existing system fully (Cook 2001). In many instances, under-utilisation of computer infrastructure is quite common in the developing countries. This is as a result of poor project planning and ineffective technology transfer programmes, which is partly blamed for the failure to enhance skills and knowledge in using the new systems (Edejer 2000).

#### 4.5 Summary

The background context and current practice of IM in the MoHM has been discussed. However, the focus of the chapter has been on providing the evidence in which the MoHM issues emerge. A conceptual diagram of the inter-relationships of these issues is included (Figure 4.3; p.54) which also indicates how the issues generated relate to the public health care IMS. The issues raised can also be directly mapped to specific objectives (see p.5).

As the instruments used in this study capture information about the MoHM issues introduced in this chapter, their findings are presented in the next chapter; then used in development of the Viable System Model (Chapter Seven); and finally discussed in Chapter Eight in context of the raw findings and their subsequent processing in the model-based components of this thesis.

**Chapter Five: Survey Findings**

**5.1. Introduction**

All preliminary activities of the field survey, including question constructs, pilot tests, survey techniques and formulation of survey samples have been introduced in Chapter Three. Having identified the activities from the field survey, this chapter will discuss their findings, particularly from the questionnaire survey. The analysis will complement work on the Viable System Model (Chapter Seven), and both will be discussed further in Chapter Eight.

**5.2 Primary Data Collection Responses**

The sustainability of the quality of responses of questionnaire and interview survey conducted was influenced by the various factors to be discussed in the following sub-sections.

**5.2.1 Questionnaire - Field Survey Conducted**

- Distribution Method**

In line with the explanation in Chapter Three, non-probability and quota sampling approach was adopted in the questionnaire survey. The guideline for the sample size as mentioned in sub-section 3.5.1 (see pp.29-30) was used during the questionnaire distribution at each hierarchy level of the organisation. Table 5.1 shows the summary of the distribution and responses of the questionnaire survey by hierarchy of organisation of the MoHM. The expected percentage of respondents (according to the non-probability and quota sampling method used) is shown in column two; with the number and percentage distributed and returned in columns three and four, and four and five respectively.



Location in organisational hierarchy	Representation (expected)	Distributed		Responded	
	%	N	%	N	%
headquarters	30	170	27.41	100	22.67
state health department	25	140	22.58	96	21.77
district health offices	10	57	9.19	47	10.66
state and district hospitals	20	155	25.0	134	30.39
health clinics	5	38	6.13	28	6.35
health institutions	10	57	9.19	36	8.16
Total	100%	620	100	441	100

Table 5.1 Summary of the list of questionnaire distributed and responded

Overall, there was a 71.13% response rate to the questionnaire survey. It is slightly higher than the initial expectation, i.e. 65%. The total number of responses (441) surpassed the initial target of 370 minimum sample size as has been mentioned in sub-section 3.5.1 (see pp.29-30), thus any results from the sample will be generalisable to the population.

The response rate is largely due to the researcher’s good rapport with senior management and personal contact with some of the senior officers of the MoHM. Even the SG himself was involved directly as an interviewee, and issuance of an official endorsement letter was definitely a key contributing factor to motivate participation of respondents in this survey. This finding shows that the importance of well-developed rapport to be a major determination factor in convincing respondents to give cooperation and participation and agrees with the available literature (Diamantopoulos & Schlegelmilck 2000, p.17).

• **Quality of Responses Received**

Before the coding and key-in process, all returned questionnaires were subject to a thorough validation and verification processes. During this stage, all questionnaires were

checked in order to ensure consistency and data validity of each variable. There were some cases where some questions were not answered. However, after checking, it was understood that this was done for a valid reason. For example, a few respondents failed to answer Q.29(a), Q.29(b), and Q.29(c) as there was no library services provided in their organisations. A medical officer from Tapah District Hospital stated that

“A library service should be provided in this hospital. Currently it does not exist at all”.

5.2.2 Interview - Field Survey Conducted

Table 5.2 shows the senior management figures involved in the semi-structured interviews, the date interviewed and its duration.

Officer's Position	Date	Time	Duration
The Secretary General	27-02-2003	15:20 - 16:40	80 minutes
Undersecretary of Human Resource Division	24-02-2003	17:40 - 18:55	75 minutes
Director of Medical Development Division	22-03-2003	13:25 – 14:45	80 minutes
Director of Planning and Development Division	10-03-2003	9:30 -10:35	65 minutes
Undersecretary of ICT Division	13-03-2003	16:25 – 17:50	85 minutes

Table 5.2 List of interview sessions

Details of the interview sessions are given in the following appendices:

- The Secretary General in Appendix 4.1;
- Undersecretary of Human Resource Division in Appendix 4.2;
- Director of Medical Development Division in Appendix 4.3;
- Director of Planning and Development Division in Appendix 4.4; and,
- Undersecretary of ICT Division in Appendix 4.5.



### 5.3 Data Analysis

*SPSS* version 11 and *ATLAS.ti*<sup>TM</sup> were used to analyse the data obtained from the questionnaire survey and interview sessions.

Sekaran (1992) describes that descriptive statistics is

“...statistics that describe the phenomena of interest...”

and inferential statistics,

“...statistical results that let us draw inferences from a sample to the population...”

(Sekaran 1992, p.259),

will be discussed in the following sub-sections.

#### 5.3.1 Reliability Test

The reliability test employed was the Cronbach's Alpha Coefficient, whose definition is

“...the test of interitem consistency reliability...”

(Sekaran 1992, p.174).

The Cronbach's alpha coefficient was generated using *SPSS* application software to assess the degree of consistency of respondents' responses to all items that *hang together as a set* to make up of the questionnaire's grouped questions (Pallant 2002, p.6). To reflect their significance, some questions in the questionnaire survey have been broken into several set of items. Table 5.3 shows the summary of results from the evaluation of the group items reliabilities using Cronbach's alpha coefficient.

Ten groups of questions tested using the 5-point Likert scale items have produced Cronbach’s alpha coefficient values between 0.9995 and 0.3796. Pallant (2002, p.87) suggests that usually, if the value of the Cronbach’s alpha for each group is above 0.7, the scale can be considered as reliable for the sample. It is this evidence that will be employed in this study to determine the decision point for reliability.

Question	Number of Items	Group’s Reliability Alpha Coefficient
Q.18	4	0.7655
Q.20	3	0.7550
Q.26	5	0.7425
Q.29	3	0.9995
Q.32	3	0.8962
Q.35	2	0.5549
Q.36	3	0.9037
Q.40	3	0.7005
Q.43	3	0.8909
Q.44	3	0.3796

Table 5.3 Summary of Cronbach’s alpha coefficient test results

In this regard, the alpha value for variables under (Q.35) and (Q.44) are measured below 0.7, i.e. 0.5549 and 0.3796 respectively. Some respondents might not have enough information and knowledge necessary to respond to the relevant questions properly at the time the survey was conducted or due to the ambiguity of the questions raised (Spector 1994, p.262; Bryman 2004, pp.70-71).

Even though the traditional procedure encourages the discard of variables which have low loadings of the alpha values, as suggested by the indicators of *Alpha If Item Deleted* and *Corrected Item-Total Correlation* statistics, the problem is that while giving a great concern with the coefficient of reliability, the data validity, i.e. the significance of those



questions in the research may be lost. Heath & Martin (1997) argue that there may be cases where a low correlation coefficient is acceptable, if the variables are intended to measure the concept of interest of the research. Hence, there is no point in discarding a part of the data set to get a better alpha (Vehkalahti 2000). For the significant purpose of the research analysis, the Researcher decided to eliminate all variables in (Q.35) and (Q.44).

Details of the Cronbach's alpha coefficient test results of all respective groups of questions are as shown in Appendix 5.

### 5.3.2 Frequency Tabulation

According to Pallant (2002, p.51) *frequencies* provide the proportions and occurrences of each interested variable answered by respondents. So, descriptive statistics for categorical variables can be obtained. For example, the variable 'hierarchy of organisation' (Q.6) explains the total returned responses according to each level of establishment of location from where the samples were derived. This is to conform to the pre-specified criteria of the non-probability quota sampling approach, which was applied throughout this quantitative survey.

### 5.3.3 Cross-Tabulation Analysis

Cross-tabulation will be used to detect an association between two variables in a tabular form. By convention

“...the independent variables that are doing the influencing, placed across the top of the table, and the dependent variable that are being affected on the side of the table”

De Vaus (2002, p.243).

Whenever they are deemed suitable, relevant charts will be used to present the results of the findings.

Generally, all survey findings will be discussed in the form of descriptive analyses, as such results from frequencies and cross-tabulation of questionnaire survey will be presented together with the excerpts of the interview responses according to the pertaining issues.

Subsequently, inferential statistics for the purpose of conducting significant test will be carried out to make conclusions about the population of the research (Diamantopolous & Schlegelmich 2000, p.65).

#### 5.3.4 Interview and Qualitative Responses

Interviews and open-ended responses in the questionnaire are transcribed and then stored into the *Microsoft Word* files. Thereafter all of those files were used as input source and assigned onto the *ATLAS.ti* formatted files according to the stipulated lists of issues. Wherever relevant, views of senior management generated from interviews will be extracted to support and complement the discussed issues in chapters seven and eight. Hence, this will ensure that the interview transcripts are a valuable interpretative outcomes from the sessions conducted (Kvale 1996, p.163) .

#### 5.4 Statistical Tests

Even though the characteristics of the population sample mostly conform to the application of statistical parametric tests, as shown in Table 5.4, the sample is normally distributed as presented by the 'age' variable, and the sample size,  $N = 441$  is large enough as suggested by Diamantopoulos and Schlegelmich (2000, p.67) that the size must be at least 30. However, non-parametric statistics will be adopted throughout the analysis. The rationale for this adoption is due to the fact that all of the questionnaire variables are under the category of nominal and ordinal variables (see Table 3.3, p.37). This is in accordance with Pallant that



“...non-parametric techniques are the most significant approach when you have data that are measured on nominal (categorical) and ordinal (ranked) scales”

Pallant (2002, p.254).

In addition, Siegel and Castellan also emphasise that

“...non-parametric statistical tests play a prominent role in research in the behavioural and social science”

Siegel and Castellan (1988, p.34).

For the purpose to predict the causal relationship between variables, tests for differences of variables adopted throughout this research study will be using results of the Pearson's Chi-Square test for the significance tests. However, a fundamental assumption must be met, as according to Pallant (2000 p.259)

“...the minimum expected cell frequency should be 5 or greater or at least 80 percent of cells have expected frequencies of 5 or more”

and

“...none of the expected values is less than 1”.

The value of significance level (alpha value) for all significance tests was determined at 0.05 and applicable for all tests of significance in this study.

## 5.5 Sample Characteristics

This section provides information on the relevant frequency tabulations and a cross-tabulation derived from variables that reflect the samples characteristics among others are related to demographic variables. Each of the analysis is presented in the form of frequency tables that were generated using SPSS application.

5.5.1 Age (Q.1)

Table 5.4 suggests that the age variable of this survey is normally distributed which has the greatest frequency of scores in the middle, with smaller frequencies towards the both ends (Pallant 2002, p. 54). The age range of respondents is divided into eight categories, each of which with 5 years interval. The lowest range is 21-25 and the highest range is above 55 years old. The largest belongs to the category of 41-45 years with 22.4% (N=99).

Age Group	N	Percent
21-25	10	2.3
26-30	65	14.7
31-35	69	15.6
36-40	75	17.0

Age Group	N	Percent
41-45	99	22.4
46-50	77	17.5
51-55	40	9.1
above 55	6	1.4

Table 5.4 Frequency table by age groups

5.5.2 Gender (Q.2)

Table 5.5 reveals that in this survey, the number of female respondents with N = 257 (58.3%) slightly outnumbered the male respondents (N = 184, 41.7%).

Gender	N	Percent
male	184	41.7
female	257	58.3

Table 5.5 Frequency table by gender

5.5.3 Category of Service (Q.3)

It is clearly shown in Table 5.6 that the medical professional group represents the highest sample population of this survey (N = 193, 43.8%), together with eight others category of



service that constituted 94.1% of total respondents; administrative, information systems, pharmaceutical, engineering, dental care, research, science officer, and health education. Also, those are currently the main groups of service being employed at the MoHM.

Category of service	N	Percent
Medical	194	44.0
Administrative	66	15.0
Information Systems	8	1.8
Pharmaceutical	43	9.8
Engineering	17	3.9
Dental Care	39	8.8
Research	12	2.7
Science Officer	27	6.1
Health Education	9	2.0
Librarian	2	0.5
Statistician	1	0.2
Auditor	3	0.7
Counselor	3	0.7
Medical Social Worker	8	1.8
Catering and Dietetic	4	0.9
Nursing	2	0.5
Accounting	2	0.5
Training In Occupational Health	1	0.2
Total	441	100

Table 5.6 Frequency table by category of service

5.5.4 Grade of Service (Q.4)

Table 5.7 shows the result of the survey by ‘grade of service’. This variable relates to the data of the rank order of serving officers and this structure is applicable to the whole

Malaysian civil service. As mentioned in Chapter Three, the managerial and professional group of officers were selected to participate in this survey. During the period of the adoption of the New Remuneration Systems (NRS) in the Malaysia’s public service personnel, the highest rank was categorised into the JUSA group (The Prime Position in the Public Service Sector), which was represented by N = 10 (2.3%), followed by officers from Grade 1, Grade 2, and Grade 3. While Grade 4 (N= 12; 2.7%) even though representing a lower level group of officers, however, they have been included considering to their influential role in the information management tasks in their own organisations.

Grade of service	N	Percent
JUSA	10	2.2
Grade 1	58	13.2
Grade 2	163	37.0
Grade 3	198	44.9
Grade 4	12	2.7

Table 5.7 Frequency table by grade of service

Table 5.7 also shows that all categories of seniority have taken part in this survey and the single largest category was officers from Grade 3 (N = 198; 44.9%). This is in tandem to the fact that they are the largest category of Officers from the managerial and professional group being employed at all agencies of the MoHM.

5.5.5 Hierarchy of Organisation (Q.6)

This variable reflects various organisational locations of the MoHM, from which the quota sampling approach for sample distribution has been worked-out. Results from Table 5.8 show each of the 14 States in Malaysia are represented. Furthermore, the quota sampling approach for sample distribution has been carried out effectively.



In terms of respondents by ‘hierarchy of organisation’, the largest group of respondents was from ‘hospital’ (N = 134; 30.4%). This is followed by respondents from ‘head office’ (N = 100; 22.7%). All of them were from states of Selangor and Kuala Lumpur. It is noted that office locations of the headquarters level are situated only in those two States.

State	Hierarchy of organisation						State Total	
	head office	state health department	district health office	health institution	hospital	health clinic		
Perlis	-	4	1	-	2	-	7	1.6%
Kedah	-	10	-	-	9	-	19	4.3%
Pulau Pinang	-	4	-	1	14	-	19	4.3%
Perak	-	8	19	-	19	5	51	11.6%
Selangor	10	6	14	7	10	2	49	11.1%
Kuala Lumpur	90	1	-	28	14	5	138	31.3%
Negeri Sembilan	-	4	-	-	6	-	10	2.3%
Trengganu	-	17	3	-	11	7	38	8.6%
Kelantan	-	5	10	-	9	9	33	7.5%
Sarawak	-	9	-	-	5	-	14	3.2%
Sabah	-	6	-	-	6	-	12	2.7%
Total	100	96	47	36	134	28	441	100.0%

Table 5.8 Cross-tabulation between State and hierarchy of organisation

5.6 Existing Practice and Procedures in IM At Various Levels of Management

This section will explore the survey outcomes pertaining to the issues of: nature of work and involvement in IM activities; distribution of computers; use of computers; and, official interaction with external agencies.

5.6.1 Nature of Work

(Q.8(a)) to (Q.8(h)) require respondents to indicate involvement in the seven listed activities related to managing of information at their offices, and for an open-ended answer (an option to specify other than the given choice), whereby 'clinical' activity was the most mentioned. As summarised in Table 5.9, the following activities received a good questionnaire response rate (> 50%).

- (Q. 8(d)), 'collecting and compiling information', (N = 311; 70.5%);
- (Q.8(e)), 'disseminating information', (N = 223; 50.6%); and,
- (Q.8(g)), 'providing information for top management', (N = 296; 67.1%).

Question number	Nature of work related to information management	Total Responses			
		No		Yes	
		N	%	N	%
8(a)	Planning and design	242	54.9	199	45.1
8(b)	Technical support	258	58.5	183	41.5
8(c)	Budgeting	258	58.5	183	41.5
8(d)	Collecting and compiling information	130	29.5	311	70.5
8(e)	Disseminating information	218	49.4	223	50.6
8(f)	Archiving information	323	73.2	118	26.8
8(g)	Providing information for top management	145	32.9	296	67.1
8(h)	Clinical (under Others)	367	83.2	74	16.8

Table 5.9 Responses on various activities in information management

Results from the above questions also asserted that operational activities such as collecting and compiling information, disseminating information, and providing information for top management received greater involvement than pre-operational



activities, such as in the planning and budgeting activities related to information management.

These results show that the questionnaire respondents cover the full range of IM work in the MoHM, indicating that findings from other parts of the questionnaire are representative of the IM discipline.

5.6.2 Distribution of Computers

Table 5.10 presents the outcomes of a cross-tabulation between (Q.13) and (Q.6) with the purpose to gauge the provision of computers among respondents. There were 87.1% (N = 384) of respondents supplied with computers in carrying out their job duties.

Hierarchy of organisation		Do you have computer				
		Yes		No		Total
		N	%	N	%	
headquarters		97	97.0	3	3.0%	100
state health department		81	84.4	15	15.6	96
district health office		37	78.7	10	21.3	47
health institution		35	97.2	1	2.8	36
hospital		113	84.3	21	15.7	134
health clinic		21	75.0	7	25.0	28
Total	N	384		57		441
	%	87.1%		12.9%		100.0%

Table 5.10 Cross-tabulation between hierarchy of organisation (Q.6) and do you have computer (Q.13)

Referring to the proportion of scores within the hierarchy of organisation, the highest scores were from ‘headquarters’ and ‘health institution’ with the score of 97% and 97.2% respectively. Thus, almost all of respondents from those agencies were equipped with

computers at their offices. However, compare this statistic to the responses from ‘district health office’ and ‘health clinic’, where responses indicate computer access at those locations at 78.7% and 75.0% respectively. While at ‘hospital’ level, reflecting the frontline situation where the delivery of health care service takes place, the scores of respondents that are equipped with computer is 84.3%.

The outcome from the responses in Table 5.10 reveal the relative imbalance between ICT resource distribution in the ‘central’ Ministry functions and service delivery to patients and their carers. This may have an effect on the overall effectiveness and efficiency of the Malaysian Health Service (see Chapter Eight for more discussion).

5.6.3 Use of Computers

Table 5.11 summarises the results of responses of (Q.17(a)) to (Q.17(f)) to investigate what the respondents use computers for at their work place. Three questions were asked about the degree of commonly used of office automation packages; i.e. ‘word processing’, ‘spreadsheet’, and ‘presentation’ tools. The use for ‘word processing’ (N = 362; 82.1%) and ‘presentation’ (N = 340; 77.1%) received the highest score, while, only 161 (36.5%) of the respondents used ‘spreadsheets’.

Use of computers for	Yes		No	
	N	%	N	%
Electronic mail	239	62.2	145	37.8
internet	267	69.5	117	30.5
word processing	362	94.3	22	5.7
spreadsheet	161	41.9	223	58.1
presentation	340	88.5	44	11.5
specific application system	134	34.9	250	65.1

Table 5.11 Summary of computer usage



For the network-based applications, 69.5% (N = 267) used internet access and 62.2% (N = 239) used the internet access for electronic mail purposes. However, the result reveals that there is still a lack of specific application systems as only 30.4% (N = 134) of respondents have indicated their use of application systems in their office.

Whereas Table 5.10 showed the ICT resource distribution, the above Table (Table 5.11) indicates how MoHM employees use these ICT resources. Clearly, there may be a potential to encourage staff to communicate electronically, because at present these are under-utilised resources. Improved communication may have a longer term effect on the overall efficiency and effectiveness of health decision-making.

• Networked Computers

Table 5.12 shows the results of the cross-tabulation between (Q.4) and (Q.16). This is primarily to relate to the subsequent analysis on the network-based applications such as the internet access and the use of electronic mail. From the 384 of respondents who were equipped with computers, 270 (70.3%) of them used networked computers.

Grade of service		Is the computer networked				
		Yes		No		Total
		N	%	N	%	
JUSA		8	80.0	2	20.0	10
Grade 1		33	66.0	17	34.0	50
Grade 2		108	73.5	39	26.5	147
Grade 3		117	70.9	48	29.1	165
Grade 4		4	33.3	8	66.7	12
Total	N	270		114		384
	%	70.3		29.7		100.0

5.12 Cross-tabulation between grade of service (Q.4) and is the computer networked (Q.16)

In terms of percentage of score, the highest scores were answered by respondents from the ‘JUSA’ category (80%, N = 8 out of 10), ‘Grade 2’ (73.5%), ‘Grade 3’ (70.9%), ‘Grade 1’ (66%), and the lowest was ‘Grade 4’ (33.3%). The results suggest that priority was given to the officers’ seniority in the process of providing networked computers. The conclusion from these findings is that a planned roll out of networked computers is required to facilitate the electronic communication discussed as consequents of findings from tables 5.10 and 5.11.

• **Use of Computer Tools**

Meanwhile, the results from the cross-tabulations as in Tables 5.13 below also describe that the use of word processing and presentation tools received overwhelmingly responses, as scores from the most senior group of officer (JUSA) in particular, were 100% as all of them (N = 10) used those packages. Overall rate of response of the usage of each of those software packages were 94.3% and 88.5% respectively.

Grade of service		Is the computer used for word-processing?				Is the computer used for presentation?			
		Yes		No		Yes		No	
Grade	N	N	%	N	%	N	%	N	%
JUSA	10	10	100.0	-	-	10	100.0	-	-
Grade 1	50	47	94.0	3	6.0	47	94.0	3	6.0
Grade 2	147	138	93.9	9	6.1	134	91.2	13	8.8
Grade 3	165	156	94.5	9	5.5	142	86.1	23	13.9
Grade 4	12	11	91.7	1	8.3	7	58.3	5	41.7
Total	N	362		22		340		44	
	%	94.3		5.7		88.5		11.5	

Table 5.13 Cross-tabulation between grade of service (Q.4), and computer used for word-processing (Q.17(c)) and computer used for presentation tool (Q.17(e))



The high score in the usage of presentation tool, e.g. *Powerpoint* from the JUSA group is pertinent to the nature of their duty and the dissemination methods at the strategic level, where JUSA and other senior levels officers spend more time in meetings, seminars and other public speaking forums. Thus, presentation tool is widely used to present their ideas or work in such sessions.

5.6.4 Officials’ Interaction With External Agencies

In this sub-section, issues about the existing IMS practice in terms of information requirements from external agencies and level of satisfaction of the interaction are explored.

• Information Requirements From External Agencies

To investigate existing IMS practice among the respondents at the respective level of organisation, results of a cross-tabulation between (Q.9) and (Q.6) are shown in Table 5.14. Altogether, 292 (66.2%) respondents agreed that they required information from external agencies.

Hierarchy of organisation		Do you require external agencies' information				
		Yes		No		Total
		N	%	N	%	
headquarters		70	70.0	30	30.0	100
state health department		73	76.0	23	24.0	96
district health office		33	70.2	14	29.8	47
health institution		25	69.4	11	30.6	36
hospital		80	59.7	54	40.3	134
health clinic		11	39.3	17	60.7	28
Total	N	292		149		441
	%	66.2		33.8		100.0

Table 5.14 Cross-tabulation between hierarchy of organisation(Q.6) and require external agencies’ information (Q.9)

Taking into account of the response according to the various ‘hierarchy of organisation’, the results showed that certain agencies received greater than 70% response about the requirement for external agencies’ information; led by respondents from the ‘state health department’ (76%), ‘district health office’ (70.2%), and ‘headquarters’ (70%).

Meanwhile, agencies that act as the health care frontline organisations received relatively lower scores, such as ‘health institution’ (69.4%), ‘hospital’ (59.7%) and ‘health clinic’ (39.3%). The results suggest that respondents who work in health management deal with external agencies to a greater degree than those from health care frontline organisations.

• **Level of Satisfaction In The Interaction With External Agencies**

Results from a cross-tabulation between (Q.6) and (Q.12) as described in Table 5.15 can be used to evaluate the level of satisfaction among respondents about the outcome from their interaction with external agencies.

Hierarchy of organisation			Rate of satisfaction of responses from external agencies								
			not satisfied		quite satisfied		satisfied		very satisfied		Total
			N	%	N	%	N	%	N	%	
headquarters			3	4.3	20	28.6	44	62.9	3	4.3	70
state health department			4	5.5	26	35.6	40	54.8	3	4.1	73
district health office			8	24.2	10	30.3	15	45.5	-	-	33
health institution			4	16.0	6	24.0	14	56.0	1	4.0	25
hospital			7	8.8	31	38.8	39	48.8	3	3.8	80
health clinic			1	9.1	4	36.4	6	54.5	-	-	11
Total	N	27		97		158		10		292	
	%	9.3		33.2		54.1		3.4		100	

Table 5.15 Cross-tabulation between hierarchy of organisation (Q.6) and rate of satisfaction of responses from external agencies (Q.12)



The results can be generalised as follows; majority of the respondents (54.1% , N = 158) specified that they were 'satisfied' with the outcome, 33.2% (N = 97) mentioned that they were 'quite satisfied', and only a minimal number of them were 'not satisfied' (N = 27, 9.2%).

The results also revealed that there were only 45.5% (N = 33) of respondents from 'district health office' who mentioned that they were 'satisfied' with information from external agencies and there were none who were 'very satisfied'. Overall, the result for 'very satisfied' received a very low responses (N = 10, 3.4%) from all levels of organisation. It means that concrete actions have to be taken so that inter agencies co-operation will be of greater benefit to the overall machinery of the Ministry.

These findings indicate a requirement to improve communication between all levels in the public health sector and external organisations. Such improvement may lead to enhancement in strategic and operational management within the organisation. This point will be picked up in the Discussion Chapter (Chapter Eight) in terms of the complementary information needs.

## **5.7 Information Needs and Requirements**

The needs and expectations at various levels of management about the potential of ICT in fulfilling their needs as an effective problem solving mechanism will be explored in this section. Issues such as gap analysis and success rate in ICT projects will be taken into account.

### **5.7.1 Equipment Requirements versus Equipment Provision**

With respect to carrying out a gap analysis in the provision of ICT equipment fulfilling the needs of various purposes of management, an investigation about the manner in which ICT equipment is distributed at the MoHM is deemed pertinent. Tables 5.10 to

5.13 explored the relationship in ICT provision and tables 5.14 and 5.15 investigated the links to external agencies. In the following Table (Table 5.16) the requirement for ICT adoption is alluded to by linking the requirement for external information to the capability of access (via computer networks) to the outside world. More specifically, results of a cross-tabulation between (Q.9) and (Q.16) are as shown in Table 5.16. From 292 respondents whose duties required them to link with external agencies, even though the majority of them (68.9%; N = 199) were provided with networked computers, 73 (25%) have standalone computers, and 20 (6.8%) of them still have no computer to work on.

Require external information	Is the computer networked						Total
	Yes		No		No Computer		
	N	%	N	%	N	%	
Yes	199	68.2	73	25.0	20	6.8	292
No	71	47.7	41	27.5	37	24.8	149
Total	270	61.2	114	25.9	57	12.9	441

Table 5.16 Cross-tabulation between require external information (Q.9) and is the computer networked (Q.16)

In order to enable staff to communicate through the electronic media, such as via electronic mail and electronic file transfer protocol (FTP) mode, and the internet access, computers with networking facilities need to be equipped for the officers to carry out their tasks effectively. Clearly, there needs to be further capital investment in rolling out ICT to enhance communication capability throughout the public health care sector.

Results from the Chi-Square test as in Table 5.16(a) suggest that at confidence level = 0.95, the Pearson Chi-square statistic = 31.697, df = 2, the p-value < 0.05. Therefore, the test is significant. In this regard, the results of the test correlated to the existence of a gap between the provision of ICT and its requirement. In other word, the provision of computers with networking facilities is perceived insufficient.



Pearson	N	Chi-Square Statistic	df	Significance Level
Chi-Square	441	31.697	2	0.001

Table 5.16(a) Chi-Square test results between (Q.9) and (Q.16)

5.7.2 Success Rate

One way to evaluate the performance of implemented ICT projects in the MoHM is by examining the responses from those who have experience in using the systems. In this regard, in order to investigate the level of perception about the success rate in ICT projects in the Ministry, the variable in (Q.34) will be cross-tabulated with the variable in (Q.41) and the results are as displayed in Table 5.17 There were 211 (47.8%) from the total of respondents answered that their organisations were equipped with specific application systems, while 120 (27.2%) answered ‘no’ and the rest of 110 respondents (24.9%) were ‘not sure’.

Results within the ‘success rate’ show that the scale of ‘not sure’ received the highest scores (N = 216; 49%). Followed by ‘average’ (N = 128; 29%) and ‘low’ (N = 95 (21.5%) scales. While, only (N = 2; 0.5%) respondents ranked the success rate of the ICT projects with ‘high’ scale.

Success rate of ICT projects		Use of application systems						Total	
		Yes		No		Not Sure			
		N	%	N	%	N	%	N	%
low		51	24.2	28	23.3	16	14.5	95	21.5
average		73	34.6	39	32.5	16	14.5	128	29.0
high		-	-	-	-	2	1.8	2	0.5
not sure		87	41.2	53	44.2	76	69.1	216	49.0
Total	N	211		120		110		441	
	%	47.9		27.2		24.9		100	

Table 5.17 Cross-Tabulation between success rate (Q.34) and use of application systems (Q.41)

Among those who responded ‘yes’ to (Q.41) (which means that their organisations were equipped with specific application systems); none of the respondents chose ‘high’ for the success rate. Perception about ‘average’ (N = 73; 34.6%) and ‘low’ (N = 51; 24.2%) were the highest score if combined together, i.e. N = 124; 58.8%. While the single scale with the highest score was ‘not sure’ (N = 87; 41.2%).

The results suggest that the success rate of ICT projects is perceived as not being that impressive. Therefore, we can conclude that the impact of ICT projects were not satisfactory and did not meet the level of expectation of respondents. In addition, the high score on the scale ‘not sure’ reflects the fact that a high proportion of respondents might be unaware about the availability of the existing ICT systems were in operation, or as an indication of a result from the ineffectively implemented of the ICT at the various agencies of the MoHM.

**5.8 Information Content**

The issue of information content will be investigated within the context that the system must identify and serve various groups of users, either within the Ministry or external to it. Moreover, the ability to provide input into decision-making processes for various levels of management is also important. The outcome of a cross-tabulation in measuring feedback from the (Q.8(g)), ‘Nature of work - providing input for top management’ and (Q.18(c)), ‘Information content needs to generate input for top management’ can be seen in Table 5.18 below.

Altogether, there were 415 (94.1%) respondents who agreed or strongly agreed with the statement that in order to ensure that the proposed Health Care Information Systems is more effective, it needs to include elements for the generation of input in the decision-making process. This figure comprises 281 of 296 (94.9%) of respondents who mentioned that their job relates to ‘providing information for top management’ and the



others, 134 of 145 (92.4%), whose duties do not involve the generation of input for top management.

Nature of work  - providing  input for top  management		Information content - to generate input for top management										
		strongly disagree		disagree		neutral		agree		strongly agree		Total
		N	%	N	%	N	%	N	%	N	%	
Yes		4	1.4	5	1.7	6	2.0	115	38.9	166	56.1	296
No		2	1.4	-	-	9	6.2	69	47.2	65	44.8	145
Total	N	6		5		15		184		231		441
	%	1.4		1.1		3.4		41.7		52.4		100.0

Table 5.18 Cross-tabulation between nature of work - providing input for top management (Q.8(g)) and information content needs to generate input for top management (Q.18(c))

This shows that most respondents realise the importance of quality input to support the needs of the top management for the purpose of an effective decision-making.

5.9 Information Culture

5.9.1. Training Needs

This sub-section will investigate issues related to the level of ICT knowledge, provision of training opportunities, constraint in attending ICT training, and formulation of ICT training programmes.

• Level of ICT Knowledge

In assessing the level of ICT knowledge among various age groups of respondents, the characteristics and skills of all respondents will be evaluated. In this respect, results of a cross-tabulation between (Q.21) and (Q.1), as in Table 5.19 can be used as a yardstick for

the relevant analysis. In this survey, 100 (22.7%) respondents admitted that their level of knowledge was ‘good’ or ‘very good’, compared to 70 (15.9%) of those who answered ‘poor’. Overall, the majority (N = 271; 61.5%) had assessed themselves with a ‘moderate’ level of ICT knowledge.

The outcome suggests that the overall level of ICT knowledge among respondents is satisfactory, as altogether responses of ‘very good’, ‘good’, and ‘moderate’ received 84.2% of the total.

The outcome as reflected in the table is a useful input for formulating and designing staff training programmes. This includes the process of identifying target groups and scope of the training programmes to be emphasised. For example, those respondents with the age groups of ‘above 55 years’ (N = 3 of 6; 50%) was the highest proportion who responded ‘poor’ in the ‘level of ICT knowledge’. So, more training programmes should be considered for this age group. While other age groups received 20% and less of such scores.

Age		Level of ICT knowledge								
		poor		moderate		good		very good		Total
		N	%	N	%	N	%	N	%	
21-25		2	2.9	6	2.2	1	1.2	1	7.1	10
26-30		10	14.3	41	15.1	12	14.0	2	14.3	65
31-35		10	14.3	41	15.1	16	18.6	2	14.3	69
36-40		10	14.3	49	18.1	14	16.3	2	14.3	75
41-45		17	24.3	59	21.8	20	23.3	3	21.4	99
46-50		13	18.6	49	18.1	12	14.0	3	21.4	77
51-55		5	7.1	24	8.9	10	11.6	1	7.1	40
Above 55		3	4.3	2	0.7	1	1.2	-	-	6
Total	N	70		271		86		14		441
	%	15.8		61.5		19.5		3.2		100.0

Table 5.19 Cross-tabulation between age (Q.1) and level of ICT knowledge (Q.21)



• **Provision of Training Opportunities**

In this survey, provision of training opportunities among respondents at the respective level of organisation are as reflected in Table 5.20, i.e. the outcome of a cross-tabulation between (Q.6) and (Q.22).

The results reveal there were only 43.8% (N = 193) of respondents who have had the opportunity for ICT training. It is noticeable that responses from respondents that represent ‘headquarters’ (62%), ‘health institution’ (58.3%), and ‘state health department’ (50%) had more opportunities for training than other levels in the management hierarchy.

Hierarchy of organisation		Have you ever attended to any ICT training?				
		Yes		No		Total
		N	%	N	%	
headquarters		62	62.0	38	38.0	100
state health department		48	50.0	48	50.0	96
district health office		16	34.0	31	66.0	47
health institution		21	58.3	15	41.7	36
hospital		40	29.9	94	70.1	134
health clinic		6	21.4	22	78.6	28
Total	N	193		248		441
	%	43.8		56.2		100.0

Table 5.20 Cross-tabulation between hierarchy of organisation (Q.6) and ever attended to any ICT training (Q.22)

To investigate statistically the perception about the differences in the training opportunities among respondents who worked at the frontline service and non-frontline service based organisation, a Pearson Chi-square test was conducted and the result as in Table 5.20(a), the test suggests that at confidence level = 0.95, the Pearson Chi-square statistic = 36.154, df = 5, the p-value < 0.05. Hence, the test is significant and we can conclude that there is a difference in the provision of ICT training opportunities between

the frontline service and non-frontline service based organisations of the MoHM. This result concurs with the descriptive statistics above.

Pearson	N	Chi-Square Statistic	df	Significance Level
Chi-Square	441	36.154	5	0.001

Table 5.20(a) Chi-Square test results between (Q.6) and (Q.22)

• **Constraint to Attend to ICT Training**

In examining results of a cross-tabulation between (Q.25) and (Q.6) as in Table 5.21, factors such as ‘lack of information’ (N = 167; 37.9%) and ‘heavy workload’ (N = 156; 35.4%) were perceived as two major constraints for officers to attend ICT training. However, the two least influential constraints perceived were ‘lack of opportunity’ (N= 6; 1.4%) and ‘office politics’ (N= 9; 2.0%).

Inspecting the results further, with respect to level of organisation, respondents from ‘headquarters’ identified three main factors as ‘heavy workload’ (N= 35; 35%), ‘lack of information’ (N = 33; 33%) , and ‘financial allocation’ (N = 21, 21%).

This can be contrasted with responses from respondents in the ‘state health departments’, whose three main constraints were ‘lack of information’ (N = 42; 43.8%), ‘heavy workload’ (N = 34; 35.4%), and ‘financial allocation’ (N = 10; 10.4%).

Feedback from respondents at the ‘district health offices’ cited four main constraints, as follows, ‘heavy workload’ (N = 19; 40.4%), ‘lack of information’ (N = 14; 29.8%), ‘financial allocation’ (N = 6; 12.8%) , and ‘do not know how to apply’ (N = 5; 10.6%).

Meanwhile, respondents from ‘health institutions’ agreed with their colleagues from the ‘state health departments’ that ‘heavy workload’ (N = 14; 38.9%), ‘lack of information’ (N = 12; 33.3%), and ‘financial allocation’ (N = 6; 16.7%) were the top three factors. Similarly, responses from ‘hospitals’ were ‘lack of information’ (N = 54; 40.3%), ‘heavy



workload' (N = 43; 32.1%), and 'financial allocation' (N = 19. 14.2%). Finally, respondents from 'health clinics' also concurred that 'lack of information' (N = 54; 40.3%), 'heavy workload' (N = 43; 32.1%), and 'financial allocation' (N = 2; 7.1%) were the prominent constraints.

11 respondents did not give any answer to this question.

Hierarchy of organisation		Constraint to attend to ICT training													
heavy workload		financial allocation		lack of information		do not know how to apply		office politics		lack of opportunity		no answer		Total	
		N	%	N	%	N	%	N	%	N	%	N	%		
headquarters		35	35.0	21	21.0	33	33.0	5	5.0	2	2.0	2	2.0	100	
state health department		34	35.4	10	10.4	42	43.8	6	6.3	2	2.1	1	1.0	96	
district health office		19	40.4	6	16.7	14	29.8	5	10.6	-	-	1	2.1	47	
health institution		14	38.9	6	16.7	12	33.3	2	5.6	-	-	-	-	36	
hospital		43	32.1	19	14.2	54	40.3	9	6.7	5	3.7	2	1.5	134	
health clinic		11	39.3	2	7.1	12	42.9	1	3.6	-	-	-	-	28	
Total	N	156		64		167		28		9		6		11	441
	%	35.4		14.5		37.9		6.3		2.0		1.4		2.5	100

Table 5.21 Cross-tabulation between hierarchy of organisation (Q.6) and constraint to attend to ICT training (Q.25)



• **ICT Training Programmes**

In seeking respondents’ feedback about the existence of any ICT training master plan according to various levels of organisation, a cross-tabulation between (Q.6) and (Q.26(a)) was carried out for further analysis. Results from Table 5.22 reveal that almost half of the respondents (N = 218; 49.4%) stated that there was no ICT training master plan implemented in their organisations, compared to 6.6% (N = 29) who indicated the existence of a training plan; 5% (N = 22) of total respondents answered ‘planned to have’, and 39% ( N = 172) of respondents were ‘not sure’ if their organisation had ICT training plan.

Hierarchy of organisation		Does your organisation have - ICT training master plan?								
		Yes		Planned to Have		Not Sure		No		Total (N)
		N	%	N	%	N	%	N	%	
headquarters		11	11.0	7	7.0	40	40.0	42	42.0	100
state health department		3	3.1	5	5.2	29	30.2	59	61.5	96
district health office		2	4.3	2	4.3	16	34.0	27	57.4	47
health institution		8	22.2	1	2.8	11	30.6	16	44.4	36
hospital		3	2.2	7	5.2	57	42.5	67	50.0	134
health clinic		2	7.1	-		19	67.9	7	25.0	28
Total	N	29		22		172		218		441
	%	6.6		5.0		39.0		49.4		100.0

Table 5.22 Cross-tabulation between hierarchy of organisation (Q.6) and does your organisation have - ICT training master plan (Q.26(a))

The results reveal that, generally, respondents from all levels of organisation agreed that ICT training master plan was not in place as the responses clearly show that the overall scores are not impressive; ‘health institution’ with 22.2% (N = 8 out of 36), ‘headquarters’ (N = 11 from 100, 11%), and from ‘health clinics’ = 2 from 28 respondents (7.1%). While other organisations scored less than 5%. Therefore, we can

conclude that the absence of an ICT training master plan was perceived at all levels of organisation of the MoHM.

Besides implementation of an ICT training master plan, its relationships with relevant variables such as 'budget for ICT training programmes', 'a specific officer/Unit to coordinate ICT training', 'capacity to provide in-house training', and 'collaboration with specific training institutions' have also been studied.

Table 5.23 summarises results for some component questions in (Q.26); (Q26(b)), (Q26(c)), (Q26(d)), and (Q26(e)). The outcome from the scores can be generalised as follows:

- In all aspects of ICT training programmes, responses to 'yes' answers were very low, which means that the perception about the existence of such matters at the respondents' organisation were not encouraging. The range for the responses were from 16.6% (have formed the collaboration with other training institutions) to 22.4% (have specified ICT training officers or units). This means that respondents were not very convinced about the existence of infrastructure for ICT training programmes;
- Most given responses were 'not sure and 'no' scales, which all received responses above 88%. This reflects the lack of ICT training mechanisms at agencies of the MoHM. Hence, the effectiveness of the information dissemination machinery at those agencies is questionable; and,
- There was also a number of 'not sure' responses. This reflects uncertainty in understanding about training issues, even though as senior officers they should be aware of them.



Does your organisation have the following?	Yes		Planned to Have		Not Sure		No	
	N	%	N	%	N	%	N	%
26(b) Budget for ICT training programmes	74	16.8	24	5.4	194	44.0	149	33.8
26(c) A specific officer/Unit to coordinate ICT training	99	22.4	18	4.1	119	27.0	205	46.5
26(d) Capacity to provide in-house training	78	17.7	23	5.2	143	32.4	197	44.7
26(e) Collaboration with specific training institutions	73	17	22	5	179	40	167	38

Table 5.23 Summary of responses on training programmes questions

5.9.2. Library Information Service Provision

The scope of discussion for inspecting survey outcomes on library services will be focused on the areas of sufficiency of resources and ease of access.

• Information Access And Information Coverage

Table 5.24 presents cross-tabulation results between ‘Frequency of library visit’ (Q.27) and ‘List of the collection of references are sufficient’ (Q.29(a)). The majority of the respondents (N = 186, 42.1%) ‘disagree’ or ‘strongly disagree’ with the sufficiency of the level of collection of references at their respective work place libraries. Others gave a response of ‘agree’ or ‘strongly agree’ (N = 122; 27.7%) and ‘neutral’ (N= 115, 26.1%). However, 18 (4.1%) of respondents did not specify any response which could be as a result of unavailability of library services provided at their place of work.

The results of this table also reveal that frequency of visits to the library among respondents was not encouraging. Only 19.7% (N = 87) of the total respondents visited the library ‘daily’ or ‘weekly’. While 11.6% (N = 51) of them made a ‘monthly’ visit to the library. The highest however, were among those visited ‘less than monthly’, (N = 170; 38.5%), and 133 (30.2%) respondents answered that they had ‘never’ visited the library at their work place.

Frequency of the library visit		library services-list of the collection of references are sufficient								Total	
		strongly disagree/ disagree		neutral		strongly agree/ agree		No answer			
		N	%	N	%	N	%	N	%	N	%
daily		6	1.3	3	0.7	5	1.1	1	0.2	15	3.4
weekly		33	7.5	17	3.9	21	4.7	1	0.2	72	16.3
monthly		23	5.2	11	2.5	16	3.6	1	0.2	51	11.6
less than monthly		77	17.5	47	10.7	43	9.7	3	0.7	170	38.5
never		47	10.6	37	8.4	37	8.4	12	2.7	133	30.2
total	N	186		115		122		18		441	
	%	42.1		26.1		27.7		4.1		100	

Table 5.24 Cross-Tabulation between how often visit library (Q.27) and list of the collection of references are sufficient (Q.29(a))

• Ease of Access to Library Facility

In order to explore how significant the relationship is between location of libraries and frequency of access, results of a cross-tabulation between (Q.27), ‘How often do you visit library?’ and (Q.29(b)), ‘How do you relate the following factors with library services in your organisation - the location is easy to access’ can be used to investigate the relevance between the two variables as presented in Table 5.25.



The outcome of the cross-tabulation reveals that the majority of respondents ‘agree’ or ‘strongly agree’ to the statement that location of libraries in their offices are easy to access (52.4%; N = 232), compared to responses of ‘disagree’ or ‘strongly disagree’ (18.3%; N = 82) and ‘neutral’ (24.7%; N = 109). While ‘no answer’ (N = 18, 4.1%), could be due to that their work places are not provided with library facilities.

how often you visit the library		location of the library is easy to access									
		strongly disagree/ disagree		neutral		strongly agree/ agree		No answer		Total	
		N	%	N	%	N	%	N	%	N	%
daily		0	0	5	1.1	9	2.1	1	0.2	15	3.4
weekly		13	3	11	2.5	47	10.7	1	0.2	72	16.3
monthly		6	1.4	11	2.5	33	7.4	1	0.2	51	11.6
Less than monthly		34	7.7	47	10.7	86	19.5	3	0.7	170	38.5
never		28	6.3	35	7.9	58	13.1	12	2.7	133	30.2
total	N	81		109		233		18		441	
	%	18.3		24.7		52.9		4.1		100	

Table 5.25 Cross-tabulation between frequency of library visit (Q.27) and library services - the location is easy to access (Q.29(b))

Even results generated by those who frequently visited the libraries, i.e. daily (9 of 15; 60%) and weekly (33 of 51; 64.7%), agreed that location of libraries at their offices were easy to access. With that, we can conclude that, the suitable location, i.e. easy accessible location is an influential factor on frequency of library visit. Furthermore, most visits were made during staff working hours.

5.10 Organisational Aspects

In this section, roles of ISO and status of the ICT Division will be analysed.

5.10.1 Roles of Information Systems Officer (ISO)

In harnessing the ICT and MIS projects at the MoHM, roles of ISOs and the CIO are two key components to judge the reputation of information professionals at the MoHM; ISO is derived from the perception of respondents as shown by the outcome from a cross-tabulation between (Q.6) and (Q.30) as displayed in Table 5.26 below.

Hierarchy of organisation		Know the role of ISO								
		yes		not sure		no		never heard of ISO		Total
		N	%	N	%	N	%	N	%	
headquarters		31	31.0	42	42.0	23	23.0	4	4.0	100
state health department		23	24.0	44	45.8	21	21.9	8	8.3	96
district health office		6	12.8	17	36.2	15	31.9	9	19.1	47
health institution		5	13.9	13	36.1	9	25.0	9	25.0	36
hospital		11	8.2	51	38.1	45	33.6	27	20.1	134
health clinic		0	0	14	50.0	9	32.1	5	17.9	28
Total	N	76		181		122		62		441
	%	17.2%		41.0%		27.7%		14.1%		100%

Table 5.26 Cross-tabulation between hierarchy of organisation (Q.6) and know the role of ISO (Q.30)

Few respondents (N = 76, 17.2%) stated that they were knowledgeable about the role of the ISO in the Ministry. The highest response rate for that scale was answered by respondents from ‘headquarters’ (31%), ‘state health department’ (24%), ‘district health offices’ (12.8%), ‘health institution’ (13.9%), ‘hospitals’ (8.2% ), and at ‘health clinics’ no one knew the role of ISOs.

However, the biggest proportion of responses came from ‘do not know’ (122; 27.7%), ‘never heard’ (62; 14.1%), and ‘not sure’ (N = 181; 41%), which is perhaps the best



incitement of the ISO's role. The assumption is that the existing establishment within the ICT organisations in the MoHM seemed mostly to cater for the needs of agencies at 'headquarters' only.

The outcomes clearly reveal that the reputation of ICT personnel in the MoHM was not up to the mark and there is room for further improvement as far as meeting the expected quality level of ICT deliverables. The results also suggest that intensive efforts are required to promote the image and reputation of the ISO in the MoHM. Enhancing the number of ISO posts and also enabling them to actively participate in providing effective information management services to satisfy the business processes of agencies throughout the MoHM are some probable solutions.

5.10.2 Status of the ICT Division

Table 5.27 displays the results of a cross-tabulation between (Q.4) and (Q.32(c)). Overall, only a small number of respondents perceived the capability of the existing set up of the ICT Division of the MoHM positively to perform the functions effectively. An indication of their pessimism is reflected by their rating from the establishment when only 73 (16.6%) of respondents specified 'good' or 'very good' scores and 'moderate' (N = 90; 20.4%). On the other hand, responses to 'poor' and 'not sure' scales were (N = 70; 15.9%) and (208; 47.2%) respectively.

The results also reveal that even responses from the highest rank of respondents, i.e. the 'JUSA' group, none of them chose 'good' or 'very good' in their justification about the status of the ICT Division. This view is furthermore emphasised as all of them answered 'poor', 'moderate', or 'not sure' in (Q.32(c)). Hence, this gave a strong impression that without drastic action for improvement, the existing establishment of the ICT Division was not fully fit to complement the overall ICT programmes of the Ministry. With such perceptions, a purposeful action must take place to strengthen the machinery of the ICT Division for the purpose of enabling effective ICT support.

Grade of service		Your rate to the strong ICT Division at headquarters								
		poor		moderate		good/ very good		not sure		Total
		N	%	N	%	N	%	N	%	N
JUSA		1	0.2	5	1.1	-	-	4	0.9	10
Grade 1		7	1.6	10	2.3	7	1.6	34	7.7	58
Grade 2		29	6.6	38	8.6	33	7.5	63	14.3	163
Grade 3		30	6.8	37	8.4	30	6.8	101	22.9	198
Grade 4		3	0.7	-	-	3	0.7	6	1.4	12
Total	N	70		90		73		208		441
	%	15.9		20.4		16.6		47.1		100.0

Table 5.27 Cross-tabulation between grade of service (Q.4) and service level of ICT Division (Q.32(c))

5.11 Policy Perspectives

The discussion will be divided into sub-sections; 5.11.1 Policy Dissemination and 5.11.2 Standards.

5.11.1 Policy Dissemination

This sub-section will investigate results of responses about the effectiveness in the current practice of the dissemination of policies in the ICT programmes.

The result of a cross-tabulation as displayed in Table 5.28 between (Q.6) and (Q.37) can justify the degree of effectiveness that relate to ICT policy dissemination at the MoHM. The result indicates that only 19.3% (N = 85) of respondents were aware about the official circulars regarding ICT security and 42.2% (N = 186) specified that they did not know.

Only 25% (N = 25) respondents from ‘headquarters’, from which the formulation and development of the MoHM policy is initiated, mentioned their awareness about such



circulation letters. However, the lowest levels of response was received from ‘health clinic’ (N = 4; 14.3%) and ‘hospital’ (N = 21; 15.7%) .

Overall, the results reveal that further action must be taken to tackle the alarming situation of policy dissemination flow in the MoHM. Otherwise, messages from senior management may not reach the target staff.

Hierarchy of organisation		Awareness of the official circulation letter on ICT security						
		No		Not Sure		Yes		Total
		N	%	N	%	N	%	
headquarters		34	34.0	41	41.0	25	25.0	100
state health department		46	47.9	33	34.4	17	17.7	96
district health office		15	31.9	23	48.9	9	19.1	47
health institution		19	52.8	8	22.2	9	25.0	36
hospital		59	44.0	54	40.3	21	15.7	134
health clinic		13	46.4	11	39.3	4	14.3	28
Total	N	186		170		85		441
	%	42.2		38.5		19.3		100.0

Table 5.28 Cross-tabulation between hierarchy of organisation (Q.6) and awareness about the official circulation letter on ICT security (Q.37)

5.11.2. Standards

The scope of ICT standards in this sub-section will be discussed within the context of the ICT master plan and transfer of technology.

• **ICT Master Plan**

Perception about the performance of the ICT master plan will be evaluated in accordance to the perspective of respondents from various levels of organisation. In this regard, Table 5.29 below reflects the results of a cross-tabulation between (Q.43(a)) and (Q.6).

There were 180 (40.8%) of respondents ‘agree/strongly agree’ that ICT programmes of the MoHM were planned according to the ICT master plan, 86 (19.5%) were ‘disagree’ or ‘strongly disagree’, and the rest of 175 (39.7%) were ‘neutral’.

Hierarchy of organisation		Level of agreement that ICT programmes are planned in the IMS master plan						
		Disagree/ strongly disagree		Neutral		Agree/ strongly agree		Total
		N	%	N	%	N	%	N
headquarters		25	25.0	37	37.0	38	38.0	100
state health department		15	15.6	36	37.5	45	46.9	96
district health office		10	21.2	17	36.2	20	43.4	47
health institution		8	22.2	19	52.8	9	25.0	36
hospital		23	17.2	53	39.6	58	43.3	134
health clinic		5	17.9	13	46.4	10	35.7	28
Total	N	86		175		180		441
	%	19.5		39.7		40.8		100.0

Table 5.29 Cross-tabulation between hierarchy of organisation (Q.6) and ICT programmes are planned in the IMS master plan (Q.43(a))

In inspecting the responses from the various levels of organisation within the scales of ‘agree’ or ‘strongly agree’, the highest responses were received from ‘state health department’ (N = 44; 46.9%), followed by ‘hospital’ (N = 58; 43.3%), and ‘district health office’ (N = 20; 42.5%). While, ‘headquarters’ contributed 38 (38%), ‘health clinic’ (N = 10; 35%), and the lowest was from ‘health institution’ (N = 9; 25%).



Overall, the results show that the level of agreement was not encouraging since none of the levels of organisation has scored a response greater than 50% to the statement of 'agree' or 'strongly agree' that ICT programmes of the MoHM were planned according to the ICT master plan. This shows that the ICT master plan is an important area to be strengthened by the policy-makers of the MoHM if the objectives of the investment in the ICT programmes are to be fulfilled.

- **Transfer of Technology (ToT)**

Perception from respondents who have ever been involved in the MoHM's ICT projects can be used to check the performance of the ToT programmes in the ICT activities of the Ministry. A cross-tabulation between (Q.40(b)) and (Q.33) has been conducted and the results are as shown in Table 5.30.

The results show that only 49% (N = 216) of respondents 'agree/strongly agree' to the statement that 'ToT issues have been emphasised in all of the ICT procurements'. This is against N = 40 (9.1%) 'disagree' or 'strongly disagree' and 42% (N = 185) of them were 'neutral' in their answer.

Among the overall respondents, only 17.2% (N = 76) of them had ever been involved in the ICT projects of the MoHM. Whereby, within this group of respondents, 37 (48.6%) were 'agree' or 'strongly agree' to 'ToT issues have been emphasised in all of the ICT procurements' while (N = 11, 14.4%) were 'disagree' or 'strongly disagree', and (N = 28, 36.8%) opted for 'neutral'.

Overall, it seems that respondents who were previous system users of any technology procurements made in the Ministry, gave strong impression from their responses that issues of ToT must be emphasised in the ICT procurement activities. Furthermore, in the procurement process, other than striving for value for money, enhancing the level of knowledge of staff members is a factor to be considered.

Involvement in any ICT projects	Transfer of technology (ToT) issues have been emphasised in the ICT procurement							
	disagree/strongly disagree		neutral		agree/strongly agree		Total	
	N	%	N	%	N	%	N	%
yes	11	2.5	28	6.3	37	8.3	76	17.2
no	29	6.6	157	35.6	179	40.6	365	82.8
Total	40	9	185	42	216	49	441	100

Table 5.30 Cross-tabulation between ToT issues have been emphasised in the ICT procurement (Q.40(b)) and involvement in any ICT projects (Q.33)

5.12 Major Constraints in ICT Implementation

Table 5.31 shows results of 5 cascaded variables under the (Q.45). The three main issues that received the highest scores and perceived as the major constraints in the implementation of the ICT programme at the MoHM were led by ‘lack of ICT skills among the staff members’ (76.6%; N = 338), followed by ‘lack of ISO’ (69.4%; N = 306), and ‘insufficiency of financial allocation’ (62.8%; N = 277).

Questions	Yes		No	
	N	%	N	%
45(a). Lack of ISO	306	69.4	135	30.6
45(b). Inappropriate methodology	161	36.5	280	63.5
45(c). Lack of skills of staff members	338	76.6	103	23.4
45(d). Insufficiency of financial allocation	277	62.8	164	37.2
45(e). Lack of management commitment	137	31.1	304	68.9

Table 5.31 Major constraints in the ICT programmes

Meanwhile, ‘inappropriate methodology’ in the IMS development and ‘lack of management commitment’ received 36.5% and 31.1% respectively. Those outcomes



reflect that factors related to staff skills and knowledge are regarded as key constraints to ‘the successful implementation of ICT projects in the MoHM.

5.12.1 Allocation of Financial Resources

To explore further the constraint factor related to the lack of financial allocation, a cross-tabulation between (Q.6) and (Q.45(d)) was carried out. The results as shown in Table 5.32 reveal that, for levels of organisation other than ‘headquarters’ (with the score 46% (N = 46)), more than 50% of respondents agreed that insufficient financial support was the main constraint for ICT implementation; with the highest response from ‘hospital’ (72.4%; 97 of 134), ‘district health office’ (72.3%; N = 34), ‘state health department’ (65.6%; N = 63), ‘health institution’ (61.1%; N = 22), and ‘health clinic’ (53.6%; N = 15).

Hierarchy of organisation		Constraint in ICT implementation - financial insufficiency				Total
		Yes		No		
		N	%	N	%	
headquarters		46	46.0%	54	54.0%	100
state health department		63	65.6%	33	34.4%	96
district health office		34	72.3%	13	27.7%	47
health institution		22	61.1%	14	38.9%	36
hospital		97	72.4%	37	27.6%	134
health clinic		15	53.6%	13	46.4%	28
Total	N	277		164		441
	%	62.8%		37.2%		100.0

Table 5.32 Cross-tabulation between hierarchy of organisation (Q.6) and constraint in ICT implementation - financial insufficiency (Q.45(d))

From these results, we can conclude that respondents from 'headquarters' were the most satisfied group of respondents in terms of the financial allocation to implement the ICT programmes in their organisations. It is recognised that staff at 'headquarters' are not frontline staff, so may have disproportionate knowledge about the effect of ICT implementations while at the same time knowing the precise details of financial allocations.

### **5.13 Summary**

The outcomes of the survey are based on the perception by the respondents who directly deal with the situation investigated in this study. From the results and their interpretation, further insights into a key aspect of the IMS scenario of the MoHM have been gained. Furthermore, the responses were from the key personnel who hold senior rank and key positions at each level of organisation.

The analysis undertaken was performed from the perspective of the proposed IMS framework presented in the conceptual model (refer Figure 4.3, p.54). Thus, the analysis forms a bridge between the overall aims and objectives of the research study and the model-based methods used to investigate the viability of the MoHM (see next chapter). Results will be drawn together and discussed in conjunction with outcomes from the diagnostic use of Beer's Viable System Model.



## Chapter Six: System Methods, Model, and Tools

### 6.1 Overview

This chapter discusses the systems-based methodology adopted in the study and consists of five sections. Section 6.2 discusses the background of the system approach adopted in the study. The theoretical issues of management cybernetics are described in Section 6.3. Details explanation of the Viable System Model (VSM) is in Section 6.4, and Section 6.5 provides a summary of the chapter.

### 6.2 Systems-based Methodology

This chapter discusses the systems-based methodology for the proposed system development, investigating the theoretical issues of the Viable System Model (VSM), based on the outcome of Beer's exploration of cybernetics principles, applied to management (Beer 1965). In addition to conducting field surveys, this research will take the opportunity to use the system approach as a tool for the diagnosis of the present operational activities of the MoHM. Prior to the practical application of the VSM (see Chapter Seven), the theoretical understanding related to management cybernetics and the VSM needs to be addressed.

The usefulness of the VSM as a tool for anticipating, planning for, and designing a large scale organisational change has been revealed in many studies (Meyer 1995; Brocklesby & Cummings 1996; Espejo & Gill 1997; Jackson 2000; Rudall 2000; Gill 2002; Leonard; Snowden 2003). The VSM in this respect can be used to create a generic system framework that can be used to explain and analyse organisational viability. The emphasis of viability is as the major measurement of quality of service delivered, thus the public health care system must be able to continually preserve the viability elements/agents in order for the organisation to survive. Maintaining the viability for the *whole* of the public health care system is the crucial role of the primary activities at all recursive dimensions

of the selected entities in the MoHM, through which the significant and capability of the VSM approach will be adopted in the system diagnosis at the respective levels of recursion.

## **6.3 Management Cybernetics**

### **6.3.1 Background**

Cybernetics is based on the Greek word meaning 'steermanship' and was first introduced by Norbert Wiener in 1947, who defined it as

"the science of control and communication in the animal and machine"

(Wiener 1962, p.11)

with special reference to self-controlling or adaptive systems of different degrees of complexity (Ashby 1973; Beer 1966; Gill 2002). Cybernetics is a theory grounded in a dynamic systems-environment that essentially addresses the motivational and behavioural processes through which goal-oriented mechanisms attempt to control or adapt to their environments.

Cybernetics theory explicitly recognises that an organism's actions for change affect the environment with which it subsequently interacts. Therefore, it emphasises intervention efforts, about searching for new discoveries, or adding value to the original products, rather than about producing similar products. In short it is about 'doing the thing right' instead of 'doing the right thing' (Ashby 1973, p.17). This emphasis on innovation is the reason for adopting the VSM in this research study. Stafford Beer highlights that

"exceedingly complex, probabilistic, and self-regulatory"

(Beer 1965, p.27)



systems are ripe for cybernetic analysis, and relevant methods have been suggested to enable managers to deal with each of the specified characteristics. In this respect, Beer (1965) and Jackson (2000) specify that 'black box' techniques can be used for exceedingly complex situations; for self-regulatory systems they propose the use of the negative feedback control approach; and probabilistic models can be accommodated through requisite variety methods. All three components can be seen in a full implementation of the VSM.

### **6.3.2 Black Box Techniques**

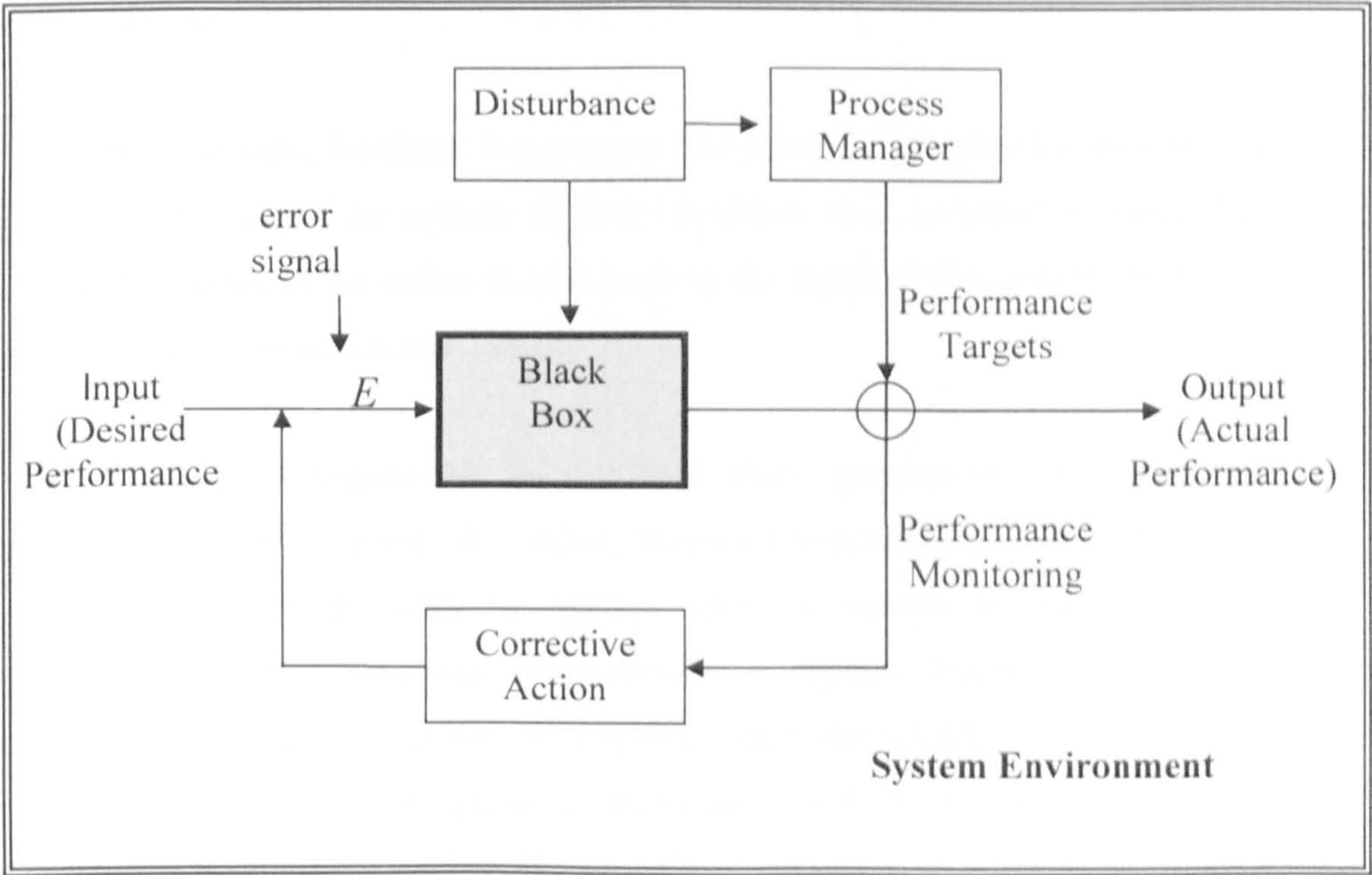
The black box concept is a useful principle in cybernetics, representing extremely complex situations too difficult to be easily understood. In these situations it is not worthwhile to probe into the structure or interrelation of component parts inside the black box to initiate feedback control. The cybernetic principle of the black box ignores the internal mechanics of the system, but instead concentrates on the study of the relationship between inputs and outputs of the system. Thus, the method of investigation is either through a formal description of the transformation rules, by linking inputs and outputs, or through the construction of a system that exhibits behaviour that approximates with that which is observable (Gill 2002). The relationship between input and output is used to learn about what kind of input changes are needed in order to achieve a given change in output, with the aim of finding a method to control the system.

As the black box concept relates to inaccessible situations, Beer (1965, pp.50-51) discusses the techniques in terms of 'variety' (see p.125 for a definition of this concept); the black box has to be controlled because it has high variety, and that variety cannot be ignored. As far as fulfilling the condition of 'requisite variety' (Ashby 1973), the control system must have sufficient variety to cope with the variety exhibited in the environment.

Since the variety that exists in the organisation is always greater than that of the management functions, managers find it difficult to 'know' everything inside the organisation. Hence, managers are analogous to the 'black box' in their own organisation.



The managers are advised not to adopt “reductionist analysis” (Jackson 2000, p.69) as it lacks the holistic understanding of the behaviour of the complex organisational system, and as such the behaviour of the system will never be understandable and achievable (Ashby 1960, p.56; Jackson 2000, pp.69-70). Figure 6.1 shows the feature of the black box technique through the adoption of input manipulation and output classification approach (Beer 1965, pp.49-68). According to Gill (2002), after setting the performance targets, the manager monitors the output against those targets. If required, the manager can manipulate the input to find regularities in the output.



Source: adapted from Gill (2002)

Figure 6.1 The Black Box Technique

However, there is always the possibility of disturbances in the system environment impacting upon the black box process to the extent that the system under investigation may not be able to return to its original state for further processing. That being said, the advantage of the black box to the manager is that by using the black box approach managers will be more informed and in a better position to understand the activities of the



organisation, because they themselves are involved directly with control functions (Jackson 2000, p.70).

### **6.3.3 Negative Feedback Control Approach**

The fundamental nature of cybernetic systems is that they are purposive and goal-oriented. In a system where a transformation occurs, there are inputs and outputs. The inputs are the result of the environment's influence on the system, and the outputs are the influence of the system on the environment. Hence, input and output are separated by a duration of time.

In cybernetic systems, feedback is a process that detects discrepancies between the goal and the current state of the system. In every feedback loop, information about the result of a transformation or an action is sent back to the input of the system, in the form of input data (Bozeman & Kacmar 1997).

Wiener (1962, p.96) argues that the feedback chain consists of the transmission and return of information. From this point Wiener formulates the concept of negative feedback control, which tends to oppose what the system is already doing, thus, stabilising the system behaviour. Furthermore, a negative feedback loop is a useful mechanism to correct any deviation in system behaviour (Ashby 1960, p.55). In VSM terms, the negative feedback system is synonymous with the concept of self-regulation. According to Beer (1965, pp.49-57) and Jackson (2000) it is essential for managers to understand the importance of self-regulation mechanism to control exceedingly complex probabilistic systems particularly with regard to:

- The existence of self-regulation mechanisms to generate the stability of the environment of organisation; and,

- To influence the self-regulation mechanism in the organisation they manage, in order to enable such an organisation pursuing the seeking goal that the managers designed under whatever prevailing environmental condition.

Homeostatis (Ashby 1973) is a property of highly complex systems that enable them to maintain stability and survive. This concept is accomplished through the process that involves continuous monitoring of the internal and external environments and directing the various components in the system to make appropriate changes, through the action of feedback loops. A homeostatic system is a system that maintains its structure and functions by means of a multiplicity of dynamic equilibria, rigorously controlled by interdependent regulation mechanisms. Such a system reacts to every change in the environment, or to every random disturbance, through a series of modifications of equal size and opposite direction to those that created the disturbance i.e. negative feedback control. The goal of these modifications is to maintain the internal balances. Ashby emphasises that

“The homeostat does nothing more than run to a state of equilibrium”

(Ashby 1973, p.84).

In relation to this, Beer gives two reasons why homeostatis is important in management cybernetics:

- Through the existence of a self-regulating system, the system implicitly arranges its own stability; and,
- The availability of ultrastability capacity which can be defined as,

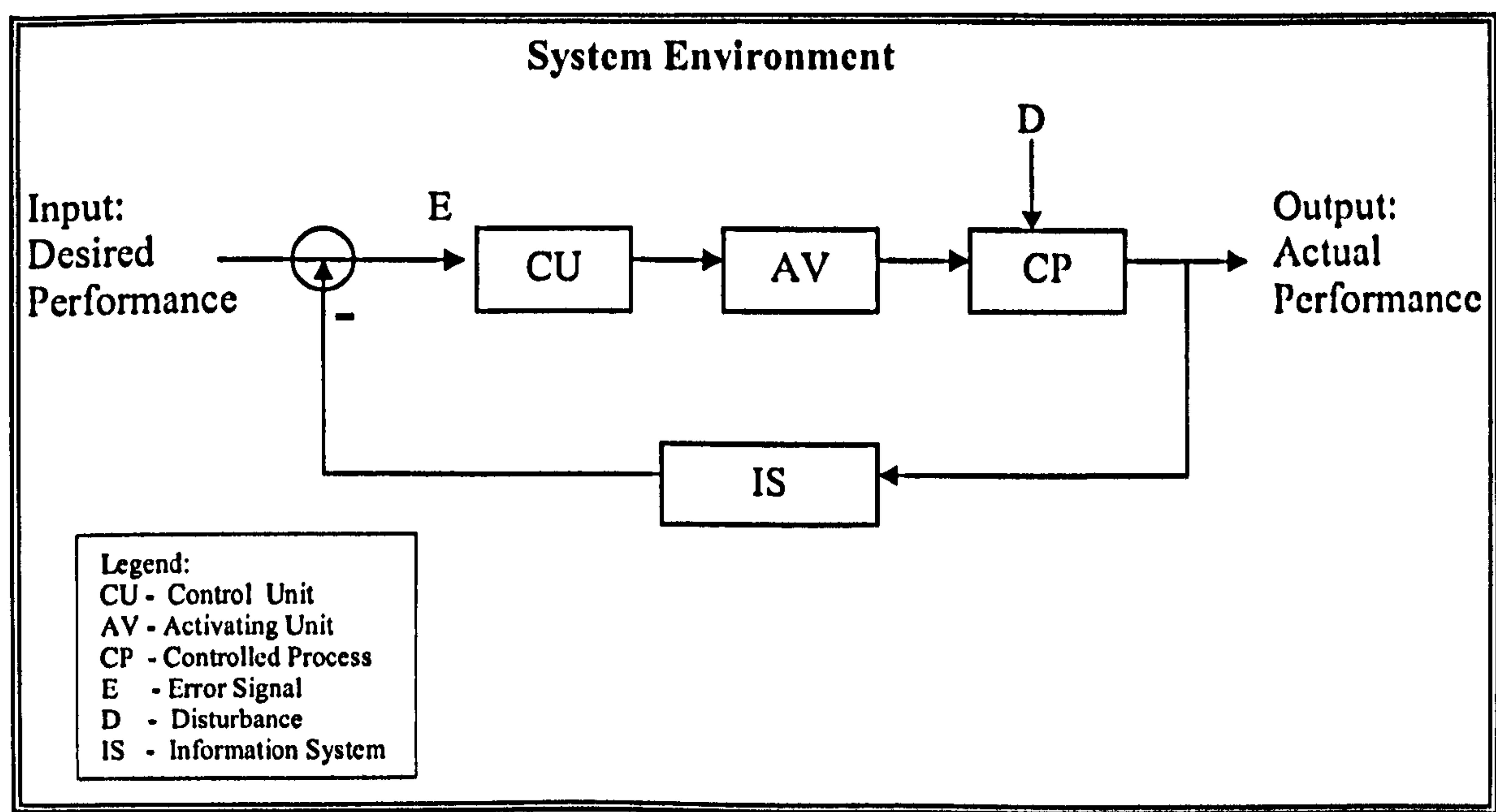
“a capacity in a system to regain equilibrium after any kind of perturbation, including kinds the system designers did not have in their mind”

(Beer 1967, p.155).



Jackson (2000) adds that a negative feedback control system is characterised by its closed-loop structure, that is as reflected in Figure 6.2, whereby the control system operates based on the continuous feedback of information about the output of the system. The output (actual performance) is then compared with the predetermined goal, and if the system is not achieving its goal, the negative feedback control system becomes the basis for adjustments to the system designed to bring it closer to realising the goal. Hence, the feedback controller not only is guaranteed to operate against a given kind of disturbance, but also against all kinds of disturbance (Beer 1965, p.30).

Figure 6.2 shows that negative feedback control systems require several essential elements to function properly: a desired performance; a sensor, i.e. IS; a control unit (CU); and, an activating unit (AV).



Source: Summers (personal communication)

Figure 6.2 A Negative Feedback System

### 6.3.4 Requisite Variety

Within a highly dynamic situation, whereby uncertainties are the price managers have to pay for lack of predictive capability in the organisations they manage or the environment within which those organisations are embedded. This is the behaviour of a so-called 'probabilistic system' and the managers therefore

"...are continually confronted by unexpected occurrences that they and their organisations must have the capacity to respond to if those organisations are going to be successful"

(Jackson 2000, p.72).

Managers have to deal with probabilistic situations in their organisations for which Beer states that

"no precisely detailed prediction can be given"

(Beer 1965, p.12).

The environment within which their organisations interact are also characterised as unpredictable. Managers are required to have the capability to respond to continually unexpected scenarios, and adapt to a changing system environment for the survival and success of their organisation.

In this respect, 'variety' has always been a fundamental idea in cybernetics, and is known as a measure of the range of possible states of the system at any point in time. While 'system complexity' is the result of the way that systems behave and interact with their environment. Above all, variety is defined as a measure of complexity of the system (Beer 1965; Beer 1966; Beer 1979; Beer 1991; Brocklesby & Cummings 1996). Thus, the existence of variety is necessary to deal with probabilistic situations, in order to enhance the ability of the organisation to adapt to all changes and choices to process information and perform activities in a given period of time (Meyer 1995).

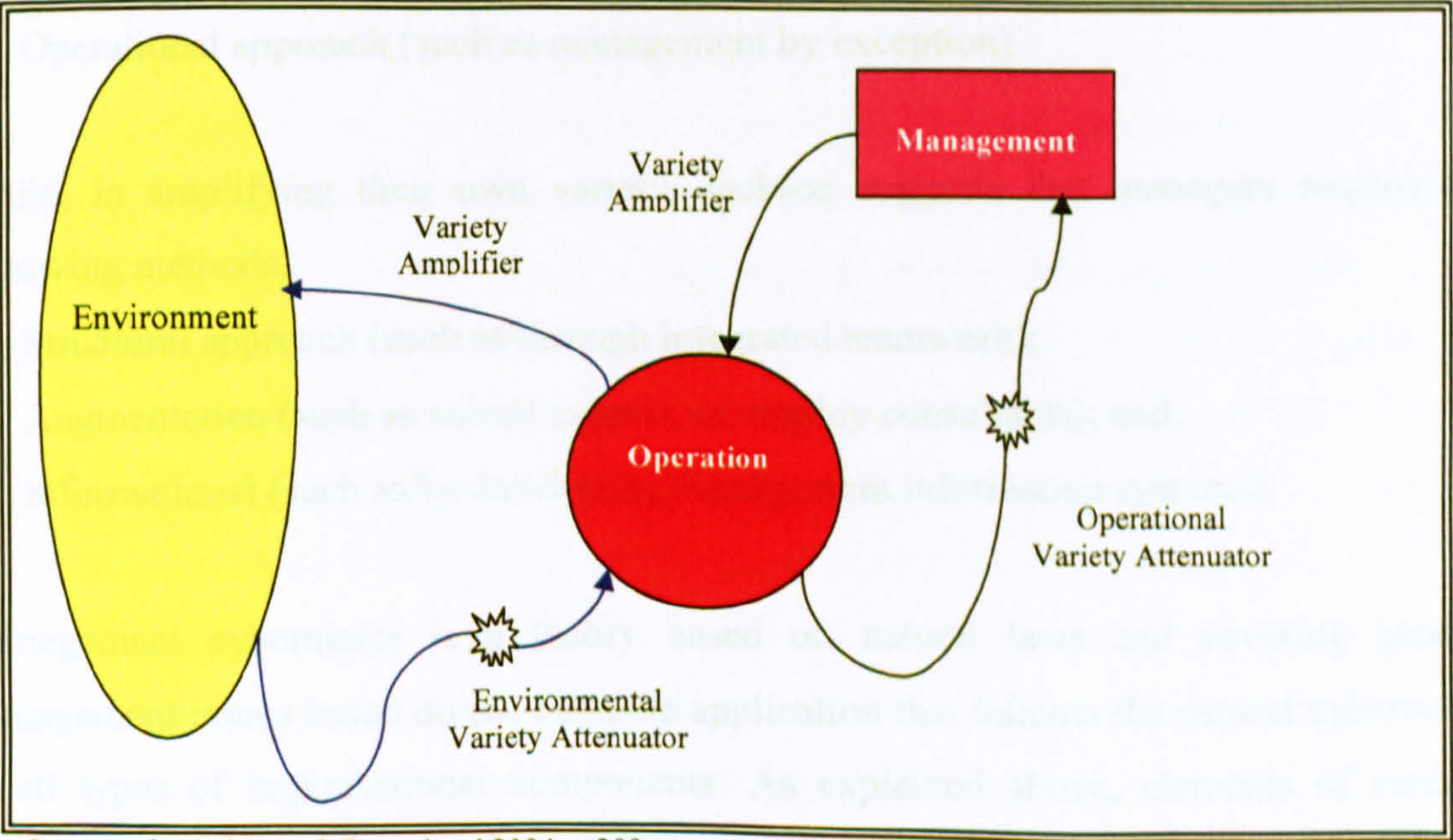


The attribute of any organisation consists of the management teams that lead the organisation, the operations that are under the management units, and interactions with the relevant environment of the organisation concerned. These interactions are as shown in Figure 6.3. To ensure the performance of an organisation meeting the level of required performance, the variety of a system has to be controlled. The relative variety of the environment is significantly greater than the variety contained in the organisation. However, the management teams have a lower relative variety than the organisation. Such a scenario is the fundamental concept of management cybernetics that states

“an organisation is like a human being, it needs a brain to control it”  
(Beer 1967, p.149).

While the significant linkage between cybernetics and management has been highlighted by many system thinkers, Stafford Beer relates it to the fact that;

“Cybernetics is the science of control, and management is the profession of control”  
(Beer 1966, p.239).



Source: after Mingers & Rosenhead 2004, p.289.

Figure 6.3 Variety of Amplification and Attenuation



According to the Ross Ashby's law of requisite variety, in active regulation

“only variety can destroy variety”

(Ashby 1973, p.207).

This law explains how organisations manage to survive in their system environments. The law of requisite variety specifies that in order to control a system, the regulator must have as much or more than the variety of the situation to be controlled, to enable the controller of the system to absorb the variety of the organisation (Ashby 1973; Beer 1967, p.148). This is achieved by the fundamental strategy adopted by the managers and the organisations in balancing variety by amplifying their own variety and attenuating incoming variety (Beer 1979, pp.93-96; Gill 2002), see Figure 6.3.

Among the suggested options to reduce the external variety, the managers can use the following methods (Jackson 2000, pp.157-158):

- Structural approaches (such as divisonalisation, functionalisation, and massive delegation);
- Planning approach (such as through setting priorities); and,
- Operational approach (such as management by exception).

While, in amplifying their own variety, Jackson suggests that managers employ the following methods:

- Structural approach (such as through integrated teamwork);
- Augmentation (such as recruit experts, or employ consultants); and,
- Informational (such as by developing management information systems).

Management cybernetics is a theory based on natural laws and covering general management issues based on the concrete application that inherits the natural cybernetics to all types of organisational components. As explained above, elements of control, decision-making, decision taking based on the accuracy information and effective communication flow of the act of the management of the organisation according to



internal and external environment. In relation to the advancing ICTs in MoHM, management cybernetics is also concerned with equipping the organisations' operations (i.e. MoHM) with IMSs facilitated by network-based infrastructure. Thus, management cybernetics can be used to recognise the impact of the ICT in MoHM. For example, the study by Rudall (2000) explains how communication and networks have become the nervous system of the organisation.

## **6.4 Viable System Model (VSM)**

### **6.4.1 Background**

The VSM was originally based on Beer's studies about the human biological form, deriving inspiration from the muscles, organs, and nervous system. Through the use of isomorphisms, Beer generalises that complex situations and activities of an organisation can be controlled through the interaction of the body (the organisation) and the brain (its controller), which is analogous to the way we manage our own body's response to a changing environment (Beer 1966; Flood & Carson 1990, p.88; Leonard 2000; Snowdon 2003).

The VSM regards that within the holistic perspective, an organisation consists of a number of operational units or subsystems, and the system needs to ensure that all of them integrate towards achieving a harmonious whole. The representation of the organisation as a holistic system allows a balance to be drawn between the organisation and its system environment. This balance represents the 'survivability' of the organisation and is the essence of the VSM diagnosis. When the environment changes, the organisation must be able to respond to those changes (Espejo 1989, pp.78-82).

Management cybernetics has proposed that for a system to be viable it has to have the following essential characteristics (Beer 1966, pp.256-257):

- ‘Innate complexity’ - the system must have to have high complexity to survive and a capability to continuously adapt to changing environments;
- ‘Complexity of interaction with the environment’ - in order to adapt to unexpected events, the viable system must not purely rely on the internal environment, and must always have multiple contacts with the external environment; and,
- ‘Complexity of internal connectivity’ - that all subsystems in the viable system must interact as a whole.

Beer’s VSM is a practical tool to diagnose organisational structure and communications by providing a way of exposing and understanding the impact of underlying structures and functions of such an organisation. The essence is to ensure that the necessary and sufficient conditions for viability can be detected.

#### 6.4.2 Recursivity

If an organisation is to remain viable it must have the capacity to adapt to new situations, i.e. has to maintain the capacity to match all life-threatening variety states regarding the potential and actual systemic states within its operating environment that may impact upon its identity (Beer 1966; Brocklesby & Cummings 1996). Therefore, an organisation needs not only a capacity to respond to familiar disturbances, but the potential to respond to unexpected change. In this respect, Espejo (1989, p.78) states that the system structure should be recursively embedded in larger systems, composed of network interactions among organisational divisions, units, and their operating agencies, that enable communication through which the necessary knowledge is obtained to take required action that counteracts any change in the system environment.

The principle of recursion (Espejo 1989, p.92) is one of the key concepts of VSM diagnosis. Recursion means that the implementation of an organisation’s mission will always need two or more primary operational activities, hence at all levels the organisation ‘recurs’. The operation of an organisation is composed of viable systems,



which are embedded in a viable system at a lower level of resolution. Whereby, operations in the lower level 'create and do' what agents at the higher level could not do themselves. Therefore, the recursion process also explains the idea of how an organisation's complexity is simultaneously generated and absorbed at each level of recursion (Espejo & Gill 1997). In actual fact, the VSM is familiarly identified as a recursive model, and the various levels of resolution are called 'levels of recursion'. They are all nested one within the other. This principle applies at all levels throughout all viable systems.

For the MoHM, Figure 6.4 reflects the relevant levels of recursion. The figure shows that the public hospital is embedded in the State Health Department, which is embedded in the category of the Health Service Management, and which finally is embedded in the highest management level – the MoHM. In turn, there are multiple subsystems composed in the hospital services, such as the Medical Directorate Service, Medical Department Services, and individual medical wards; this recursivity will be discussed in detail in Chapter Seven.



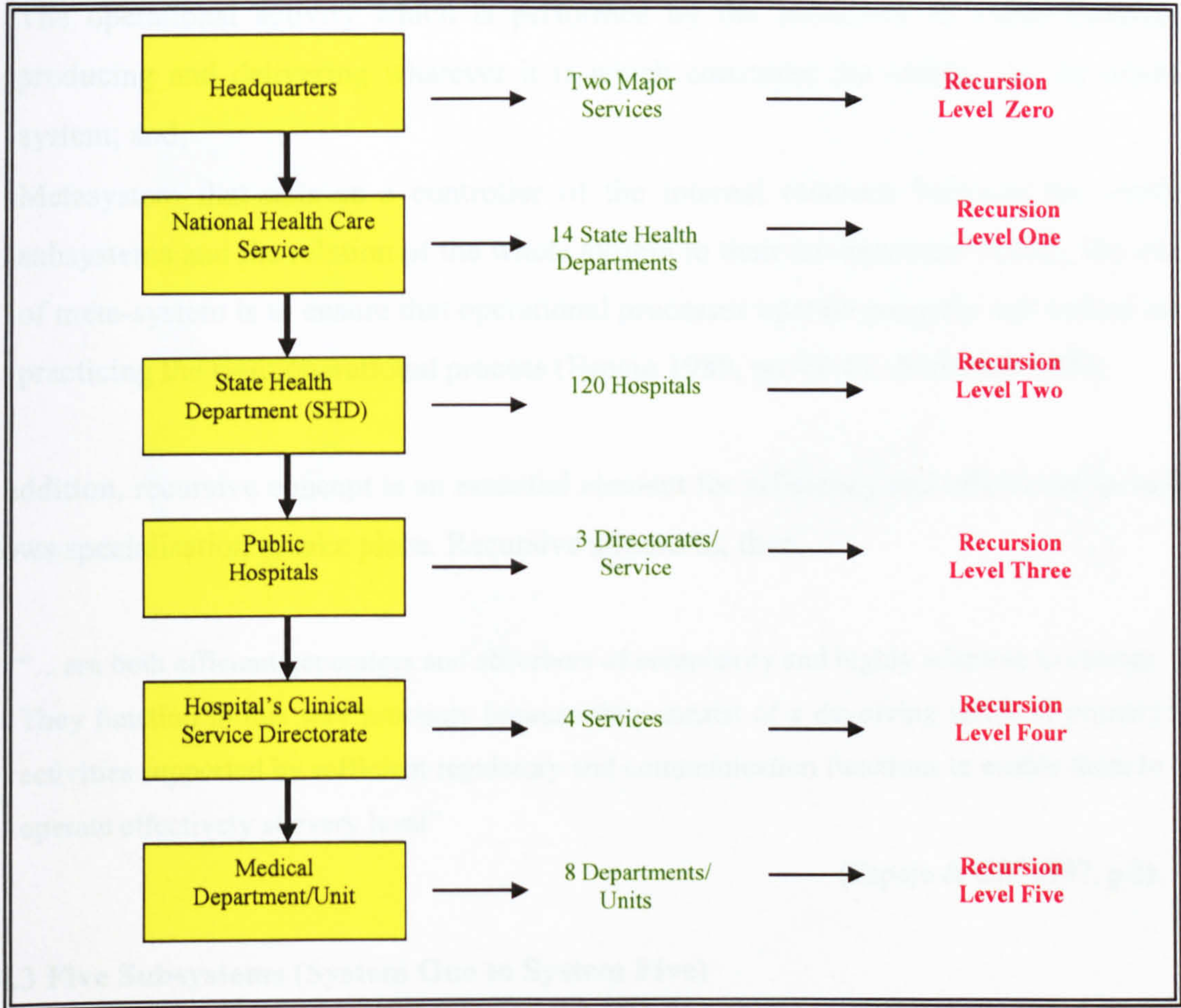


Figure 6.4 Example of structural recursion for the Ministry of Health Malaysia

As a matter of fact, we are surrounded by recursive objects, and within the context of system thinkers and management cybernetics, the VSM that was introduced by Stafford Beer is the best known recursive model (Schiemenz 2003; Espejo & Gill 1997, p.2). Shiemenz specifies further that

“a system is viable when it has a specific informational and control structure, and when its operational subsystems (in System One) are also viable themselves”

Schiemenz (2003).

This statement indicates that the viable system structure can be divided into operational activity and metasystem activity as indicated below:



- The operational activity which is performed by the collection of viable systems, producing and delivering whatever it is which constitute the identity of the whole system; and,
- Metasystem that acts as a controller of the internal relations between the viable subsystems and the relation of the whole system to their environment. Hence, the role of meta-system is to ensure that operational processes operate properly and indeed are practicing the right operational process (Espejo 1989, pp.43-44; Anderton 1990).

In addition, recursive concept is an essential element for efficiency and effectiveness as it allows specialisation to take place. Recursive structures, then,

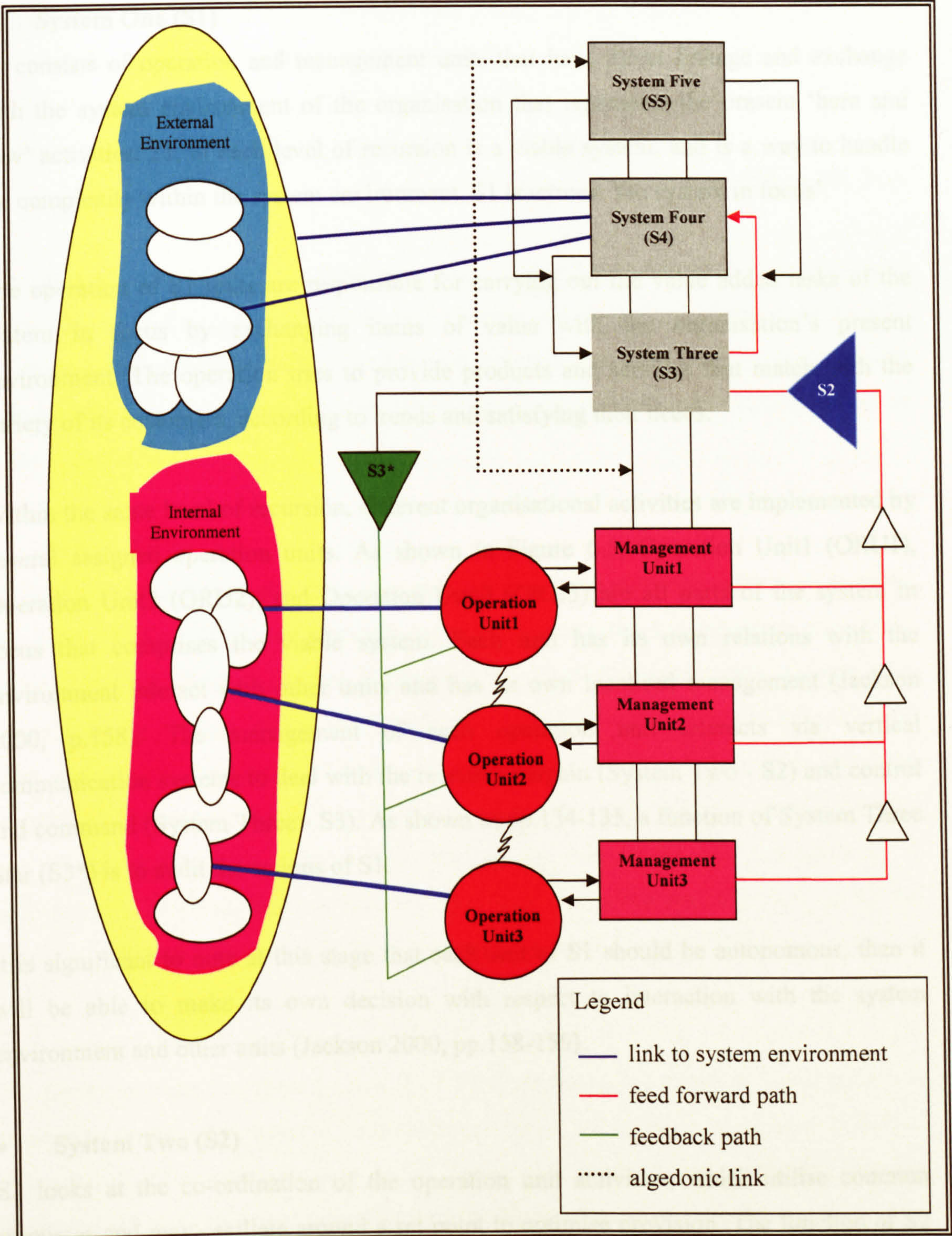
“...are both efficient generators and absorbers of complexity and highly adaptive to change. They function in this way precisely because they consist of a devolving series of primary activities supported by sufficient regulatory and communication functions to enable them to operate effectively at every level”

(Espejo & Gill 1997, p.2).

### **6.4.3 Five Subsystems (System One to System Five)**

The VSM structures an organisation at each level of recursion into five interacting subsystems whose proper operation will both fulfil the purpose of a system and sustain the system within its changing environment. All these subsystems are connected by communication channels (horizontal and vertical), to balance their interactions through actions of amplification and attenuation. Figure 6.5 presents a schematic diagram of a VSM including all the interaction channels between the components in the system. The following sub-sections provide an explanation for each subsystem.





Source: after Beer 1991, p.136.

Figure 6.5 Schematic Diagram of Viable System Model



- **System One (S1)**

S1 consists of operation and management units that have direct linkage and exchange with the system environment of the organisation that represents the present 'here and now' activities. S1, at each level of recursion is a viable system, and is a way to handle the complexity within the system environment. S1 is termed 'the system in focus'.

The operation of S1 units are responsible for carrying out the value added tasks of the system in focus by exchanging items of value with the organisation's present environment. The operation tries to provide products and services that match with the variety of its customers, according to trends and satisfying their needs.

Within the same level of recursion, different organisational activities are implemented by several assigned operation units. As shown in Figure 6.5, Operation Unit1 (ORU1), Operation Unit2 (ORU2), and Operation Unit3 (ORU3) are all parts of the system in focus that comprises the viable system. Each unit has its own relations with the environment interact with other units and has its own localised management (Jackson 2000, p.158). The management of each operation unit interacts via vertical communication systems to deal with the resource bargain (System Two - S2) and control and command (System Three - S3). As shown in pp.134-135, a function of System Three Star (S3\*) is to audit the actions of S1.

It is significant to note at this stage that each unit of S1 should be autonomous, then it will be able to make its own decision with respect to interaction with the system environment and other units (Jackson 2000, pp.158-159).

- **System Two (S2)**

S2 looks at the co-ordination of the operation unit activities, which utilise common resources and may oscillate around a set point to optimise provision. The function of S2 is related specifically to damping the oscillation between operational units. As

interactions within the operational domain and the system environment are continuous in time, in order to deploy requisite variety in S1, S2

“must be continuously in being”

(Beer 1979, pp.201-202).

Therefore, it is important that mechanisms exist, so that best practices are shared among all members of S1 as in the use of standard routines and procedures. Circumstances exist whereby misunderstanding of the S2 function arises because the function itself has not been identified in managerial thinking, therefore is confused with other functions formed in the organisation.

- **System Three (S3)**

S3 is where the decision about the key day to day organisation administration is made. The roles of S3 to S1 include deciding tasks to be performed by respective units in S1 under S3 control. Through the direct linkage of S3 with all S1 management systems, S3 is aware of all happenings ‘inside’ the organisation ‘now’. S3 seeks synergy between the S1 units and makes executive decisions regarding areas where no procedure has been established. Synergy in this context is the extent to which ‘the whole is greater than the sum of its parts’ which requires each unit in S1 (operational and management) to contribute to ‘cohesive’ decision-making. This is to ensure the integrity of S1 to S3 and their co-ordination and control in ‘here and now’ situations (Leonard 2000).

- **System Three Star (S3\*)**

S3\* performs audit functions on behalf of S3. Sometimes, S3 needs to countercheck to ensure that the report it receives from the management unit of S1 is an accurate reflection of the status of the particular units in S1. This is also to avoid the tendency of personal biases and other communication problems from the accountability reports.



Therefore, S3\* is provided with a channel that runs directly to the operation unit of S1 to enable for the direct culling of information, bypassing that particular operation's management function. The findings are reported to S3.

- **System Four (S4)**

S4 provides the intelligence function (Espejo & Gill 1997) and has direct connections with the external environment. Its other direct linkages are with S3 and S5. S4 has several roles within the VSM.

Firstly, S4 captures and analyses important information about the future systems environment that is not available to S1 yet is likely to be very useful to the S1 operation units. Special attention is paid to information about the potential events that may upset the organisation's operation. S4 therefore, identifies long term opportunities and threats, and enables preparations for the future being made inside the organisation that ensures survivability. In its connection with S3, S4 also assembles the information collected by S3 to evaluate the strengths and weaknesses of S1 and S2, via accessing management and audit reports which are regularly submitted by those subsystems. This internal information is compared with external information to reflect crucial insights for the 'total system environment' on the relationship between the internal organisational capacity to face external environment changes, to the extent to enable for the organisation 'to invent its own future' (Espejo & Gill 1997). Finally, S4 also ensures the moderated flow of information between S3 on the one hand and S5 on the other hand.

In its interaction with S5, normally S4 passes information to S5 only after discussing with S3 (see below – the S3-S4 homeostat). Typically, S4 tasks are related to activities in research and development (R&D), corporate planning, public relations, and market research.

- **The System Three-Four Homeostat (S3-4 Homeostat)**

Even though homestats are emphasised in all VSM communication channels within all subsystems, the function of S3-4 Homeostat was given special attention by Stafford Beer in its role in keeping the organisation stable (Beer 1979, pp.257-262). The relevant issues related to the close interaction between S3 and S4 are:

- The people in S4 making future plans based on links to the future system environment must co-ordinated closely with S3 to take into account the internal capabilities of the organisation; and conversely,
- The people charged with the overview of the internal environment must be aware of the plans being formulated by the future planners.

Stability is achieved through maintaining the right balance between present and future consideration for each situation. In this respect, the S3-4 Homeostat is fundamental to the survival of the organisation.

- **System Five (S5)**

Basically, S5 functions deals with strategic decision-making, seeking to harmonise provision with requirements for the longer term. S5 decides the organisation's purpose (identity) and is thus responsible for the direction of the whole organisation. The direction is based on the justification of information generated by S4, and then is pursued through exploring the relationship between external trends and internal capacity. Then S5 develops policies that are delivered to S3 for implementation by S1.

S5 also monitors operation of the 'balancing operation' of the S3-4 Homeostat (Beer 1979, p.259). This is carried out by maintaining a balance between concerns for present operations and preparing for the predictable and unpredictable future. Furthermore, as the equilibrium point tends to fluctuate over time, those responsible for delivering S5 need to understand change and its management.



#### 6.4.4 Algedonic Link

The VSM also has a special alarm signal, identified as an 'algedonic' ("pain and pleasure") signal, to alert S5 to respond to the lower systems and vice versa. The need for the rapid response can come from within the same recursion level, at any lower level of recursion, or 'inter-recursive' algedonic signals of the whole system. As reflected by the dotted line in Figure 6.5, this information channel bypasses the normal VSM communications channels. This link ensures that the organisation maintains its 'whole purpose' by responding urgently to any threat or opportunity, otherwise the whole organisation

"would lose its cohesiveness"

(Beer 1979, p.407).

The significance of the algedonic mechanism is that the alert signals provide the necessary conditions for the system to remain viable, as Beer reminds is that the VSM

"cannot remain viable if it goes to sleep"

(Beer 1979, p.408).

An example of the use of the algedonic link is when organisations respond to reduce the advantage that their competitors gain in introducing a new product or service. This response could be to introduce a similar product or service, or to bring an innovation to market that improves customer satisfaction in same way.

#### 6.4.5 The Environment

Espejo defines the environment in the viable system as:

“the ‘reality’ of the threats and opportunities that the organisation has to deal with in order to remain viable in the future”

(Espejo 1989, p.84).

The organisation does not operate in isolation, it has various elements influencing its operation, such as in the health care application where there are patients, suppliers, the general public and others which together these make up environment and the environment will produce a number of variety states.

In this study, the environment of the public health care system is largely beyond the knowledge and control of the people within it, because they cannot know everything about every aspect of the health care matters within the scope of the MoHM. They can only know a fraction of what could be known. Hence, the conclusion can be drawn that for the MoHM, the environmental variety of the MoHM service at every level of recursion is greater than its operational variety.

Generally, the total environment of the viable system can be split into two components: internal and external. The internal environment is dealt with by the S1 and specifically concerns the present environment. The external environment interacts with S4 which looks to the future environment. In reality, the borders of the environmental subsystems are uncertain (Beer 1979, p.94). As indicated in the viable system, only S1 and S4 have direct linkages with the environments of the organisation.

## 6.5 Summary

The application of a management cybernetics approach in the system diagnosis will contribute a new application to test the established methodology. Furthermore, its flexibility is useful particularly for exploring further ideas in the development of IMSs. Since the aims and objectives of this research emphasise the situational analysis of the existing organisational practice and environment interactions of the MoHM, the wide spectrum offered by the VSM approach has sufficient variety itself to cover the intended



system design. In this regard, the core attribute of viability will be incorporated within the context of an organisationally complex national health service delivery, and the current system diagnosed at six different levels of recursion.

The VSM comprises two separate modes of study: design and diagnosis. Whereas VSM design mode is used for new deployments of information management systems (IMS) (for example), the VSM diagnostic mode allows for an in depth study of existing IMS. It is clear that the MoHM already has a functioning IMS, however the systemic nature of the interactions that comprise this system can be investigated via the VSM diagnostic mode. Thus, this study endeavours to find out if the IMS at the MoHM is viable, and if not (a) identify the systems in each level of recursion that are missing or not functioning; (b) make recommendations to address the issues uncovered. Whereas (a) is investigated in Chapter Seven, (b) is covered in the Discussion Chapter (Chapter Eight).

## Chapter Seven: System Intervention

### 7.1 Introduction

The purpose of adopting the VSM is to diagnose the operational viability of the public health service offered by the MoHM. This chapter is organised to reflect the levels of recursion investigated. After the context of the approach is reported, six levels of recursion are identified. A systems diagnosis is made at each level, and omissions or limitations noted for further action.

### 7.2 Context

The aims of this chapter are:

- To study current practice through existing organisational activities;
- To diagnose the system at each level of recursion using the VSM approach; and,
- To identify the viability features and the potential issues at each level of recursion, to serve as input and to collectively stimulate the impact in the next chapter, Chapter Eight (Discussion).

The MoHM is the major provider of public health care service in the country. Besides the primary health care service, the secondary and tertiary medical care services are provided through a network of public hospitals that have been established throughout the country. As of the year 2000 (last available figure), there were 120 hospitals comprising 34,118 beds (Ministry of Health Malaysia 2004a, p.177). In addition to providing health care services, the MoHM is also responsible for monitoring and regulating other activities related to the health care services provided by other agencies, including the private sector, NGOs, and other government agencies. The provision of a public health care service by the MoHM has been described as being:



“to continue to provide affordable, accessible, equitable and quality health care to all citizens”

(Tajuddin 2000).

Viability in the public health care domain can be regarded as to ensure that the service delivered by the MoHM is valued by customers and responsive to change as conditions evolve. It is also concerned with organisational performance - this relates to the performance of each agency as well as the performance of the total organisation.

The levels of recursion investigated are reflected in Figure 7.1 below and reflect the structural organisation illustrated in Figure 4.1 (see p.48). Although these levels of recursion are not an exhaustive representation of all the agencies in the MoHM, they are sufficient to discuss the core issues pertaining to the overall practices of IMS in the MoHM. In fact the representation is further simplified by taking appropriate examples (shaded in red in Figure 7.1) at Recursion Level Two to Recursion Level Five. This gives:

- Level of Recursion Zero (RL0) is about the scenario at MoHM Headquarters and the Divisions at the Head Office;
- Level of Recursion One (RL1) refers to the connection between Headquarters and the fourteen SHDs;
- Level of Recursion Two (RL2) looks at relevant activities in all State and District Hospitals under the jurisdiction of the SHD of Perak (as a selected State);
- Level of Recursion Three (RL3) analyses the activities at the Ipoh State Hospital, in the State of Perak (as an example);
- Level of Recursion Four (RL4) focuses on activities at four Clinical Service Directorates of the Ipoh State Hospital (as an example); and,
- Level of Recursion Five (RL5) evaluates the activities at eight Medical Departments under the Clinical Service Directorate of Ipoh State Hospital (as an example).



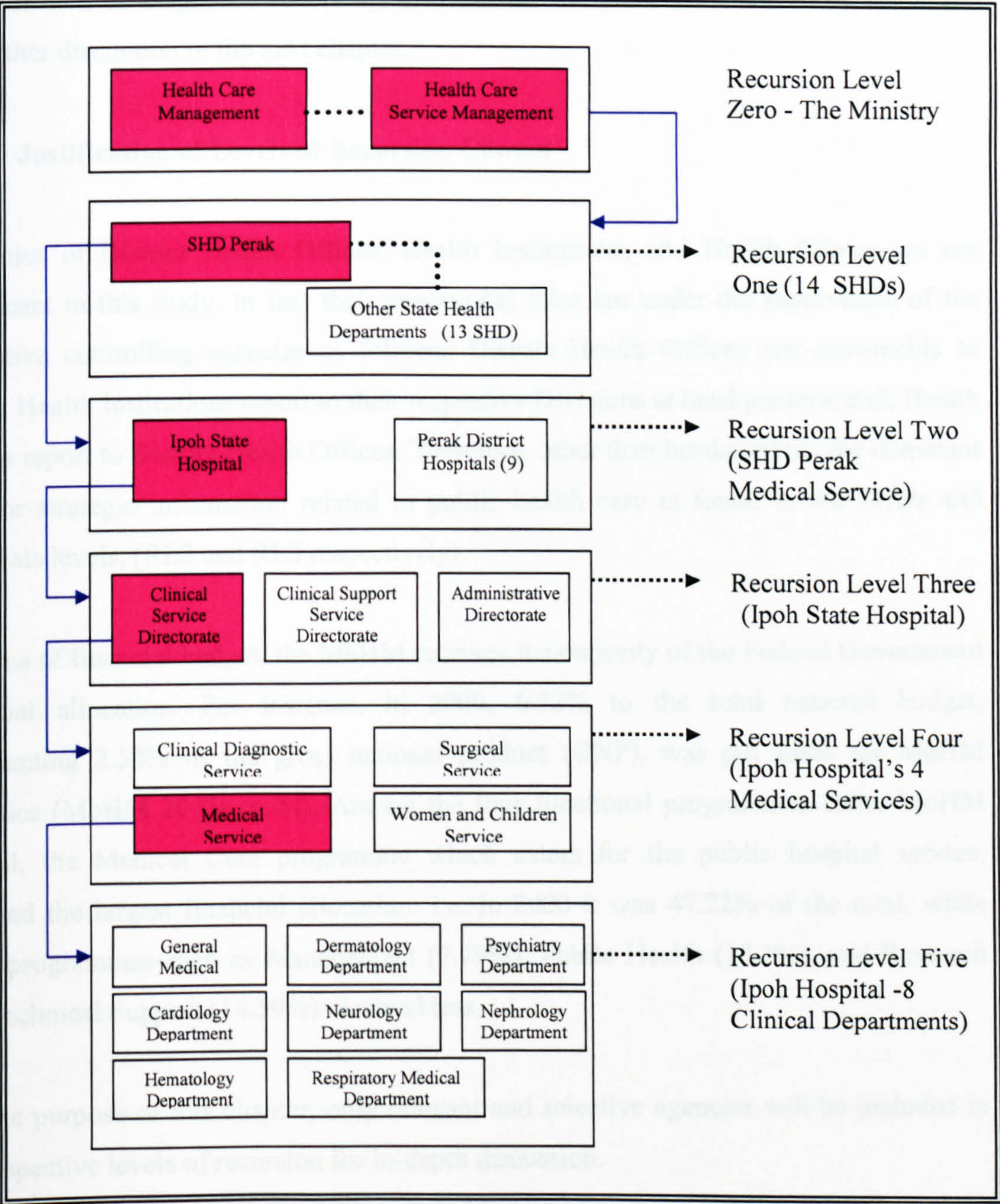


Figure 7.1 An example of levels of recursion

7.2.1 Diagnostic Approach

Relevant issues will also be related to primary data sources; questionnaire and interviews as well as the available literature. Details of each system (S1 to S5) at each level of



recursion will be diagnosed accordingly, to explore the potential issues to be raised for the further discussion in the next chapter.

### **7.3 Justification of Levels of Recursion Chosen**

The roles of District Health Offices, Health Institutions, and Health Clinics are not significant in this study. In fact their operational roles are under the supervision of the respective controlling agencies as follows: District Health Offices are answerable to SHDs; Health Institutions report to their respective Divisions at headquarters; and, Health Clinics report to District Health Offices. Therefore, other than headquarters, the dominant role for strategic information related to public health care is found in the SHDs and Hospitals levels, (RL2 and RL3 respectively).

In terms of financial budget, the MoHM receives the majority of the Federal Government financial allocation. For instance, in 2000, 6.32% to the total national budget, representing 2.58% of the gross national product (GNP), was put aside for MoHM activities (MoHM 2003a, p.24). Among the four functional programmes under MoHM control, the Medical Care programme which caters for the public hospital service, received the largest financial allocation: i.e. in 2000 it was 47.22% of the total, while other programmes such as Management (7.79%), Public Health (18.1%), and Research and Technical Support (14.59%) received less.

For the purpose of this chapter, only relevant and selective agencies will be included in the respective levels of recursion for in-depth discussion.

### **7.4 The VSM of the MoHM at the RL0 – the MoHM**

The functions of the agencies at headquarters includes to plan and design the organisational activities and formulate policies for service delivery, which is to be borne by the implementing and operating agencies at the State levels, District Health Offices, public hospitals, and health clinics.

All Heads of Divisions (the Directors and Undersecretaries) at headquarters are members of a strategic group responsible for the whole activity of the MoHM. Each of them has direct access channels to the most senior executive officers. To strengthen the operational function, several Units were established to complement the function for each Division.

The implementation of the four functional programmes of the MoHM are co-ordinated by the respective Divisions at headquarters. The outline of the Divisions are as shown in Figure 4.1 (see p.48). Each of the Divisions is responsible for managing, supervising, and implementing their defined scope of tasks. Divisions perform their tasks either in the context of regulation or implementation capacity. For the VSM diagnosis, the service and the functionalities of the Divisions can be distinguished as reflected in Figure 7.2 (The VSM - RL0):

- **Health Care Service Management;** comprises Divisions that are concerned with the implementation of the health care services delivery and support services. Those Divisions manage and supervise the stipulated activities by monitoring the performance of operational agencies. Nine Divisions are included; Oral Health Services, Disease Control, Health Education, Food Quality Control, Family Health Development, Medical Development, Medical Practice, Pharmaceutical Services, and Engineering Services. The Divisions themselves are managed by the DGoH and three Deputies. As part of their role in health promotion and disease prevention, some of the Divisions also deal with the regulation, licensing, and law enforcement related to the public health care service in Malaysia. The Heads of Division at this level of management are called the Directors of Division; and,
- **Health Care Management Service;** consists of Divisions that perform the regulation role, and their tasks primarily relate to the management of resources. These Divisions are directly answerable to the Deputy SG (Management) and Deputy SG (Finance) as well as the SG. There are seven Divisions in total: Management, Human Resource, Training and Career Planning, ICT, Finance, Procurement, and



Accounts. All of the Heads of Divisions are Managers, Information System Officers, or Financial Officers, and their official titles are known as the Undersecretary of Division.

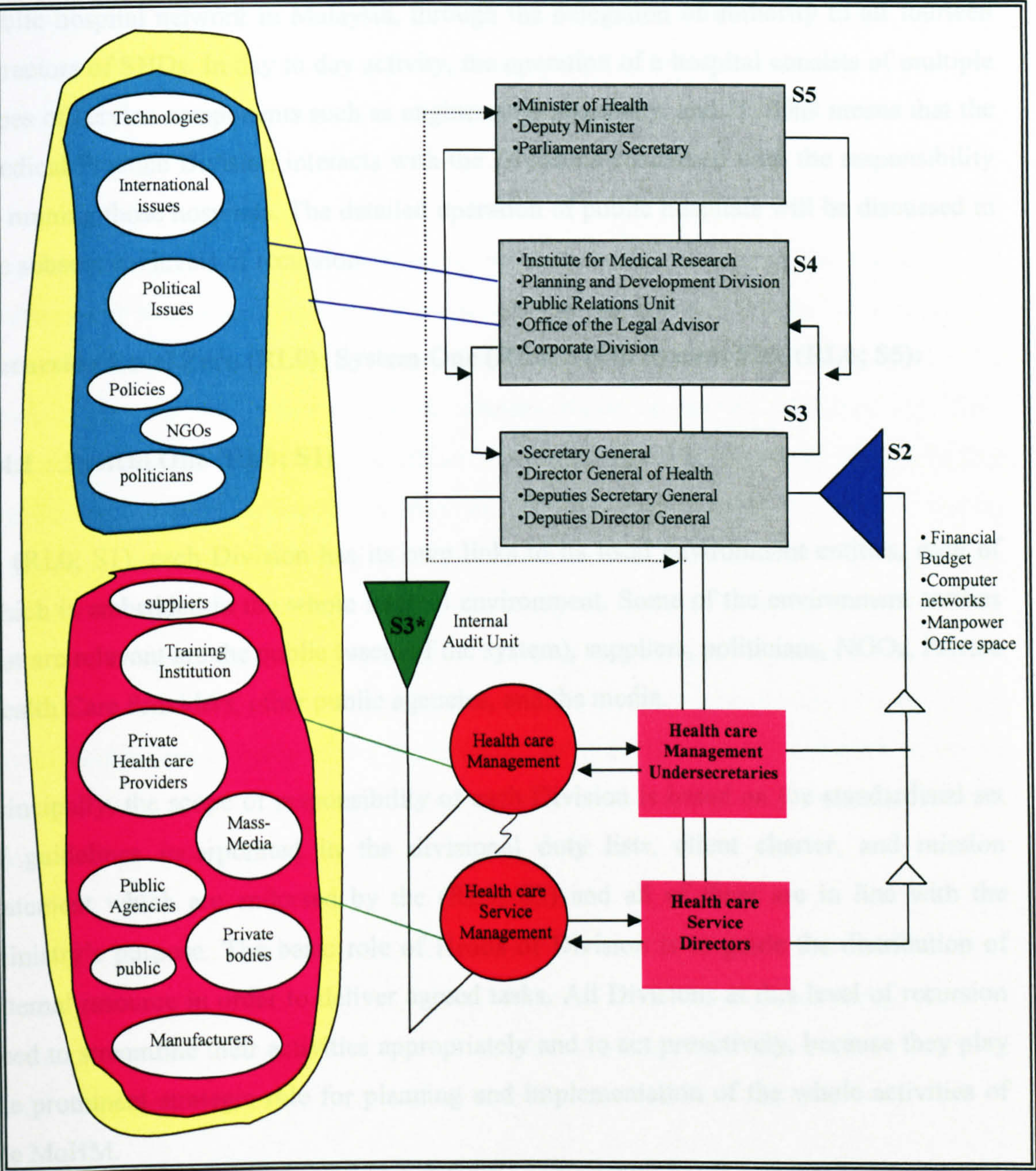


Figure 7.2 The basic structure of VSM Level Zero: Headquarters Service Provision of the MoHM



Unlike the Divisions in the Health Care Management Service, the responsibilities of each Division in the Health Care Service Management include the co-ordination and supervision of all activities of their implementing agencies throughout the country. For example, the Medical Practice Division is responsible for the overall operation of the public hospital network in Malaysia, through the delegation of authority to all fourteen Directors of SHDs. In day to day activity, the operation of a hospital consists of multiple types of service components such as engineering, pharmacy, and IT. This means that the Medical Practice Division interacts with the Divisions concerned with the responsibility of running those hospitals. The detailed operation of public hospitals will be discussed in the subsequent levels of recursion.

#### **Recursion Level Zero (RL0): System One (RL0; S1) to System Five (RL0; S5):**

##### **7.4.1 System One (RL0; S1)**

In (RL0; S1), each Division has its own links to its local environment entities, each of which is embedded in the whole internal environment. Some of the environment entities that are relevant are the public (users of the system), suppliers, politicians, NGOs, Private Health Care Providers, other public agencies, and the media.

Principally, the scope of responsibility of each Division is based on the standardised set of guidelines incorporated in the divisional duty lists, client charter, and mission statement which are endorsed by the (RL0; S3) and all of them are in line with the Ministry's purpose. The basic role of Heads of Division is to guide the distribution of internal resource in order to deliver agreed tasks. All Divisions at this level of recursion need to streamline their activities appropriately and to act proactively, because they play the prominent strategic role for planning and implementation of the whole activities of the MoHM.

Divisions at this level of recursion perform an organisational and strategic role, supporting (RL0; S3) by providing input for the formulation of procedures, standards,



and guidelines related to general administration or specifically the service delivery to each of the agencies of the MoHM.

The complexity of each Division's functions are complemented by autonomous units responsible for the scope of tasks, which is termed by Beer (1991) as "multiple level of recursion" or by Espejo, Bowling & Hoverstadt (1999) as "primary activities". In this context, just as the 'Ministry' is made up of 'Divisions', each 'Division' is made of 'Units'.

Due to complexity in the organisational activities at the Division level, the variety in the environment is greater than the Divisions' operations, and the Division has a greater variety than its Head of Division. Thus, it is impossible for the Heads of Division to be aware of all situations in their local environments. However, the variety can be amplified, such as using discretion under the (RL0; S1) autonomy. One exemplar of this variety amplification occurs when the Heads of Division can form a consensus among themselves, sharing information to serve the common interest of all. Even though responsibility for administering and co-ordinating the finances is under the care of the Finance Division, manpower utilisation is under the care of the Human Resource Division, and training is handled by the Training Division, all new practices issued by the government's central agencies are disseminated to each Division Head. Hence, effective mechanisms to achieve the effective dissemination of new practices and work procedures should be in place, either by formal or informal methods.

It is clear that benefits should accrue from the close relationship between the Divisions, for the sake of the viability of the whole of the Ministry. In addition, the problem of redundancy and duplication in the work processes among Divisions in the (RL0; S1) could partly be eliminated, as admitted by the SG in the interview response that;

"...most of the work processes in the MoHM and health care service delivery are still adopted widely in the manual practices"

(The Secretary General, response to Q.11; Appendix 4.1).

Effective information sharing mechanisms in the Ministry is another area that needs to be rectified, even at this higher level of recursion. Among the components that establish information sharing are newsletters, common seminars, and discussions, each facilitated by ICT provision. However, as a result of a cross-tabulation from the questionnaire survey only 70.3% officers within the managerial category at the MoHM were provided with networked computers (see Table 5.12, p.89), which may be a constraining factor.

A further cross-tabulation from the questionnaire survey revealed that 66% of managers dealt with external agencies in performing their tasks. Therefore, the outcome of the survey suggests that there is a gap in the provision of the ICT facilities among the staff, which may affect the information sharing capability among them (see Table 5.14, p.91).

Even though actions of Heads of Division are dictated by commands from (RL0; S3), most routine activities of (RL0; S1) Divisions act as a 'black box' to (RL0; S3). In this case, input in the form of reports from Heads of Divisions are useful sources that could influence (RL0; S3) in their actions and decisions. For example, to respond to parliamentary questions, (RL0; S3) relies on the answers drafted by the respective Divisions before submitting them to (RL0; S5), the Minister, for the eventual reply.

#### 7.4.2 System Two (RL0; S2)

(RL0; S2) exists to harmonise the activities of all the Divisions in (RL0; S1) and in cybernetic terms, this is to perform 'the viable system's anti-oscillatory device' for all Divisions in S1 (Beer 1991, p.66). This includes the use of the local resources that are relevant to one or a small number of Divisions, and the use of global resources that are required by every Division in (RL0; S1). This damping oscillation function for the allocation of resources among the different Divisions in (RL0; S1) is managed by the (RL0; S3) in accordance to the rules, regulations, and procedures set by the Central Agencies of the Federal Government of Malaysia.



At this level of recursion, besides managing their own Division's needs, all Divisions must co-ordinate to establish a resource bargain for all of their implementation agencies. For example, the Training Division takes into account the requirements of all MoHM's training institutions, including intake of trainees, training curriculum, staffing, equipments, and maintenance. The Medical Practice Division covers activities at all public hospitals in the country, including all the related service delivery components such as equipment, staffing, health technology, and maintenance. Nonetheless, special consideration must also be reserved in the event of uncertainties which may require some adjustment in the allocation of resources.

Even though every now and then the management of the MoHM takes utmost effort to enhance the service level, the following issues still persist, and collectively affect the provision of the service delivered:

- Shortage of skilled staff, including medical professionals and medical auxiliary staff;
- Financial constraints, because the Malaysian Health Service is a publicly funded service and depends on its budget from the Federal Government; and,
- Obsolescence of work practices, as the MoHM still relies heavily on manually driven work procedures.

In normal practice, the requirement for resources is based on the detailed list of activities submitted by the Divisions in their annual budget proposal to the (RL0; S3). Pertaining to resource allocation, (RL0; S2) must emphasise a reporting system mechanism, such as standardised formats and procedures, to enhance the accountability awareness among the Heads of Division about the utilisation of resources, and to ensure (RL0; S3) are always well-informed. In addition, (RL0; S3) is also responsible to compile and furnish the overall resource bargain activities of the Ministry to (RL0; S5), because the Minister is responsible to the PAC.

Under the common circumstances, either for local or global resource requirements, each Division Head is required to submit a budget for the coming year for their proposed activities, based on the formal instructions issued by the (RL0; S3). The practice is that all proposals will be compiled and evaluated by the respective Divisions in the Health Care Management Service; namely for financial, human resources, training, ICT facilities, and other equipment. Adherence to standardised rules and procedures are among the essential considerations, as the Heads of Division hold the accountability for all related administrative matters. All endorsed proposals will then be forwarded to respective central agencies of the Federal Government of Malaysia; such as for financial requirements to the Federal Treasury Office and human resource requirements submitted to the PSDoM.

In the resource bargain activities, upon granting the budget approval, subsequent actions take place such as the procurement process. Following that, each Division is required to furnish the progress report for the attention of (RL0; S3) periodically. For the whole compilation of the Ministry's activities, RL0; S3) needs to furnish reports to serve for the various purposes of (RL0; S5) such as to present before the PAC.

### 7.4.3 System Three (RL0; S3)

Basically, S3 manages activities of the S1 units that impinge upon one another or that can be co-ordinated for greater effectiveness. The role of (RL0; S3), particularly as the MoHM headquarters must be able to deploy requisite variety among the various (RL0; S1) Divisions, whereby,

“S3 must have the capability to absorb the variety of S1”

(Beer 1979, p. 209).

(RL0; S3) in practice consists of those staff who manage the administration of the Ministry, with regard to the control role, and at this level of recursion comprises the SG, the DGoH, and their respective deputies. Central to senior management issues and the



executive power in (RL0; S3) is that the CEO of the Ministry is the SG, whereas the DGoH is responsible for service delivery. It is crucial for these two officers to work hand in hand to deliver strategic decisions that effect the future direction of the MoHM.

(RL0; S3) attention is 'internal and present' oriented. In this case, among the dominant roles of (RL0; S3) are the issuing of directives and commands to Divisions in (RL0; S1) which is basically based on reports from (RL0; S1); the situation in (RL0; S2); investigation from (RL0; S3\*); input from (RL0; S4); and, instructions from (RL0; S5). The directives conveyed to (RL0; S1) are likely to be in the form of decisions of meetings, circulation letters, memos, and other means of conveying official instructions.

In most situations, for example, in addressing the issues of shortage of a skilled workforce, financial constraints, and obsolescence of work practices (RL0; S2 refers, pp.149-151), the identified (RL0; S3) personnel might have to prepare policy papers to propose strategic or remedial actions. The Minister (RL0; S5) may further pursue the issues with his Government's Cabinet Minister colleagues.

(RL0; S3) in the public health care service at this level of recursion must also be in an alert state to face any possibility of unpredictable circumstances. There is a requirement for the public health authority in any country to keep track of causes of health hazards through systematic, and systemic actions, both internal to the country and with international co-operation via agencies such as the World Health Organisation (WHO).

Additional resources such as financial allocation, medical experts and other facilities are required to combat such problems as they arise (e.g. the Bird Flu epidemic). Using the negative feedback mechanism, for example, (RL0; S3) must be able to compare the amount of the additional resources required with the available resources, and *to adjust* resource budgets by requesting the Malaysian Federal Treasury for extra, one-off funding.

#### 7.4.4 System Three\* (RL0; S3\*)

Tasks conducting auditing functions are carried out by the Internal Audit Unit which is directly under the control of (RL0; S3). As shown in Figure 7.2 (see p.146), the audit function is based on the instructions from (RL0; S3), i.e. the SG or the DGoH. The instructions can be in various forms such as the approved yearly schedule, meeting decisions, or through official memoranda or letters.

Generally, the purpose of auditing is to ensure that Divisions carry out their activities according to the standard procedures and resources are used for their purpose within context, preventing any malpractices in the services. In the auditing process, the auditors communicate with the target Divisions' management, or in specific cases are authorised by (RL0; S3) to probe more deeply and access directly into (RL0; S1) organisation thus bypassing Heads of Division.

The establishment of this Unit is centralised at the headquarters of the MoHM and its scope covers all agencies of the Ministry. At this juncture, (RL0; S3) needs to review the existing set up of this Unit in terms of number of staff and use of relevant ICT tools, so that the role of (RL0; S3\*) is effective.

#### 7.4.5 System Four (RL0; S4)

(RL0; S4) in the VSM is directly connected to the external environment related to all the activities that are oriented toward providing for the future existence of the MoHM, including functions such as recruitment pool, technological impact, training requirements, and strategic planning. It should act as a principal engine that drives the MoHM's innovation, adaptation, and evolution.

(RL0; S4) at this level of recursion, consists of The Public Relations Unit, Planning and Development Division, Corporate Division, Office of the Legal Advisor, and IMRoM. In the day-to-day routine, all of these organisations are responsible to (RL0; S3). This means



all actions are subject to the (RL0; S3) directions and approval. Thus (RL0; S4) Units have lack of freedom in carrying out their actions. Undeniably, their close relationship to (RL0; S3) will enable them to understand the internal scenarios well, as most of them are also regular members in the Ministry's Post Cabinet Meeting, and are involved in other strategic level discussions.

However, the actions of the Units may lack focus to the actual roles of (RL0; S4), which is for the 'future' of the whole purpose of the MoHM. For example, by taking into consideration the R&D aspect, the scope of responsibility of the IMRoM is only to serve for the medical related field. None of the Units and Divisions are assigned with the 'future' for the overall public health care area. In this regard, Mohan & Raja Yaacob (2004) suggest that the potential impact of the MSC Telehealth project shall also be used to promote and facilitate research for all of the players involved in the public health care system, including epidemiology, sociology, behavioural physiology, and legal medicine. One important area in the medico-legal aspect is the ability to predict and protect the MoHM from future litigation. In actual fact, the role of (RL0; S4) stands at cross-roads within the organisation, it mediates between the outside and the inside (Mingers & Rosenhead 2004).

#### **7.4.6 The System 3-4 Homeostat (RL0; S3-4 Homeostat)**

The present situations of (RL0; S3) and (RL0; S4) in the MoHM, as has been mentioned above, reveals the gap for the suitable existence of the (RL0; S3-4 Homeostat) at this level of recursion. Theoretically, every action of (RL0; S3) would have to be invigilated by an observer in (RL0; S4), and vice versa because (RL0; S3) and (RL0; S4) are accountable to each other (Beer 1979, p.253). Therefore, in order to fulfil the requirements of the homeostat (i.e. present are balanced with those of the future), in addition to the close connection within the (RL0; S3-4 Homeostat), the role of (RL0; S4) needs to be enhanced proportionately.

#### 7.4.7 System Five (RL0; S5)

(RL0; S5) is represented by politicians; the Minister, the Deputy Minister, and the Parliamentary Secretary of the Ministry. (RL0; S5) maintains the organisation on a course consistent with its purpose and identity that is based on the policy, list of activities, and resource allocation approved by Parliament.

Being in the policy maker position, (RL0; S5) also maintains the proper balance that concerns the present operations against preparing for the expected future operations. This is very significant and is effective as the Minister is answerable and accountable to Parliament.

In the VSM, the function of (RL0; S5) includes to balance the capacity of the (RL0; S3-4 Homeostat), and receive reports from (RL0; S4) about the significant issues as a result of (RL0; S4) interaction with the external environment. In reality however, only the SG and the DGoH, in (RL0; S3) who submit reports to (RL0; S5) based on the information generated from (RL0; S1), (RL0; S2), (RL0; S3\*), and (RL0; S4). Whereas, the VSM dictates that to be more effective all 'future' reports to (RL0;S5) should be conveyed directly by (RL0; S4).

#### 7.4.8 Findings From VSM Diagnosis at RL0

- Conflict between Resource Management and Resources Requirement categories, the existence of the requisite variety among (RL0; S1) Divisions is questionable;
- (RL0; S2), shortage of skilled staff;
- (RL0; S2), diversion of allocated resources to unplanned activities due to political pressure and unpredictable circumstances;
- (RL0; S3), differences in organisational interest among the senior executives that affects the priority for the *whole* purpose of the MoHM;
- (RL0; S3\*), ability of the Internal Audit to function effectively is questionable;



- (RL0; S4), Divisions and Units in (RL0; S4) cannot function independently, all Units are answerable to (RL0; S3) and not to (RL0; S5);
- (RL0; S4), scope service and activities of agencies in (RL0; S4) should be widened to cover for the viability for the whole purpose of the MoHM; and,
- (RL0; S5), dominated by politicians with a tendency of lack of transparency in policy decisions.

## **7.5 The VSM of The MoHM at the Level of Recursion One (RL1) – The MoHM and State Health Departments**

### **7.5.1 Background**

Under this level of recursion, the complexity of health care services is delivered by fourteen SHDs which are situated in the fourteen States of the Federation of Malaysia. In outline, the role of the SHDs is to enforce laws and regulations, and to supervise, co-ordinate, and monitor the delivery of health care services via District Health Offices, public hospitals, and public health clinics. All these tasks are in accordance to the policy, plan, and strategy which originate from (RL1; S5) at this level of recursion.

Apart from the list of components in (RL1; S1), RL1 shares the same metasystem entities as those in RL0, which has implication for organisation of the MoHM. All Directors of the SHDs are under the direct control of the SG of the MoHM. Hence, the RL1 metasystem entities as in the RL0 will be repeated; at (RL1: S3), (RL1: S4), and (RL1; S5).

Figure 7.3 shows the structure and organisation at RL1.



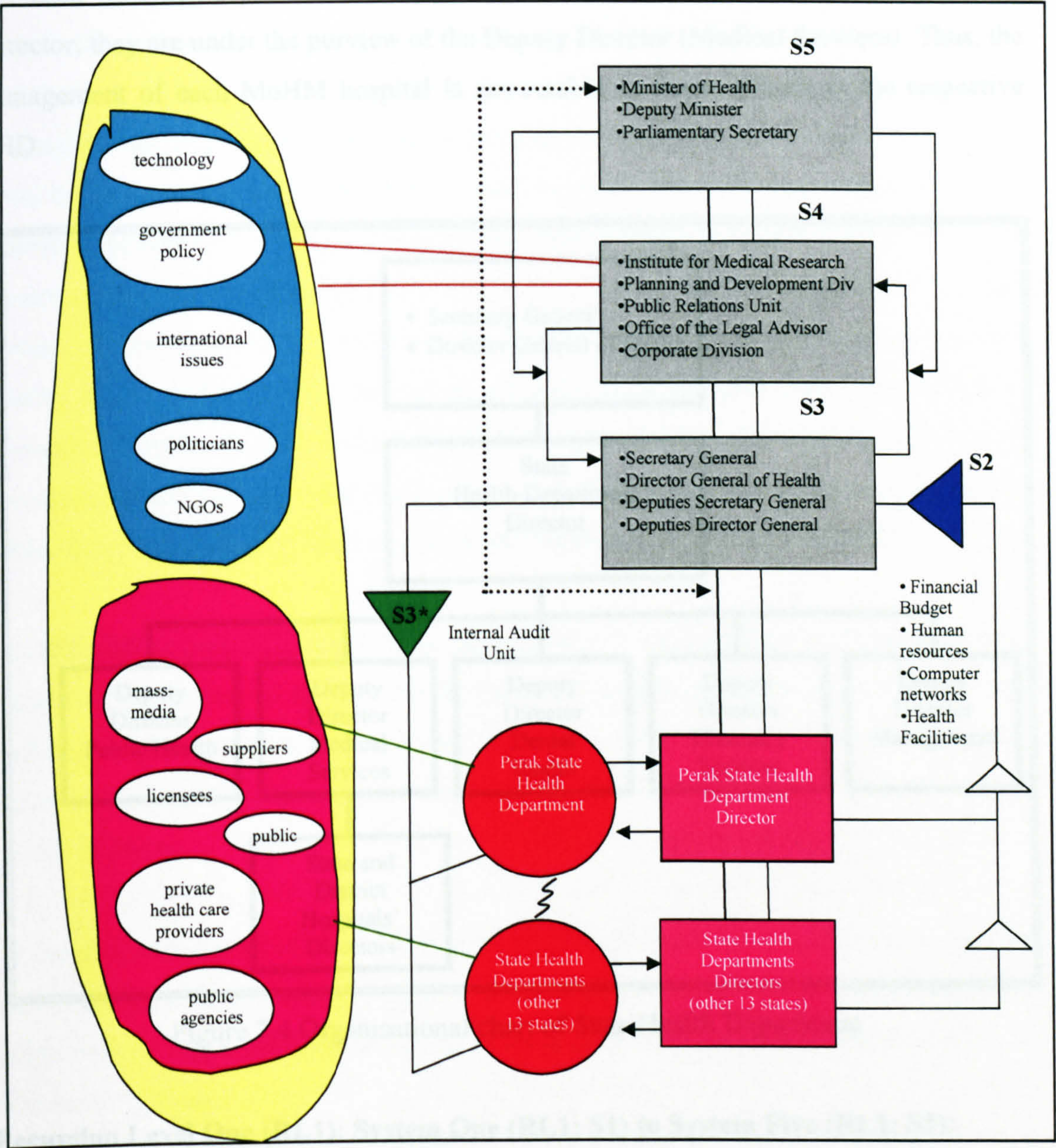


Figure 7.3 The basic structure of VSM Level One: Headquarters Services of the MoHM

7.5.2 Organisational Structure

Figure 7.4 indicates the SHD organisational structure. Every SHD is led by a Director, each is a medical professional who is supported by five Deputies who are responsible for Medical, Public Health, Pharmacy, Dental, and Management operations respectively.



For each MoHM hospital service operation in any particular State, besides the SHD Director, they are under the purview of the Deputy Director (Medical Services). Thus, the management of each MoHM hospital is answerable to those officers at the respective SHD.

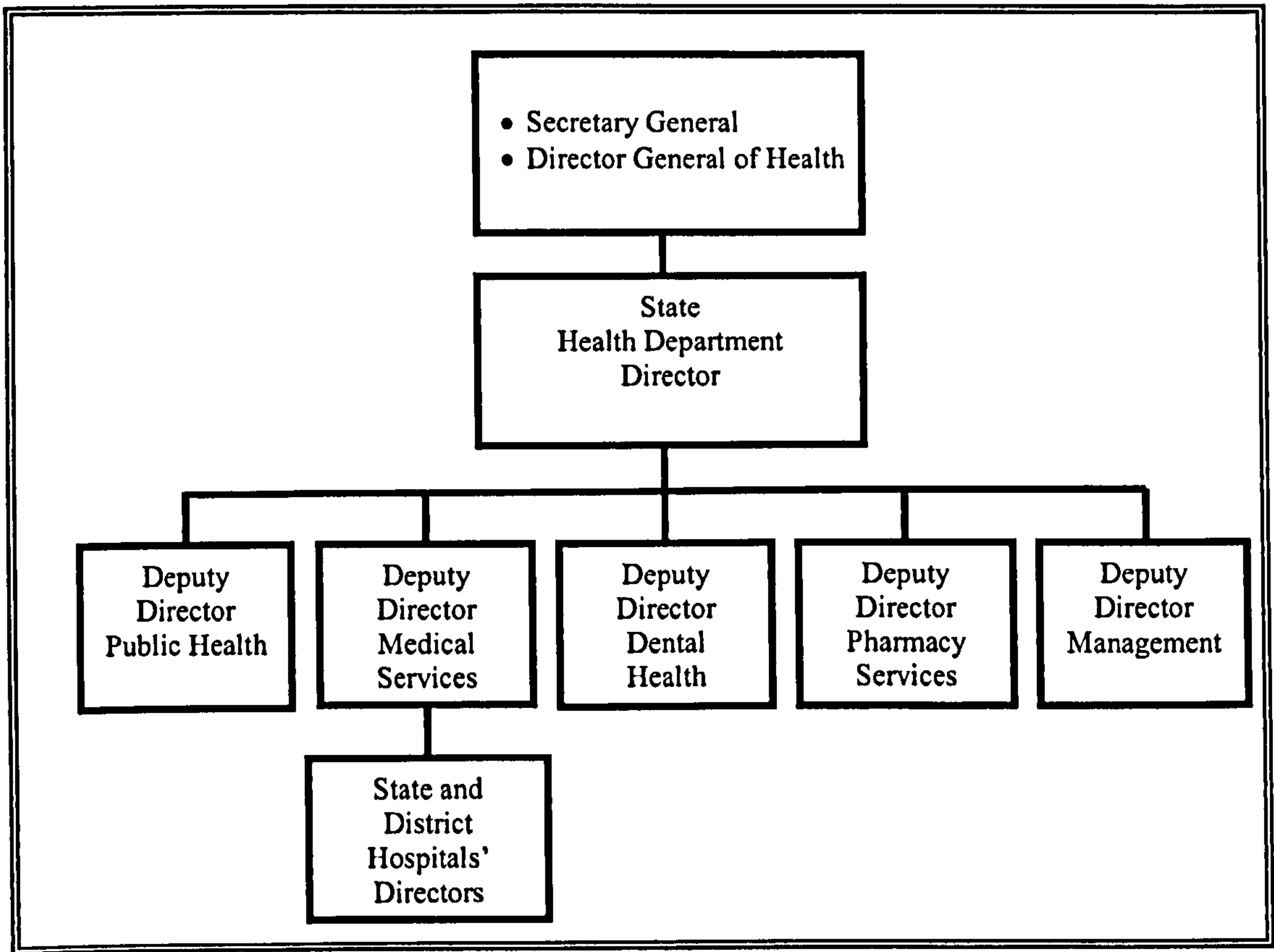


Figure 7.4 Organisational chart of State Health Department

**Recursion Level One (RL1): System One (RL1; S1) to System Five (RL1; S5):**

**7.5.3 System One (RL1; S1)**

At this point, we can note that there are links between all fourteen SHDs which indicate that they have direct lateral contact with each other. The prominent metasystem of the Ministry, (RL1; S3) also provides the Directors of SHD an opportunity to discuss common matters. The most formal avenue of contact is during the State Directors’

periodical meeting which is chaired by the SG of the MoHM, with the presence of other senior officers from headquarters.

Throughout their operation, every SHD interacts with multiple embedded environments, thus, its environment variety is greater than the respective SHD operational activities. However, Ashby's Law specifies that all this variety tends to equate. There are several measures adopted by each SHD to amplify their variety in the interaction with their system environment. Among the obvious measures is the continually upgrading of the quality of service delivery, setting up of new facilities, and being responsive to grievances from the public. Meanwhile, the environmental variety is attenuated through several methods, such as mass media releases, interagency discussions, participating in public functions, licensing medical-related activities, and regulatory approaches.

The Director of each SHD needs to amplify their own variety in the interaction with the State level operations by striving for the sufficient supply of resources, as well boosting staff morale. In addition to relying on the reports from subordinates, they may also gain a better understanding through first hand information by conducting personal visits to certain locations.

As the post of Director of the SHD is held by a medical professional, it is essential that their knowledge in the medical field is broadened by taking into consideration public health care management services which cover a wide range of component services other than medical areas.

Each of the SHDs is autonomous in its own right, which subsequently enables them to develop their own mission, own environmental scanning, and planning capabilities. This will allow the Directors to deal with the dynamism of this sector, even to handle emergent situations amicably with ease. For example, the outbreak of Nipah virus disease in 1999, which claimed the lives of 105 pig farm workers in the States of Negeri Sembilan, Malacca, Perak, and Selangor (MoHM 2000, p.280). The MoHM was appointed as the lead agency to tackle this problem. The Directors adopted a 'negative



feedback' mechanism whereby information pertaining to the use of health system resources and direct measurement of the prevalence of the virus was used to contain the epidemic in the respective States. Appropriate integrated actions were taken such as designing detailed action plans, rescheduling staff tasks, and mobilising resources needed, all facilitated by inter Ministry and interagency co-operation. These activities were carried out until the virus was eradicated, thus achieving homeostatis within the service delivery and organisation.

On the other hand, with regard to some the top-down interactions, there are various administrative commands in the form of directives and guidelines issued by (RL1; S3) to (RL1; S1) from time to time, in which the information dissemination mechanism to the target recipients is doubtful. The comments by a questionnaire respondent is relevant,

“many staff members are still unaware about the planning and development of ICT programmes of the MoHM”.

This comment is supported by the result of a cross-tabulation between *Hierarchy of Organisation* (Q.6) and *Are You Aware of the Official Circulation Letters Regarding Information Systems Security Issued By the MoHM and the Government of Malaysia?* (Q.37), as there were only 19.3% of respondents from SHD that answered 'yes'. This means that the majority of respondents (80.7%) did not realise that important communications had been received (see Table 5.28, p.111). Hence, those responses can be used to reflect the reality of the information dissemination mechanism at this level of hierarchy in the organisation.

#### 7.5.4 System Two (RL1; S2)

The prominent role of (RL1; S2) is to regulate oscillation in the SHDs by the adoption of mechanisms that deal with resource requirements issued by the Federal Government's central agencies and the Ministry's internal directives. As has been discussed, the variety of operation of each SHD is large, therefore (RL1; S2) is logically necessary, since

without the effectiveness in damping the oscillation in the resource bargain practice, the service operation of the SHDs would be unstable and (RL1; S1) would go into uncontrollable oscillation (Beer 1989, p.177). In addition, the presence of (RL1; S2) will also to ensure the autonomy of (RL1; S1) by not intervening in the freedom of (RL1; S1) to manipulate its own horizontal variety. This includes the management of SHDs being able to use allocated resources accordingly.

Public health care expenditure is subject to a stringent control since the overall budget is determined by the Federal Treasury. All agencies under the control of each SHD must submit their budget proposals to the Office of the Director's of the SHD for their perusal. With such an evaluation practice, allowing some degree of precision for internal resource bargain to take place, avoids the elements of redundancy in the proposals.

In dealing with the global resource bargain practice, in order to overcome the constraints in resources some health facilities are provided on a regional basis. For example, in 1999 three public health laboratories were set up via a World Bank loan to serve health care diagnostic functions. These laboratories were built at Ipoh (to cater for the northern region States), Sungai Buloh, Selangor (for the central region States), and Johor Bahru, Johor (for the southern region States). In realising the vision of the MoHM for the efficiency of the public health care service, it is crucial for (RL1; S2) to sustain the resources available and that they be fairly allocated, based on an agreeable priority according to need. A considerable improvement to the provision of the public health care facilities has been made over the past 10 years, for example there has been a steady improvement in the doctor to population ratio in Malaysia, from 1:2,533 in 1990 to 1:1,433 in 1999. However, the equal distribution of doctors within the country is also important. For example, in 1999, the ratio among States varied from 372 people per doctor in the Federal Territory, Kuala Lumpur to 4,1220 in the less developed State of Sabah (MoHM 2003a, p.17).

In addition to SHD proposals, some health projects were centrally initiated. There have been cases in which such new health facilities had attracted disproportionate quantitative



and qualitative performance, mainly as a result of lack of participation from the local public health management (MoHM 2000, p.176). An obvious example of this is the early inception of service operations at the ICT-based hospitals in Selayang, Putrajaya, and Slim River in 1999. Due to inadequately skilled staff and appropriate financial allocation the service operation showed a counterintuitive decline.

### 7.5.5 System Three (RL1; S3)

The prime role of SHDs concern the management of operational activities of the public health care services in the respective States. This is a very complex and diverse set of tasks. This means that (RL1; S3) can be regarded as facing a 'black box' situation in its interaction with the organisations in (RL1; S1). Whereas, in reality, (RL1; S3) does not need to understand all of the possible combinations of interactions within the activities of agencies under each SHD.

In exercising its control role, (RL1; S3) relies heavily on reports from the Director of the SHD. These reports include providing statistics for the national socio-economic plan, including those derived under the SHD administration. The Director of the SHD is responsible for providing statistics in the required format to the identified central agencies of the Federal Government, such as The Economic Planning Unit, The Implementation and Co-ordination Unit, and The Federal Treasury, all in a timely manner. The Directors also need to provide prompt and precise responses to relevant issues raised during the Inter-Ministerial meetings.

One more important note, there should be a comprehensive yet routine reporting mechanism from (RL1; S1) to (RL1; S3) in the form of integrated IMSs. However, present practice is incapable of fulfilling the expectation of (RL1; S3) in this respect, as the SG states:

“Certainly, we need to enhance the current information management system (IMS) because of the problem of the accuracy of information...Frequently, there is conflicting information

due to the disintegration in generating of information. As a result, the scope of information is gathered at different times, and is given by various sources...”

(The Secretary General, response to Q.2; Appendix 4.1).

Furthermore, the results of the questionnaire responses shown in Table 5.11 (see p.88) reveal that only 35% of respondents agreed that specific application systems were in place. With the lack of use of application systems, surely, is a constraint to complement their primary role to facilitate in producing reports for the Directors of the SHDs.

In its role to monitor the performance of (RL1; S1), sometimes (RL1; S3) needs to interfere and advise (RL1; S1) about what course of action to follow, especially when there is confusion regarding the State Government policy. This may occur, for example, when there is disagreement over the choice of new locations for health facilities that requires several pieces of land to be acquired. The approval for any land acquisition is under the jurisdiction of the respective State Governments and not at the level of the Directors of the SHDs.

#### **7.5.6 System Three Star (RL1; S3\*)**

The basic function of (RL1; S3\*), which is carried out by The Internal Audit Unit, is to support the operational monitoring tasks of (RL1; S3). Thus, this minimises metasystemic intervention, and

“restores requisite variety to System Three in its relationship with System One”

(Beer 1979, pp.211-217).

In actual fact, all auditing tasks need prior endorsement from (RL1; S3), as (RL1; S3\*) acts to accomplish the needs of the CEO of the MoHM. This means that with this authority in place, audit officers must be skilful in their missions, so as to fulfil the expectations of (RL1; S3) for provision of accurate reports.



At present, due to the academic background and experience of staff trained for the (RL1; S3\*) function, their focus is on management audit matters, rather than on the auditing of service quality; facilities performance; and, technical aspects. This oversight in function may prove costly to the overall viability of the system at this level of recursion.

#### **7.5.7 System Four (RL1; S4)**

The function of (RL1; S4) must be in line with the policy that is received from (RL1; S5), which is towards achieving the viability of the whole system in public health care service delivery. It is important that all promotional and developmental activities be continually given focus to achieve the desired results.

In this regard all entities of (RL1; S4) deal with the wider external environments which potentially influence the performance and viability of the SHDs and the MoHM. With that, the (RL1; S4) at this level of recursion must show their ability to generalise forecasts so that (RL1; S5) can develop practical policies for the viability of the whole of the health care services.

(RL1; S4) should heed the Government aspirations to ensure that the fundamental effectiveness in the service level prevails. Hence, the existing system is subject to evaluation and review periodically, with respect to efficiency in resource allocation and utilisation such as the effectiveness and equitable distribution of the health care financing scheme, sufficient supply of health care professionals, and the diffusion of effective and suitable health technologies. Being 'intelligent' is the prime role of (RL1; S4). All influencing factors at the local, national, and international levels will have to be considered in performing their tasks.

Among the main objectives of the Federal Government of Malaysia under the agenda of 'The New Public Health Concept' is the emphasis on multi-sectoral concerns in the national health service, and the optimal use of available health resources by strengthening the collaborative mechanism (MoHM 2001b, p.23). Following this, MoHM being the

lead agency through actions of (RL1; S4) needs to play a prominent role in facilitating interagency co-ordination, co-operation, and information sharing. The purpose is to embark on a smart partnership between other government agencies, the private health care sector, and the community, based on a mutual understanding that benefits all for the implementation of the new Public Health concept.

From a wider perspective, (RL1; S4) should analyse the potential impact of the global trade liberalisation issues that include free movement of human capital, technology transfer, health financing, patent reform, and intellectual property rights. For the national interest, new laws to protect against infringement of intellectual property will be needed, while laws and regulations that hinders growth of any practice needs to be removed. (RL1; S4) also needs to take note that the digital divide among staff members in different States could become wider, unless appropriate preventive measures are taken. Thus, the movement of skilled workers needs to be controlled with due diligence to deliver a truly *national* health care service.

Research and Development (R&D) should be given a greater emphasis by considering an appropriate budget and fostering the collaboration and networking with other national and international agencies. The fact is that applied research must be combined with innovative efforts in health care service delivery with the aim to improve quality of life for all the population of Malaysia.

Even though the MoHM has claimed that a huge expenditure has been spent in the delivery of ICTs, as a result of lack of complete and integrated information, the existing systems are still unable to improve the planning and management of health sector resources. Nor are they useful to help guide future health care planning (MoHM 2003a, p. 262). Therefore, the ineffectiveness of the IMS is another area that needs to be looked into seriously by (RL1; S4), particularly by the Planning and Development Division. Whereby, under the integrated ICT for health care services, the intended systems must be able to support strategic planning and decision-making, and not just to document operations and producing health indicators.



### 7.5.8 The System 3-4 Homeostat (RL1; S3-4 Homeostat)

The diagnosis of (RL1; S3-4 Homeostat) revealed that it is synonymous to the (RL0; S3-4 Homeostat). The similarity is influenced by the fact that it is again represented by the same responsible agencies. To their scope of service is mainly to provide for 'here and now' for (RL1; S3) requirements instead of 'intelligence and future' input to support the (RL1; S5). This in turn causes a deficiency to enable (RL1; S5) to formulate an effective policy for the viability of the overall national health care service.

### 7.5.9 System Five (RL1; S5)

Fundamentally, (RL1; S5) deals with issues to design and formulate policies to ensure that a public health care service is delivered throughout Malaysia. Viability of the system is maintained by enhancing current service level agreements to match future trends in the sector. The level of service available and capacity to build a potential opportunities and respond to potential threats is based on information derived from (RL1; S3) and (RL1; S4) respectively.

In this respect, four major areas are identified that concern (RL1; S5) at this level of recursion (MoHM 2002, p. 9):

- Escalation of health care costs to the government, consequent upon the rising demand for greater access to high quality services and expectation for the provision of high cost medicine in response to changing disease patterns;
- Inequitable distribution of health care resources between developed and under-developed areas among the various SHDs;
- Overdependence of the population on health care services provided by the government. Thus, the MoHM is struggling to balance costs with revenue. The public health care services in Malaysia are highly subsidised by the government and only nominal fees are charged to the patients. For example, in the year 1998-1999,

the total revenue collected by the MoHM from provision of the services accounts for about 5% of the total annual operating budget for the Ministry (Malaysian Medical Association 1999b, p.4); and,

- Reinforcing the potential impact of the IMSs for the effectiveness in the decision-making processes, which eventually enables fulfilment of the high expectation of the public for the better and affordable public health care services.

In the VSM, the function of (RL1; S5) includes to monitor the balance of the (RL1; 3-4 Homeostat). However, in practice only (RL1; S3) (particularly the SG and the DGoH) give reports to (RL1; S5) based on the information furnished by (RL1; S1), (RL1; S3\*), and (RL1; S4). In fact (RL1; S4) very seldom interacts directly with (RL1; S5), *without prior permission* by (RL1; S3).

In certain circumstances, it is crucial that the broad management of (RL1; S5) shifts its focus of policy to deal with routine administrative matters. This is achieved by generating the alerting signals, which Beer calls the 'algedonic' signals. This signal allows (RL1; S5) to communicate directly with operating agencies in (RL1; S1). For instance, some cases are referred directly to the personal attention of the Minister, thus, requiring (RL1; S5) to consult with the Director of the SHD (in (RL1; S1)) for further clarification and immediate solutions.

#### 7.5.10 Findings From VSM Diagnosis At RL1

- (RL1; S3-4 Homeostat) are constrained by the departmental bureaucracy to access to (RL1; S5) directly, as (RL1; S4) is in the control of (RL1; S3); and,
- There is a mismatch between the role and function of (RL1; S4) in the model and real life.



## **7.6 Recursion Level Two (RL2) – State Health Department**

### **7.6.1 Background**

RL2 will focus on the role of SHD Perak, being one of the prominent SHDs in terms of its share in the public health care service delivery and in managing service delivery through its network of State and District Hospitals; Ipoh State Hospital and 13 District Hospitals.

In order to streamline service delivery, the MoHM categorises the operation of public hospitals into State and District Hospitals. State Hospitals are located in each of the fourteen State capitals. These hospitals provide a wide range of services: in primary health care (outpatients and ambulatory services), secondary care (inpatient; diagnostic, curative and rehabilitative services), and tertiary care (specialist services). Other than providing services to the public within their catchment areas, these State Hospitals also cater for referral cases from District Hospitals.

District Hospitals are set-up within every District with the facilities for the primary, secondary and inpatient facilities. Some big Districts Hospitals are being equipped with limited specialist services.

Besides the MoHM, the SHD Perak is also under the jurisdiction and answerable to the State Government of Perak. Any activities must be in line with local State political decision-making. The Director is also appointed as a member of the State Administrative Action Committee, the body that monitors the implementation of public projects in the State.

The discussion throughout this section will be based on the details of the VSM (RL2) shown in Figure 7.5 below.



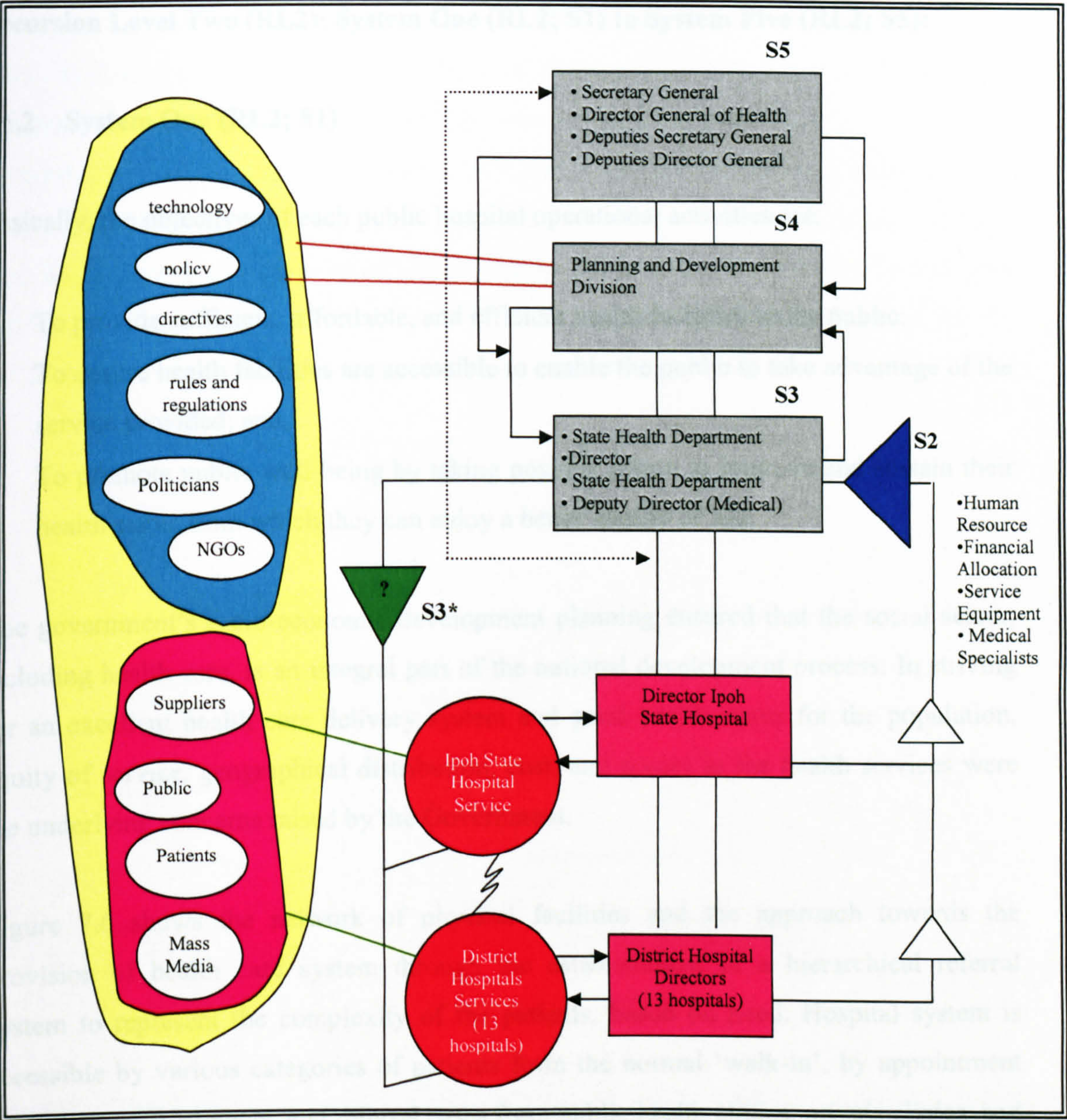


Figure 7.5 The basic structure of VSM Recursion Level Two: Perak SHD



**Recursion Level Two (RL2): System One (RL2; S1) to System Five (RL2; S5):****7.6.2 System One (RL2; S1)**

Basically, the objectives of each public hospital operational activities are:

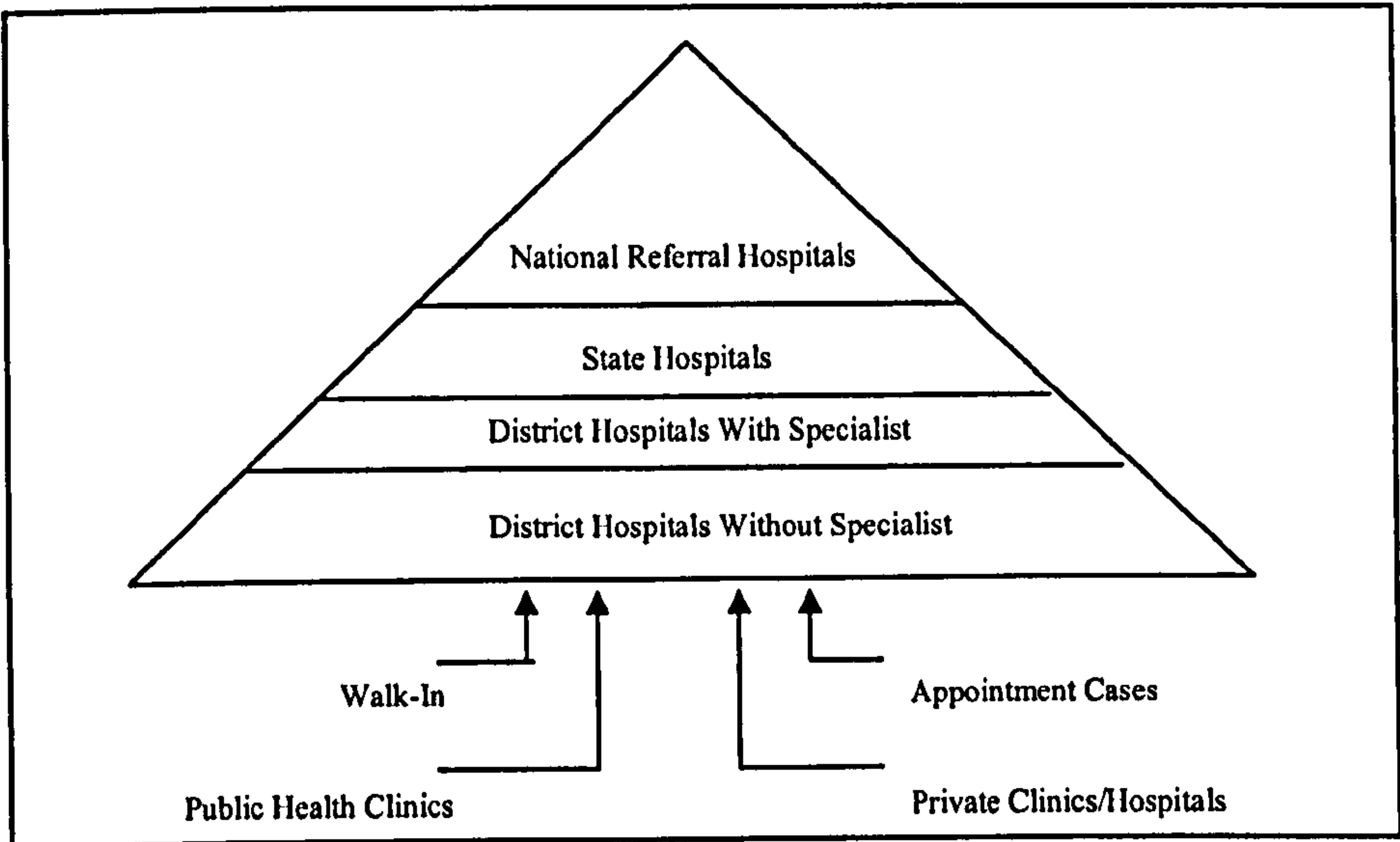
- To provide sufficient, affordable, and efficient health facilities to the public;
- To ensure health facilities are accessible to enable the public to take advantage of the service provided; and,
- To promote public well-being by taking positive action to improve and sustain their health status from which they can enjoy a better quality of life.

The government's socio-economic development planning ensured that the social sector, including health care, is an integral part of the national development process. In striving for an excellent health care delivery system and good health status for the population, equity of service, geographical distribution, cost, and access to the health services were the underlying concerns raised by the Government.

Figure 7.6 shows the network of physical facilities and the approach towards the provision of health care system through the establishment of a hierarchical referral system to represent the complexity of the patients, based on need. Hospital system is accessible by various categories of patients from the normal 'walk-in', by appointment for follow-up treatments, and referral cases from public health clinics, private clinics, and hospitals.

In 2004, the MoHM managed a total of 120 hospitals throughout the country with comprehensive health care services ranging from outpatient treatment to secondary and tertiary care services. Apart from size, the difference in the various types of hospitals is in the breadth type of services offered. Small District Hospitals provide general medical and nursing care, and are staffed by medical and other personnel without specialist service.

These are followed by the District Hospitals with some specialist services available, which are located at the larger towns such as Taiping and Teluk Intan in Perak. State Hospitals are located in the State capitals, and are in some cases centres for National Referrals. For instance, in the case of heart diseases treatment, in addition to the National Heart Institute in Kuala Lumpur, additional cardiac centres can be found in Serdang Hospital in Selangor to cater for the central region, Johor Bahru Hospital for the southern region, Kuching Hospital for Sabah and Sarawak patients, and Penang Hospital for the northern region (Economic Planning Unit Malaysia, 2001a, p. 494).



Source: adapted from Juni 1996

Figure 7.6 MoHM public hospital delivery system

It is crucial for the Director, who is a medical professional, to possess sufficient skills and competencies to ensure that the above objectives are fulfilled. The fact is that, in order to achieve requisite variety, the larger variety of the environment needs to be attenuated and at the same time the variety of hospital services must be amplified.

Table 7.1 shows the workload handled by all fourteen hospitals in the State of Perak, where 173,284 patients were given inpatient treatment in the year 2002 compared to the overall national figure of 1,7000,712 patients. The hospitals in Perak were equipped with 3,458 beds from the national total of 34,524.



Hospital Name	Bed Compliment Size	Bed Occupancy Rate (%)	Total Number of Admission	Average Length of Stay (day)
Ipoh State Hospital	990	60.36	50,889	4.27
Taiping Hospital	608	55.58	32,426	3.83
Teluk Intan Hospital	548	40.18	21,972	3.63
Parit Buntar Hospital	120	45.72	9,676	2.07
Kuala Kangsar Hospital	136	44.55	6,320	3.52
Batu Gajah Hospital	160	31.46	6,485	2.83
Kampar Hospital	90	31.11	2,880	3.58
Tapah Hospital	120	35.07	6,076	2.52
Slim River Hospital	108	44.42	6,333	2.76
Sri Manjung Hospital	270	47.97	16,209	2.92
Gerik Hospital	75	46.81	4,863	2.64
Selama Hospital	90	21.22	2,283	3.06
Changkat Melintang Hospital	50	39.02	2,666	2.67
Sungei Siput Hospital	93	33.68	4,206	2.74
Perak State Total	3,458	48.46	173,284	3.53
National Total	34,524	62.68	1,700,721	4.65

Source: Health Management Information System, Ministry of Health Malaysia.

Report Identifier: PER-PD 211

Table 7.1 Summary of inpatient for MoHM hospitals in Perak State for the year 2002

In 1999, 6.9% of the national budget was allocated for the provision of a national health service (MoHM 2003b, p.23). Even though effort has been expended to enhance the service level of the public hospitals, such as through the construction of new health facilities, the basic problem issues remain: shortage of skilled staff; ineffective work processes; and, obsolescence of physical facilities, due to poor maintenance.

The shortage of the skilled staff is alarming. For example since the end of year 2002, of the total of 12,708 posts available for medical professionals, only 7,902 or 62.2% were

filled, and those unfilled were mostly in the specialist service category (MoHM 2003c). The consequences of the shortage of skilled staff are serious. The patient load is too high and as a result, the staff are overworked. Ultimately, this is not a good omen for the delivery of a quality health care service. Patients have to bear long waiting lists and in certain examples have to wait for months to get specialist medical attention (Malaysian Medical Association 1999b). Hence, if the present shortage of staff is not addressed there will be a long-term adverse effect as new health facilities and waiting lists will increase while bed occupancy rates will remain low.

Even though the importance of ICT for speedy access to information for effective decision-making at all levels has been recognised, prior to a proper strategy the reorientation of work culture and value system of the workers and their roles and functions need to be addressed. Fundamental to the HISs is the construction of an integrated e-health record, which is at this moment only implemented at State Hospitals including Ipoh State Hospital, which functions more as a patients' billing system, than care enhancement system.

The nature of the public health care in the frontline delivery of service deals directly with the situation that a simple medical error may cost a patient's life. In addition, the error can be subject to mass-media attention that is very costly to the reputation of the Ministry. In this respect, the environment complexity is great, which means that hospital management must take every effort to achieve the requisite variety by attenuating the environment complexity, such as by reducing public complaints and at the same time amplifying the complexity of service delivery. This is done through enhancing the existing service, introducing new facilities, and replacing the 'beyond economic repair' and outdated medical facilities.

In terms of utilisation, Table 7.1 shows that in year 2002 all fourteen Perak State Hospitals handled 173,284 admissions against the overall national of 1.7 million patients. Overall bed occupancy rate (BOR) for hospitals in Perak was 48.46% (48.10% in 1999), compared to the overall national rate 62.68% (62.06% in 1999) which is low. Hospitals



with specialist services recorded high BOR (Ipoh and Taiping hospitals in particular). On the other hand, all the smaller hospitals without specialist services recorded a lower BOR (between 21.22% and 47.97%). Meanwhile, average length of stay is between 2.07 days and 4.27 days. Overall, all hospitals in the State experienced lower average length of stay compared to the overall national hospitals figure (3.53 days against 4.65 days).

The question that inevitably arises is whether the MoHM has over-invested or over estimated in building new hospitals, or has located them incorrectly. Since hospitals are expensive to build and maintain, there may be a need to review the current and future development of hospitals (Sahan 1998).

### 7.6.3 System Two (RL2; S2)

(RL2; S2) concerns monitoring the resource bargain with respect to ensure that hospitals are able to carry out activities according to their stipulated tasks. List of activities and the required resources by each hospital are planned in the annual report or incorporated in a five year project plan. The former is categorised under the operating budget and the latter under the Federal Government development budget.

Under normal circumstances, the list of activities of each hospital are gathered from discussion between (RL2; S3) and Hospital Directors. However, to respond to the environment variety, hospitals' service level has to be evaluated periodically, which is based on the performance of (RL2; S1), decisions from (RL2; S5) and their relevant justification. As a result, the review of the current service will be done, for example, in the form of introducing new services, re-sizing and upgrading the present service capacity, and even relocating physical services, as has happened to Teluk Intan Hospital in the late 1980s where a new hospital complex with a wider scope of service has been built at the new site.

Decision on the scope of service for each hospital is based on the performance reports submitted by the Hospital Directors to (RL2; S3) for justification, then forwarded to (RL2; S5) for further consideration and approval.

With respect to providing medical specialists, some specialists at the Ipoh State Hospital are required to provide their service to patients at District hospitals in the State. This is carried out based on the schedules that have been agreed by the respective hospital directors and endorsed by (RL2; S3).

In the case of provision of ICT facilities at all fourteen hospitals in Perak, which is centrally planned by (RL2; S5), it is obvious that (RL2; S2) plays an insignificant role. Implementation of several ICT networked application systems, such as hospital billing system and pilot telehealth systems that were only implemented at Ipoh Hospital, as other District hospitals still remain without computer network facilities. In fact, (RL2; S3) should consult (RL2; S5) to consider giving opportunity to other hospitals in the State to share the experience of Ipoh Hospital in their ICT activities.

Disparity in the ICT implementation among the hospitals in the State contributes to disparities in staff distribution. The existence of this unwelcome phenomenon has been highlighted by a respondent in the questionnaire response,

“Some top management are still unaware about the significant role and contribution of ICT in enhancing work processes”

(Senior Dental Officer, Dental District Office, Alor Setar, Kedah).

In this respect, some hospital staff have a great interest in internet access, searching for information relevant to their official duties. As mentioned by a Medical Officer in his questionnaire response,



“Unavailability of the internet service at the office means that access is made through my own personal account”

(Head of Diagnostic Imaging Department, Queen Elizabeth Hospital,  
Kota Kinabalu, Sabah).

As far as to nurture the value of the knowledge worker particularly among the hospital staff, a resource centre is deemed to be a fundamental addition, to provide routine information services and to carry out advocacy work, creating interest amongst health workers to update their information and knowledge. A comment from the following Medical Officer in the questionnaire response may represent the general situation about the existing status of the library service in District Hospitals. The officer mentioned that

“A library service should be provided in this hospital. Currently it does not exist at all”

(Medical Officer, Tapah District Hospital).

Therefore, the role of (RL2; S2) is crucial in order to streamline the establishment and enhancement of the information services, enhance work processes, and improve staff morale in all hospitals in the State.

#### 7.6.4 System Three (RL2; S3)

(RL2; S3) is led by the Director of the SHD of Perak and supported by the Deputy Director of the SHD (Medical). Functionally, (RL2; S3) is the link between the policy-maker of the public hospital service identity in (RL2; S5) and the implementation of the service delivery carried out through the network of public hospitals in Perak.

Beer (1979, pp.206-211) mentions that the fundamental role of S3 is to achieve the synergy in the public health care service which is derived from the *recognition of mutual support between the operational elements* of public hospitals services in S1. Beer also emphasises that S1 needs to act in a concerted manner within the context of *minimal systemic intervention in elemental autonomy*.

The effectiveness of the controlling role of (RL2; S3) will be translated by the ability to transform the wishes of (RL2; S5) in the form of policy directives to the efforts of the hospital directors towards developing their self-regulating performance with the given 'autonomy power'.

In reciprocating the set of policies issued by (RL2; S5), (RL2; S3) requires to bring to the attention of (RL2; S5) ways to enhance the overall hospital services, including those provided from the private health care system. This is to be justified within the context of the optimal use of the limited resources for the interest of the population within the State. As a short-term measure in facing the shortage of medical specialists in the public hospitals, subject to the sufficient financial allocation, referring certain priority cases to private specialists will ease the workload and burden of public hospitals and the problem of long waiting periods that patients experience in seeking treatment.

In actual fact, (RL2; S3) at this level of recursion is the (RL1; S1) at the previous level of recursion (RL1), in which the whole hospital service is embedded within a larger public health care services. In order for requisite variety, (RL2; S3) therefore must have the capability to absorb the variety of all public hospitals in the State. In addition to this, (RL2; S3) needs to ensure that all policy directives issued by (RL2; S5) are transmitted as smoothly as possible for the realisation of action at the implementation level in the hospitals in the State.

This scenario can be related to the effort by the MoHM to adopt the Health Promoting Hospital concept, based on the Budapest Declaration of 1997. In this respect, hospitals are an important component to generate health in the community. The programme re-orientates the traditional role of hospital as a place for treating illnesses to one that promotes wellness among its staff, patients, their families, and the community. Even though in the circular issued by (RL2; S5) in 1998 which required (RL2; S3) to formulate and implement their own strategic plan and activities appropriate to their local setting, the evaluation of activities undertaken were not encouraging. It was stated that primarily as a result of misunderstanding, SHDs, particularly (RL2; S3), failed to interpret the



requirement of the circular. Local initiatives were not promoted and activities implemented lacked focus (MoHM 2003a, pp.56-60). The MoHM anticipated that if the Budapest Declaration succeeds, then a strategy is feasible to reduce the burden on the acute health care system and allow resources to be devoted to other interventions such as good nutrition.

#### **7.6.5 System Three Star (RL2; S3\*)**

(RL2; S3\*) does not formally exist at this level of recursion.

#### **7.6.6 System Four (RL2; S4)**

In the operation of the hospital service in the Perak State, (RL2; S1), (RL2; S2) and (RL2; S3) are dedicated to the process of delivering the required service level through a network of fourteen hospitals as described in (RL2; S1). The successful functioning of (RL2; S1), (RL2; S2), and (RL2; S3) however, depends on the appropriate designed medical service programmes that are received by (RL2; S3) from the Planning and Development Division (which resides in RL2; S4) as incorporated in the service policy endorsed by (RL2; S5).

As can be seen from Figure 7.5 (see p.168), (RL2; S4) is relevant to the role of the Planning and Development Division of the MoHM which has the core business focus for the whole Ministry namely: Health plan formulation and evaluation; Facility planning and development; and, Health information collection, analysis, and dissemination (Ministry of Health Malaysia 2004a, p.202).

All of those are parts of the MoHM Health Policy which is decided by (RL2; S5), primarily to maintain and sustain the whole public health care service. With respect to the viability of the hospital service, (RL2; S4) collects and analyses information in the internal and external environment, in particular whatever influences the future performance of the service delivery. In formulating the planning process, (RL2; S4) also

invites relevant parties to contribute technical input to ensure the development of the comprehensive plan will benefit all sectors. This has been seen during the design stage of the preparation for the MoHM's 'Third Long-term Outline Perspective Plan (2001-2010)' in the year 2000. Within the context of the VSM, having recognised the potential of the environmental opportunities and threats, the relevant information including all the outcomes and compilations of the analyses are then submitted by (RL2; S4) upward to (RL2; S5). On the other hand, if the information is deemed to have immediate implications that affect the existing service status, such as distribution of facilities and disbursement of financial budgets, will be submitted to (RL2; S3) for speedy action.

Meanwhile, (RL2; S3) also communicates with (RL2; S4) about the present state and the potential future all relevant aspects of hospital service performance throughout Perak. This is done through regular meetings and relevant reports, either submitted directly to (RL2; S4) or brought to the attention of (RL2; S5).

In addition to the public involvement at the national level of health facilities planning, the success of individual project implementation is more significant. Therefore, (RL2; S4) considers the importance of providing an avenue for the public view right from the beginning of the planning stage, so that related problems such as geographical location and design problems can be addressed (MoHM 2004a, p.208).

#### **7.6.7 System Five (RL2; S5)**

(RL2; S5) consists all members of policy management, including the SG together with his two Deputy SGs who control the health resources, and the health service management group are represented by the DGoH and the three Deputy DGoHs. Basically, the role and responsibility of (RL2; S5) is similar to (RL1; S3) (at the previous level of recursion), which is to ensure that public hospital services contribute to the whole national health service delivery of the MoHM.



In this regard, the function of (RL2; S5) is to formulate hospital service policies based on the information provided by (RL2; S4) and also input of (RL2; S3), for strategic decision purposes. Thus, (RL2; S5) will issue policy directives, and to a certain extent allows all Directors of SHDs (RL2; S3) to make a proper adjustment for the suitable implementation at all hospitals in the respective States.

The aim of the service policy is to strive for viability, hence will be mainly based upon the ability of (RL2; S5) to regulate the (RL2; S3-4 Homeostat). (RL2; S4) focuses on future-oriented processes, while (RL2; S3) concerns the present implementation of hospital service delivery. Therefore, (RL2; S5) must be able to decide the balance of issues in providing and constructing new health facilities, upgrading and resizing the existing hospitals services and capacity planning.

In monitoring the performance of the overall SHDs, (RL2; S5) relies on the reports tabled during the SHDs regular meeting, progress reports submitted by the Directors, and also relevant recommendations by (RL2; S3).

Over and above all this, with respect to the performance of IM at this level of recursion, (RL2; S5) should give proper attention to the issue of effectiveness of the information dissemination mechanism in the sense of smooth flow of information - top-down and bottom-up. In the case of the latter, the quality of input received by senior management is somewhat unsatisfactory at present, for example, evidence from an interview response:

“I would like to relate this issue with my experience, whereby in most situations the outcome of the reporting system from my subordinates is outdated and not satisfactory. More often, the information provided for is not current and does not meet the level of expectation for the effective input in the decision making purpose. Hence, I reckon that a lot more things have to be done to improve the capability of the current system whereby sound decisions depend heavily on reliable sources of input”

(Director of Medical Practice Division, response to Q.1; Appendix 4.3).

Furthermore, the skill in handling the policy interpretation in practice, particularly at the (RL2; S3) level that will transmit downward to (RL2; S1), is a crucial factor for service effectiveness. Therefore, (RL2; S5) should regard policy dissemination, interpretation, and implementation as core contributions for service delivery. In addition, every policy issued must be evaluated from time to time.

In dealing with the total environment of the MoHM hospital services, (RL2; S4) therefore needs to be competent in project management skills as well as authority and knowledge in the technical and medical service. Following that, as has been discussed in the previous sections, the focus for the efficiency in the hospital service delivery must take into account the ability to contain issues of excess capacity in hospitals in terms of low bed occupancy rate, slow progress in the adoption of ICT programme and the shortage of skilled staff.

#### **7.6.8 Findings From VSM Diagnosis at RL2**

The issues that are diagnosed at this level of recursion reveal:

- A role for the viability of hospital services in terms of level of serviceability, efficiency and cost effectiveness as there is a limit in the public purse. With regard to considering the provision of health care as a social service, and by ensuring the basic health services are treated as public goods, the current policy of providing free or minimal fee charges for accessing such services should be maintained. Cost containment must be viewed within the perspective of enhancing the service efficiency rather than to burden the patients with extra fee charges;
- Inform a policy about the ICT implementation at hospitals, including to realise the adoption of the e-patient record and provision of computer network facilities. In relation to this, a study by Mohd Said, Abdul Ghani & Hairi (2001) reveals that staff competency is essential for working in an ICT environment. The study also identifies



that training opportunities and staff education background are relevant with respect to enhance ICT literacy rate among the staff;

- (RL2; S3\*) is absent; and,
- (RL2; S1-S5) – dissemination of timely reports that provide sufficient information in which to base decisions (for example planning and resource utilisation) is ineffective.

## **7.7 The VSM of The MoHM at the RL3 – Ipoh State Hospital**

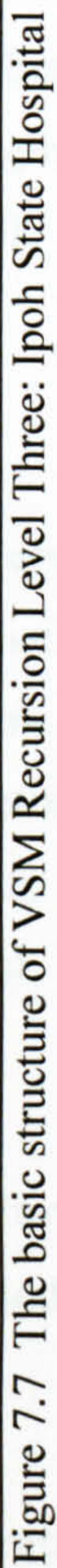
### **7.7.1 Background**

The image of MoHM is mainly mirrored by the level of quality of service in the public hospitals. Within the whole organisational structure, the individual hospital is at the third level of recursion of agencies within the MoHM organisational setup.

The role of public hospitals in Malaysia is to ensure the provision of sufficient health care which is accessible to all. This is the commitment and responsibility of the stakeholder, i.e. the Federal Government, in maintaining well-being for the population. Therefore, this must be complemented with the establishment of a sound support service and dedicated team members. The MoHM is the major provider of the health care service in the country. Besides the primary health care service, the secondary and tertiary medical care services are provided through a network of public hospitals that have been established throughout the country. As of 2000, there were 120 hospitals with a total of 34,118 of beds (Ministry of Health Malaysia 2004a, p.178).

The discussion of this section is based on the details as in Figure 7.7 (The basic structure of VSM Recursion Level Three – Ipoh State Hospital).







### 7.7.2 The Purpose

The purpose of adopting this method is to diagnose the viability of the public hospital service of the MoHM organisational recursion in accordance to Beer's VSM approach. This approach evaluates the existing public hospital operation based on the current set-up of the organisation structure. In this regard, Ipoh State Hospital which is located in the state capital of Perak is representative of a public hospital for this analysis. The Ipoh State Hospital comprises 990 beds that are distributed over 36 wards, with a 1,700 staff complement. The statistics for this hospital as of 2002 show the average daily number of beds occupied was 597.56, indicating a bed occupancy rate 60.36%; average length of stay was 4.27 days, and total number of admissions was 50,889 cases (MoHM 2004b).

### 7.7.3 Organisational Structure

Figure 7.7 shows that (RL3; S1) comprises three distinct Units: the Clinical Service Directorate, the Clinical Support Service Directorate and the Administrative Service. In more detail, as shown in Figure 7.8, the management of the hospital is headed by the Director of Hospital, who is answerable directly to the Director and Deputy Director of SHD (Medical). In the day-to-day routine, the Director of Hospital is assisted by the Deputy Director of Hospital (Medical), a post that is held by a medical professional, and Deputy Director of Hospital (Administration), who is a Hospital Manager.

The VSM diagnosis of the service provided by the Ipoh State Hospital will be further refined in lower levels of recursion; the Clinical Service Directorate (RL4); and Medical Directorate at (RL5).

Overall, there are common procedures adopted by all of the MoHM's hospital operations throughout the country. This is primarily based on the standard rulings that originate and issued from the Office of the DGoH. All the day-to-day issues related to hospital services are handled directly by the Director of Medical Development Division within the MoHM

who interacts with each of the fourteen SHDs via the respective SHD Directors and held responsibly by the Deputy SHD Director (Medical).

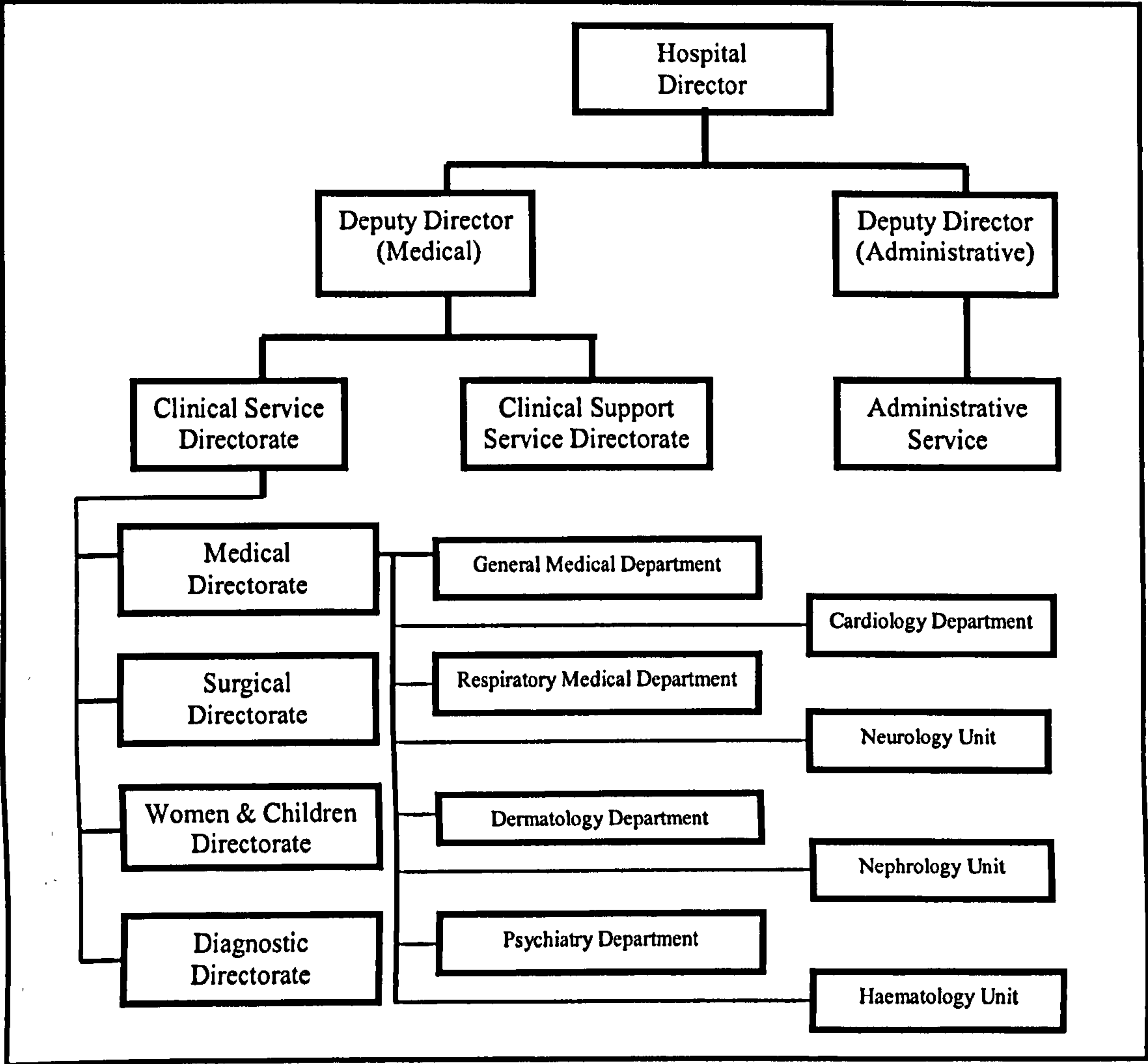


Figure 7.8 Organisational chart of Ipoh State Hospital

7.7.4 Services Provided

On average the hospital treats about 620,000 outpatients and 50,889 inpatients annually (MoHM 2004b). Ipoh State Hospital also acts as a referral hospital for the thirteen District Hospitals and other private clinics and hospitals in the State of Perak. Therefore, various specialist services are provided in the respective medical departments. Apart from providing health care services, Ipoh State Hospital is also equipped with facilities to train



candidates under the postgraduate training programme, trainee doctors and student nurses. About 60 houseman officers and 400 staff nurses are trained each year.

- **Human Resources**

The Administrative Division is responsible for handling all matters pertaining to human resources from the recruitment, promotion, training, retirement, and disciplinary actions.

- **Training**

Training is an important element that is considered crucial in supporting the hospital service. The main purpose is to ensure that staff members keep abreast of technologies and gain new skills so to match with the state-of-the-art equipment.

- **Procurement**

Prior to staff procurement, financial allocation must be formally requested and channelled through the Head of Programme, which is normally submitted prior to the current financial year for the operating budget (on an annual basis) or development budget (in each five year period). With the approved financial allocation, the procurement processes must be done in accordance with procedures presented in the Federal Treasury instructions.

With the autonomy given by MoHM, all organisations including hospitals can handle directly procurement up to the value of RM200,000. If the value exceeds RM200,000, the procurement process will be handled by the Procurement and Privatisation Division of the MoHM through competitive tendering.

### **7.7.5 Environment Complexity**

- **External Environment**

In order to maintain their viability, public hospitals have to manage their interactions with the organisations (elements) in the external environment. Technological change in health care service delivery is an unavoidable phenomenon that needs to give a great care. Containing the impact must be related to enhancement of service delivery. Hence, in the

planning and development for the health care service, the hospital management must be able to anticipate the potential implication of the affected factors, such as financial aspects, human resources, work procedures, and physical space requirements.

From a policy perspective, since the government is the major stakeholder, operation of public hospitals must be able to be adapted to the respective policies introduced from time to time by the government. In addition, directives issued by the MoHM explains the policy statements in more detail for their successful implementation or operation. Factors that may implicate the respective hospitals service operation are:

- The policy to increase the number of medical professionals to decrease the ratio of number of patients per doctor requires the setting up of new, or expansion of existing, medical colleges; and,
- Certain hospitals have been upgraded to cater for the needs of referral services, such as by increasing the number of beds and providing extra facilities in the tertiary health service. For instance, setting up of regional referral centre in the Penang State Hospital to serve for coronary cases from all the northern States and Pandan Hospital in Johor which provides oncology treatment for patients in the southern States.

- **Internal Environment**

Several entities that are pertinent to the internal environment are as follows.

- **Law Enforcement Agencies and Insurance Companies**

Opinions and certification by medical experts are frequently sought after to justify the findings of cases under the purview of various agencies such as the Police Department, court authorities, and insurance companies that are related to legal proceedings such as accidents, or other criminal cases. At the (RL3; S1), this issue is under the purview of the Clinical Support Services that manages patient's medical records for each hospital.



- **Insurance Companies**

Most insurance claims are made under the personal and health insurance schemes by the affected policy holders that must be justified by the hospital authority. Details as recorded in the patient's medical record will form the basis for such claims and payments. To a certain extent, some cases go forward for legal proceedings and judged via the courts.

- **Medical Students and Students Nurses**

The hospital provides training facilities such as lecture rooms, lecturers, access to patients and other related facilities for all of the trainees. Meanwhile, the Nurses Training School and the Medical Faculty are responsible for the overall affairs of the respective trainees.

- **Employers**

Employers are responsible for the welfare of all staff and to protect the right of their employees in obtaining the appropriate medical services and for the settlement of their medical bills. Administrative Services is responsible in handling all activities related to financial administration for each hospital that includes billing and financial settlements.

- **Suppliers**

In line with government policy, some of the hospital support services have been privatised. The main purpose of the privatisation is to avoid unnecessary bureaucracy in public services, resulting in an increased efficiency of health care delivery. Several consortia of private companies have been assigned to carry out such services in all MohM, premises including public hospitals. To date there are several services that have been privatised such as the supply of pharmaceuticals and medical equipment, maintenance of medical and bio-engineering equipment. The supply of high technology ICT equipment for the newly constructed ICT-based hospitals, has also been privatised.

- **Patients**

Public hospitals provide a range of services to cater for the health care needs of the population residing within the geographical catchment areas. There are various ways in which the public can access medical services in public hospitals: walk-in, by appointment, referral, or transfer from private clinics and private hospitals.

The provision of public health care in Malaysia is a part of the government's social responsibility, hence only a token fee is imposed for the provision of health services and fees are exempted for certain categories of patients, such as patients in lower income groups, school children, and government employees.

The overall number of outpatients in 2000 was 27,592,030; total admissions to hospital was 1,612,691 (MoHM 2004a, pp.175-179).

### **Recursion Level 3 (RL3): System One (RL3; S1) to System Five (RL3; S5)**

#### **7.7.6 System One (RL3; S1)**

The operation of any public hospital tries to accommodate the variety found in its patients by at least matching with the variety of services available, such as provision of primary, secondary, tertiary, and mobile health care services. In terms of patient satisfaction, hospital management tries to amplify the satisfactory level and attenuate their level of dissatisfaction. Thus, actions must be taken in looking for the best ways to establish best practice and facilitate communication with the system environment.

The Clinical Service Directorate handles the frontline activities with regard to delivery of the health care service. In the unfolding of complexity of related activities in this Directorate, several medical departments have been established and each is headed by a Head of Department to manage services in the Medical, Surgical, Women and Children, and Diagnostic areas.



Activities under the Clinical Support Directorate includes the Departments of Pharmacy and Supply, Dietetics and Catering, Medical Welfare, Health Education, Rehabilitation, and Medical Records.

Administrative Services handles activities such as General Administration, Financial Services, Billing, Training, and Hospital Maintenance and Support Services.

#### **7.7.7 System Two (RL3; S2)**

The main (RL3; S2) role is to damp oscillations among the activities of each of the three Directorates, and co-ordinates resource bargain activities between them to be consistent with the Federal Government's standards and procedures.

For staff training programmes, training schedules are planned prior to the calendar year. This includes a list of training courses, staff involved, and the financial budget appropriated for the delivery of training materials. Activities related to procurement and maintenance services are subject to the financial instructions and list of job schedules that are stipulated in the contract documents. While for staffing matters, the gold standard adopted is the Malaysian Civil Service's General Orders.

Hospitals also provide blood transfusion services, handled by the Laboratory Services Unit in the smaller hospitals and the Pathology Departments in larger hospitals (MoHM 2001a, p.189). The main role of this service is to ensure a continuous supply of blood and blood products which are safe, of high quality and accessible for all who need them. In Malaysia there are two options for the procurement of blood products, either via public blood donations which are voluntary, or replacement donors via a patient's relatives or friends (MoHM 2003b, p.179). The blood transfusion service also includes blood testing and processing, blood grouping and cross matching, supply of screened blood and their constituent blood products and storage. In addition, technical support and co-ordinating all blood banks are also provided.

In normal circumstances, use of the shared medical facilities by other elements in the (RL3; S1) is subject to the advance request and appointment schedule. This includes the use of specific services such as Magnetic Resonance Imaging (MRI), Computerised Tomography Scanners (CT- Scan), mammography, and radiology.

An Inpatient Management System (IPMS) has been developed by the ISOs from the ICT Division of the MoHM, and was implemented at each State Hospital in 1999. The scope of the IPMS however, is mainly for financial management purposes with respect to inpatient billing processes rather than for the integration within the wider Hospital Information Systems (HIS).

Ipoh State Hospital together with Kuala Lumpur Hospital, Kajang Hospital (in Selangor), and Seremban State Hospital (in Negeri Sembilan) have been identified as pilot sites in the 'MSC Telehealth' project (MoHM 1997, pp.26-27). Even though the development phase of the project commenced in 1999, the five year roll out plan for the pilot implementation is unlikely to deliver any telehealth service in the regions identified.

#### **7.7.8 System Three (RL3; S3)**

(RL3; S3) manages the 'inside and now' hospital activities, so it includes the functions of the Hospital Director with the participation of the two Deputy Directors. In the day-to-day decisions, (RL3; S3) issues commands during the meetings and discussions, using memos or internal circular letters, and receives feedback in various ways. The feedback received from (RL3; S1) is very useful with regard to the enhancement of service delivery. For example, in order to serve the purpose of its establishment, each public hospital has to align local health interest with the national health interest. For instance, to satisfy the increasing complexity of user needs, if there is any potential to provide new services or upgrade existing service levels, (RL3; S3) of the Hospital takes initiatives forward via proposals to the MoHM via the SHD. For example, in the case of the huge number of patients who need the use of haemodialysis machines, justification for the financial



burden, technical support requirement, and staff and patient training must be included in the request for extra service provision.

Overall, managing the operations of Ipoh State Hospital implies more than co-ordinating operations in order to satisfy the demands of the public and patients with the required quality of services. It also implies managing the potential resources involved in decision-making, which includes:

- To meet the increasing complexity of public and patients requirement (variety);
- To fulfil stakeholder expectations such as reducing red tape and civil service bureaucracy in the delivery of the health care service;
- To provide adequate IMSs; and,
- To provide co-ordinated and transparent work practices and procedures.

In addition, (RL3; S3) also monitors all of the Directorates' activities to ensure that they are compliant with government regulations.

The Director of the Hospital is a post held by a medical professional. This is the highest position that can be achieved in a hospital. However, in State Hospitals in particular, the rank of some of the Heads of Medical Departments might be higher than the Director. The effect of this may raise cultural issues. In addition to sound medical skills, managing a hospital needs a sound knowledge of management. The service provided involves various elements other than medical-related services, such as human resource management, financial management, and legal aspects. Furthermore, an understanding of ICTs is regarded as a valuable advantage.

#### **7.7.9 System Three Star (RL3; S3\*)**

The auditing function is not formalised under the jurisdiction of the hospital authority, as it is centrally performed by officers from the Internal Audit Unit of the MoHM (RL0; S3\*).

Therefore, the monitoring channel of (RL3; S3\*) to (RL3; S1) is not formally defined under the existing organisational structure at any of the MoHM's hospitals.

#### **7.7.10 System Four (RL3; S4)**

The VSM is concerned with the characteristics and behaviours essential in an organisation if that the organisation is to survive in an environment which is forever changing, epitomised by the role of (RL3; S4). In the existing organisational structure in Malaysia hospitals, the function of planning, development, and research are all centrally managed at the MoHM (RL0; S4).

However, the Hospital's Board of Visitors has been formally instituted at each hospital. Board members are appointed from distinguished persons within the geographical location of a hospital's establishment by the MoHM. The role of the members is limited, and is mostly related to oversee the service performance carried out by the hospital. A Secretariat is located in each hospital and all comments and suggestions made are forwarded to the hospital management for further action.

#### **7.7.11 System Five (RL3; S5)**

(RL3; S5) includes of the DGoH, Deputy DGoHD (Medical), SHD Director, and Deputy SHD Director (Medical). (RL3; S5) involves the formulation of policy for the hospital service, setting up of new hospital services, upgrading service capability in existing hospitals, and implementing a medical fee structure.

To ensure that MoHM policies are rolled out, a function of (RL3; S5) is to issue relevant circulars or use other dissemination methods to deliver important messages.



### 7.7.12 Findings From VSM Diagnosis at RL3

From the above system exploration, the adoption of the VSM in diagnosing the organisational structure of hospital has uncovered the following factors:

- Role of (RL3; S3\*) is not formally established at the hospital level of recursion instead it is centrally controlled at the MoHM. Hence, there is a need to formalise an internal audit function at each hospital;
- The Hospital Visitors Board in (RL3; S4) is not functionally effective. Most of the Board members are appointed by the MoHM within an advisory role. More often than not, members' actions do not reflect public opinion;
- Some processes in (RL3; S1) are too formal and add unnecessary bureaucracy. The adherence to MoHM standards and procedures are perceived as 'red tape' rather than aiding the facilitation of service delivery. In certain circumstances the added bureaucracy leads to counterintuitive system behaviour – that is, instead of enhancing service delivery, the delays in the system caused by 'red tape' syndrome lead to poor performance;
- Issue of integrated ISs at the hospital level in particular is still not given a serious consideration by (RL1; S5) in particular, as the MoHM's policy-making hub. Therefore, even though the so-called Hospital In-Patient Management Systems (IPMS) have been introduced several years ago at State Hospitals, yet the setting up of the proper ICT Unit for supporting the service is not the priority; and,
- Medical statistics derived by the hospital still relies on manual processes. This has a knock-on effect on the ability to manage performance in real-time.

## **7.8 The VSM of The MoHM at the Level of Recursion Four (RL4) – Ipoh State Hospital Clinical Directorate**

### **7.8.1 Background**

The Clinical Directorate is a key entity in carrying out frontline activities for public health care service delivery within MoHM hospitals. It consists of various components that generally are categorised under four different service foci: Medical Services; Surgical Services; Women and Children Services; and Medical Diagnostic Services. In order to attenuate the complexity of these services, various Departments and Units have been established. As a means of sharing knowledge, expertise, and streamlining service delivery, permanent members of the Clinical Directorate are also the Heads of the respective Clinical Services of the hospital. More often than not, the Hospital Director is the Chairperson of the Clinical Directorate.

#### **• Services Provided**

The Clinical Services Directorate in Ipoh State Hospital comprises 25 separate Clinical Departments and Units as shown in Table 7.2. Each is led by a Head of the Department or Unit.

The Clinical Directorate handles all kinds of patient treatment through the service variety of the Medical Departments. Patients are normally referred to this Directorate via the following methods:

- Walk-in cases that are handled by the hospital's polyclinic, which forms the largest proportion of the cases handled;
- Emergency cases, that are handled through the Admission and Emergency Department;
- Referral cases from District Hospitals or private hospitals that require further specialist care; and,
- Follow-up cases that require regular observation.



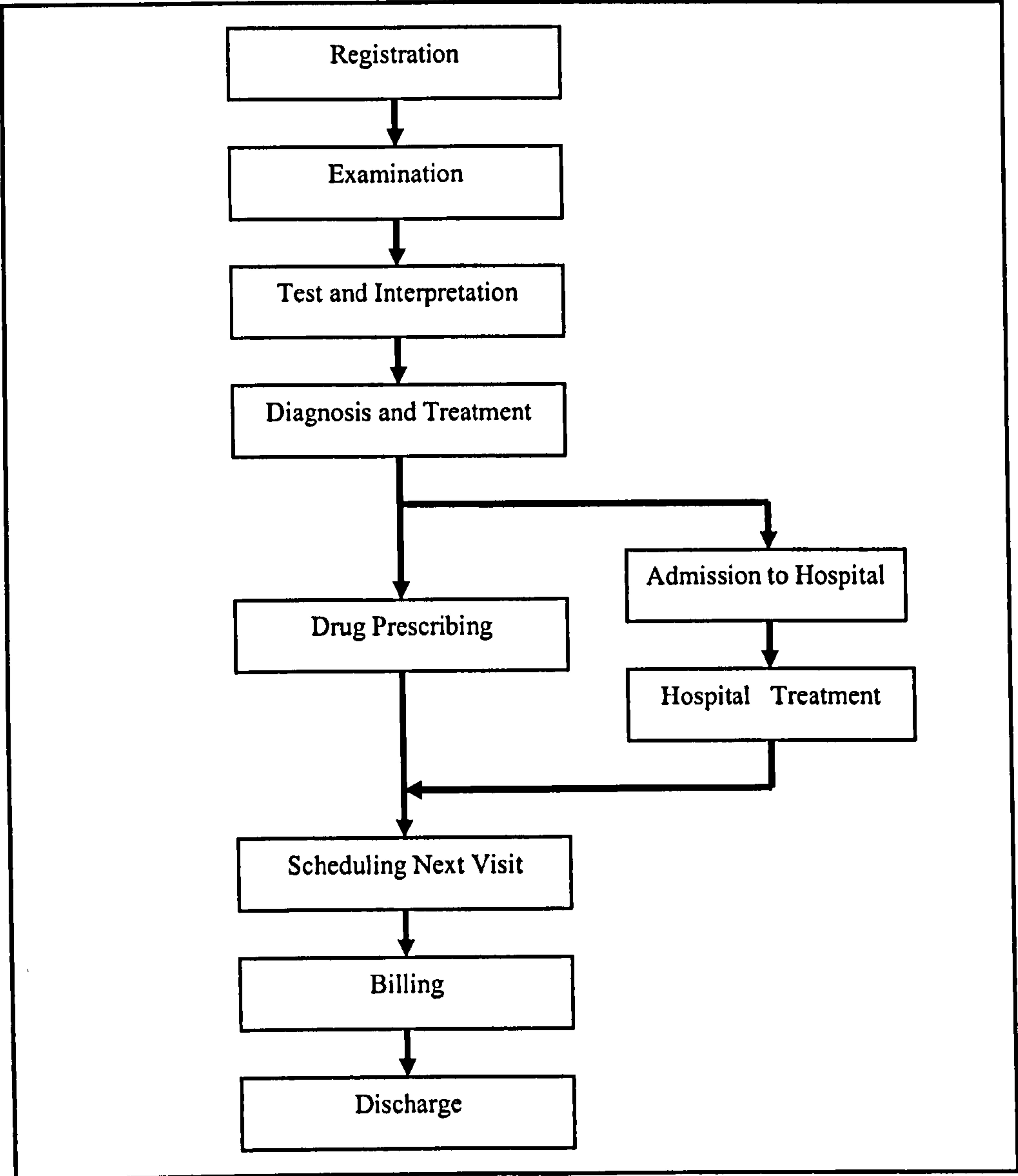
Medical Services	Surgical Services	Women and Children Services	Medical Diagnostic Services
General Medical Department	General Surgery Department	Paediatric Department	Pathology Department
Medical Respiratory Department	Orthopaedic Department	Obstetric and Diagnostic Department	Imaging and Diagnostic Department
Dermatology Department	Ophthalmology Department		
Psychiatry Department	Cardiothoracic Department		
Cardiology Department	Anaesthesiology and Perfusion Department		
Neurology Unit	Emergency Department		
Nephrology Unit	Urology Department		
Haematology Unit	Oncology Department		
	Neurosurgery Department		
	Oro-Max-Faso Surgery Department		
	Paediatric Surgery Department		
	Plastic Surgery Department		

Table 7.2 Ipoh State Hospital (List of Medical Departments and Units under the Clinical Directorate)

In relation to the public health care service delivery system shown in Figure 7.6 (see p.170), Figure 7.9 below depicts the overall flow of the patient care activities. In outline, it



reveals that the Clinical Directorate is involved in the process from the examination stage until patients are discharged.



Source: adapted from MoHM 1997, p.39

Figure 7.9 Process flow in the Clinical Services

7.8.2 Environment Complexity (External)

As the Clinical Directorate is an entity within the hospital organisation, most of the external elements are same as in the previous level of recursion (RL3). The ability to



detect the impact of the medical service delivery will somehow commence at this level of recursion (RL4).

Figure 7.10 shows the VSM at RL4 and outlines the entities needed to diagnose the functional activities of the Clinical Directorate at Ipoh State Hospital. The Basic Structure of VSM RL4 - Clinical Service Directorate, will be discussed in the following sub-sections.

### **7.8.3 Environment Complexity (Internal)**

- **Employers**

The employers are responsible for the welfare of all staff, including their rights for getting the appropriate medical services and for the settlement of their medical bills. Administrative Services (RL3; S1) is responsible for handling all activities related to financial administration for each hospital which includes billing and financial settlements.

- **Public**

The presence and concern of a patients' family members and visitors on the clinical premises need to be controlled within limits to ensure that they do not interfere with the right of patients receive maximum benefit from their treatment. To achieve this, patient visitors are asked to come within scheduled visiting hours to wards, and patients themselves to attend clinics within their stated operating hours. Some areas of the hospital remain 'out of bounds' to visitors, mainly for their own safety.

- **Patients**

The Clinical Directorate offers inpatient, outpatient, and follow-up rehabilitative types of services. All patients are registered, which is handled by the Patient Registration Unit, under the remit of Administrative Services. In present practice, for every new registrant, a new registration card will be raised together with a unique registration number. The card will be kept as part of the patient's medical record and a small acknowledgement card will be handed to the respective patient for their reference and safekeeping.

- **Qualified Doctors**

Each doctor is assigned with a duty roster and their scope of work is prepared on a weekly basis by the Head of Department and approved by the Chairman of the respective Clinical Service Directorate. The duty is completed on a shift rotational basis. There are 'normal' and 'on-call' working hours. Doctors are categorised into General Practitioners, Specialists, and Consultants. Their work area covers hospital clinics as well as wards.

Each doctor is responsible for handling all cases under their care, and have to report the status and progress of each case in summary form to the Head of Department each day. To attenuate the complexity concerning the diagnostic process, the doctor may require to consult with other doctors' to seek their expert opinion.

All doctors must adhere to the code of conduct and work ethic in performing their service, including giving treatment to all patients in an equitable manner.

- **Qualified Nurses**

There are various categories of nurses involved in the provision of care; nurses, assistant nurses, community nurses. All are supervised by their senior officer with the rank of Sister or Matron. Other than doctors, nurses are the key personnel that deal with patients directly. The fundamental responsibilities of nurses are to promote health, prevent illness, restore health, and alleviate suffering caused by ill health.

- **Other Services**

Personnel from other disciplines such as Clinical Support Services, also play role in the clinical service operation.

- **Nursing Students**

Prior to their appointment as professional nurses, all student nurses are required to undergo a systematic three year training. Other than classroom lectures, the trainees are also required to be exposed to patients during their training period allowing acquisition of 'hands on' experience. They are supervised by qualified nurses at all times.



- **Medical Students**

Medical students require practical experience obtained from direct access to patients that are being treated. The Ipoh State Hospital is one of 28 MoHM hospitals authorised as the medical training hospitals in the country (Utusan Malaysia 2004). Therefore, teaching and learning facilities such as auditoria, laboratories, as well as student accommodation are required and add to the facilities offered by the Hospital. Medical students can only gain access to certain patients, and are supervised by a suitably qualified doctor.

**Recursion Level Four (RL4): System One (RL4; S1) to System Five (RL4; S5):**

The following discussion will be mainly based on issues pertinent to the diagram as shown in Figure 7.10.

#### **7.8.4 System One (RL4; S1)**

In attenuating the incoming variety from the environment, through the supervision of the respective Directorate Chairperson, each of the four Directorates in (RL4; S1) have been assigned a scope of tasks to deal with. The Chairperson of each Directorate is appointed from among the experienced and senior doctors. Some Chairs hold a higher rank than the position of Hospital Director.

As has been explained in the previous recursion level (RL3), the image of the Hospital relies heavily on the performance of the service delivered which is handled by the Clinical Service Directorate. In order to absorb the complexity of related activities under this Directorate, these functions have been unfolded further into several medical departments and each is led by a respective Head of Department.

The objectives of each of the Directorates under RL4 include:

- Provide quality medical services and outpatient treatment that is quick, efficient, and effective, and performed in a caring manner;



- Identify and refer cases that need follow up to identified specialist clinics; and,
- Reduce mortality and morbidity of inpatients by providing specialist treatment.

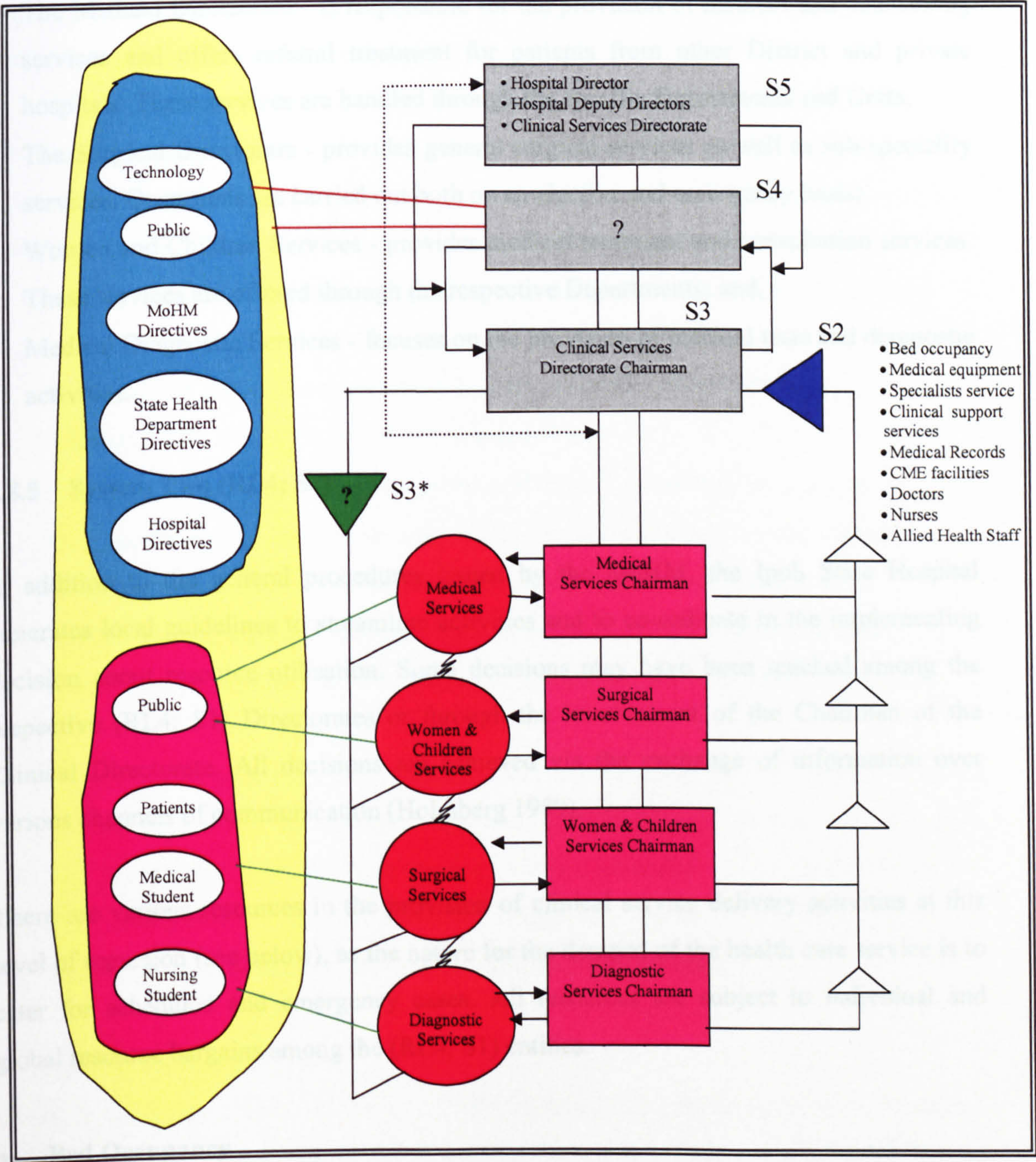


Figure 7.10 The basic structure of VSM Recursion Level Four: Clinical Service Directorate



Each of the four main services under the remit of the Clinical Directorate are involved in specific service areas namely:

- The Medical Directorate - is responsible for the provision of medical and counselling services and offers referral treatment for patients from other District and private hospitals. These services are handled through the specific Departments and Units;
- The Surgical Directorate - provides general surgical services as well as sub-speciality services. Operations are carried out both on an elective and emergency basis;
- Women and Children Services - provides medical treatment and consultation services. These services are offered through the respective Departments; and,
- Medical Diagnostic Services - focuses on the provision of medical tests and diagnostic activities.

#### **7.8.5 System Two (RL4; S2)**

In addition to the general procedures issued by the MoHM, the Ipoh State Hospital generates local guidelines to streamline activities and to co-ordinate in the implementing decision about resource utilisation. Some decisions may have been reached among the respective (RL4; S1) Directorates or through the involvement of the Chairman of the Clinical Directorate. All decisions are achieved via the exchange of information over various channels of communication (Holmberg 1989).

There are various resources in the provision of clinical service delivery activities at this level of recursion (see below), as the nature for the demand of the health care service is to cater for scheduled and emergency cases. All resources are subject to individual and global resource bargains among the (RL4; S1) entities.

- **Bed Occupancy**

A sufficient number of vacant beds must be ready to cater for the scheduled and emergency cases that obtain ward admissions, and the variety must be able to match the case-mix. Patient admissions are based on the decisions of doctors in the Clinical

Directorate, and the Hospital Registration Office identifies to which ward the patient is to be admitted. Information gained includes type of bed for which the employer's guarantee letter is used to determine the patient's status. Normally, financial obligations will be dealt with by an officer in the hospital's Financial Division directly dealing with the patient's employer or insurance company.

- **Medical Equipment**

All medical equipment used on patients must be safe, secure, and have a sufficient stock level for completion of the treatment. For example, other than the physical space occupied by operating theatres, they require surgical equipment, and other components, such as:

- A preparation room, to keep all items that are to be used during surgery;
- A sterile room, to cater for sterilisation preparation;
- An anaesthetic room, to store equipment and drugs for anaesthetics purposes;
- An equipment store, to store surgical related items such as stitches and staples;
- A holding bay, a place where patients will be kept before their operation;
- A recovery bay, a place where patients will be kept after their operation; and,
- A waiting area, a place where relatives and friends can wait for news of progress.

In the resource bargain scenario, these facilities are managed by the Surgical Services Directorate, exerted by the Medical Services Directorate and Women and Children Services Directorate; and the maintenance function is under the responsibility of the hospital's Administrative Service. While, the Diagnostic Service Directorate is responsible for the storage and management of the captured images of patients.

- **Medical Specialist Service**

Other than treating patients at the Ipoh State Hospital and delivering lectures to medical students, medical specialists are also required to extend their service to 13 District Hospitals in Perak State, according to the prepared schedules.



- **Clinical Support Services**

Clinical support services include the provision of facilities such as an ambulance service, day care centre, mobile/exhibition for advisory/counselling/talks. A kitchen service prepares suitable meals to satisfy the diet of inpatient cases.

All activities need a proper schedule, since they involve various entities in (RL; S1). Therefore, the relevant chairperson in the Clinical Directorate in (RL4; S1) must deal with issues of synchronisation so that patients experience is seamless.

- **Medical Records**

Medical records contain information that is formed as a basis of the patient's consultation and must contain a complete set of patient biodata and medical history. Therefore, it includes details of the identified diagnosis and treatment given, regarding the current episode, plus a record of past events.

Information about the treatment of patients are pertinent for the performance measurement of the service delivery by each doctor and hospital. Therefore, clinical records management is deemed a crucial element in the patient care management process. Furthermore, accuracy and completeness of the clinical record is of great help to form the basis for formulating appropriate advice, diagnosis, and treatment, whenever such patients may seek such services. However, clinical records management at Ipoh State Hospital still relies on manual, paper-based practices.

- **Continuing Medical Education (CME) Facilities**

The Ipoh State Hospital has established a CME Unit to co-ordinate all relevant activities in order to cater for the needs of staff members, patients, and the public. For staff members, the purpose of the CME Unit is to ensure that staff keep abreast of changes in medical practice through activities that provide exposure to new concepts, procedural refinements, innovative product applications, and acquisition of increased expertise. This is done through a series of medical discussions and seminars. For patients, the CME programme is conducted through sessions of counselling and rehabilitative treatments. Various

programmes have been scheduled for health care preventive, curative, and advisory talks for the public.

#### **7.8.6 System Three (RL4; S3)**

The Chairperson of the Clinical Service Directorate sits at (RL4; S3), a post normally held by the Director of the Hospital. However, (RL4; S3) is at this stage not formally institutionalised, hence, his/her actions are carried out based on the official capacity as the Hospital Director.

Considering the fact that most Senior Medical Officers of the Hospital (representing RL4; S1) get involved at some time in formal discussions with the (RL4; S3), therefore, in most instances they might have used these meetings as a platform to decide issues that should have been discussed at a higher level of recursion, i.e. RL3, such as:

- Shortage of medical professionals may affect the performance of service delivery of the Hospital, and are strongly felt at this recursion level; and,
- Lack of appropriate medical facilities provided by the hospital, that may adversely affect the service performance. This is particularly pertinent during emergency admissions and unforeseen circumstances such as those that have been experienced in overcoming severe epidemics such as Japanese Encephalitis (JE), Severe Acute Respiratory Syndrome (SARS), and AIDS, whereby constraints in the financial resources and bureaucracy influenced the quality of service.

#### **7.8.7 System Three Star (RL4; S3\*)**

Auditing activities of (RL4; S3\*) are not locally exercised, as it is a function of MoHM at (RL0; S3\*).



### **7.8.8 System Four (RL4; S4)**

The role of (RL4; S4) is not formally recognised.

### **7.8.9 The System Three-Four Homeostat (RL4; S3-4 Homeostat)**

(RL4; S3-4 Homeostat) does not exist.

### **7.8.10 System Five (RL4; S5)**

The diagnosis of VSM at this level of recursion declares that the role of the Director of Hospital as (RL4; S5) is redundant with (RL4; S3). Through tracing (RL4; S3) at the previous level of recursion (RL3), a response is that the whole accountability for Hospital operation resides within the Director's authority. His position is obviously more effective as (RL3; S3) than (RL4; S5). So do with the role of the Deputy Directors of Ipoh State Hospital, as they are not in the position to question the decision of the Director at the (RL4; S3).

### **7.8.11 Findings From the VSM Diagnosis**

- Hospital operations, including Clinical Directorate activities are centrally controlled. Therefore, any local adaptations of the service requires the approval of the MoHM (RL2; S5);
- In Ipoh State Hospital, some of the Heads of Medical Departments are ranked higher than the Hospital Director's position. This may result in a cultural issue to do with authority and respecting managerial judgements made;
- The role of (RL4; S5) and (RL4; S3) are handled simultaneously by the officer under the official capacity of the Hospital Director. The result is that the Director is mostly overloaded by trivial operational problems at (RL4; S3) and in turn, lacks attention to operate within a policy framework in (RL4; S5);

- Members of the Clinical Service Directorate are not from multidisciplinary background leading to a loss of variety. The Chairperson and members of the four Clinical Services are all Medical professionals. The absence of non-medical opinions in the management of (RL4; S1) and (RL4; S3) at this level of recursion (RL4) might affect the decision process related to resource management for Hospital's clinical service delivery;
- (RL4; S3\*) and (RL4; S3) do not formally exist at this level of recursion, hence (RL4; S3-4 Homeostat) does not exist;
- (RL4; S3\*), (RL4; S4) need to be activated, as has been mentioned in the context of previous level of recursion, RL3;
- The acute shortage of medical staff is felt at the operational level (RL4; S1). An impact of this finding is that the serving doctors work longer hours than they should, a longer waiting time for patients to gain access to their required medical services is just one of the consequences of this action;
- As a result of the adoption of manual procedures in the clinical record management system, clinicians find great difficulty in accessing medical records at the right time and in the right place. When the patient record is obtained most of the records are found incomplete;
- ICT should be widely adopted, incentives should be introduced to the hospital staff to foster their interest, such as use of training facilities, provision of well equipped computer networking facilities and equipment to all offices and wards in the Hospital. To realise this, a reliable and sufficient support team must be established. At present, lacking ICT facilities is a common phenomenon as all ICT projects and staff recruitment and placement are initiated by the MoHM centrally (RL1; S3); and,
- The requirement of this Hospital's Clinical Services can be used to formulate a development plan for a MoHM capacity model to represent the overall scope of health care information management.



## **7.9 The VSM of The MoHM at the Level of Recursion Five (RL5) – Ipoh State Hospital Medical Directorate**

### **7.9.1 Background**

The hospital's Medical Directorate, which is under the remit of the Clinical Directorate, makes an effort to match the variety of their environment via the establishment of the following Medical Departments and Medical Units (see Table 7.2, p.195): General Medical Department; Respiratory Medical Department; Dermatology Department; Psychiatry Department; Cardiology Department; Neurology Unit; Nephrology Unit; and, Haematology Unit.

It is under the responsibility of the management of each Medical Department and Unit (each of which is led by the Head of Departments or Unit) to evaluate the performance of the service level rendered, and to improve the effectiveness of any interactions, between Departments or Units.

### **Recursion Level Five (RL5): System One (RL5; S1) to System Five (RL5; S5):**

The following discussion will be based on the details as in Figure 7.11.

### **7.9.2 System One (RL5; S1)**

To attenuate the complexity of the patients' requirements, the Medical Directorate of the Ipoh State Hospital amplifies the provision of services according to standard service procedures as follows. At the very early stage of contact with patients, all cases are regarded as outpatients and they will have to undergo preliminary treatment, investigation, and diagnosis that are conducted in the respective departmental clinics; and, inpatient treatments for cases classified as acute or who require intensive care.



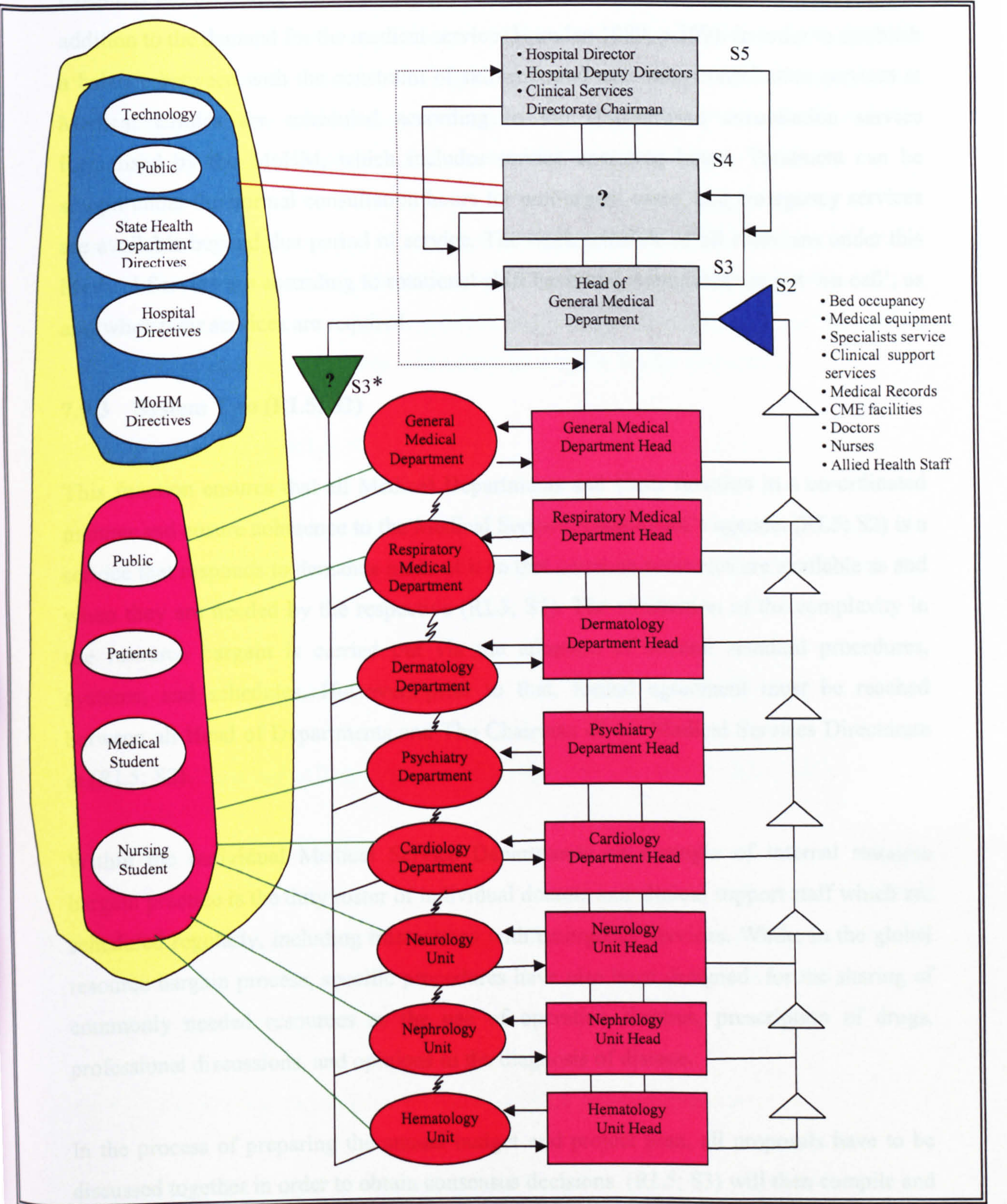


Figure 7.11 The basic structure of VSM Recursion Level Five: Medical Services Directorate



Hospitals are becoming seen increasingly as organisations to manage social problems, in addition to the demand for the medical service (Harnden 1989, p.399). In order to establish a balance between with the constraint of skill-mix and case-mix, consultation services at Medical Clinics are scheduled according to the standardised consultation service formalised by the MoHM, which includes service operating hours. Treatment can be sought under the normal consultation hours for non-urgent cases, and emergency services are available beyond that period of service. The work schedule of all clinicians under this Medical Service are according to rotational shift basis and sometimes are put 'on call', as and when their services are required.

### 7.9.3 System Two (RL5; S2)

This function ensures that all Medical Departments and Units function in a co-ordinated manner and ensure coherence to the Medical Services Directorate's agenda. (RL5; S2) is a service that responds to demands made of it so that common resources are available as and when they are needed by the respective (RL5; S1). The attenuation of the complexity in the resource bargain is carried out via the adoption of several standard procedures, systems, and schedules. However, prior to that, formal agreement must be reached between all Head of Departments and The Chairman of the Medical Services Directorate at (RL5; S3).

Within the individual Medical Service Departments an example of internal resource bargain practice is the duty roster of individual doctors and clinical support staff which are scheduled regularly, including interactions with emergency services. While, in the global resource bargain process, specific procedures have also been designed for the sharing of commonly needed resources as the use of operation theatres, prescription of drugs, professional discussions, and opinions in the diagnosis of disease.

In the process of preparing the annual budget and project plan, all proposals have to be discussed together in order to obtain consensus decisions. (RL5; S3) will then compile and submit the decisions made to the Director of Hospital for further evaluation at the Hospital

level (RL3). Among other examples are: upgrading and reviewing of practices that enhance existing clinical service delivery, which includes new procurement, replacement of existing facilities or reallocation of physical space. If proposals are to be implemented at the expense of existing floor space then alternative options must be sought to avoid the interruption in the continuation of routine service delivery.

Physically, the hospital is open to all and is designed to be staff and customer friendly. However, to preserve a clean environment, safe working, and stimulating a conducive working atmosphere, access to service facilities are subject to procedures such as visiting hours, security pass access control, and restricted zones in designated areas.

#### **7.9.4 System Three (RL5; S3)**

This position is held by the highest ranked among the Head of Departments within this Directorate. It is normally the Head of the General Medical Department who takes on this role.

#### **7.9.5 System Three Star (RL5; S3\*)**

Control function is not decentralised and originates from the MoHM (RL1; S3\*).

#### **7.9.6 System Four (RL5; S4)**

(RL5; S4) is missing. It seems probable that the issue of service enhancement and the consideration of the 'future' operation of (RL5; S1) is administered at a higher level of recursion (RL3) at the Ipoh State Hospital.

#### **7.9.7 The System Three-Four Homeostat (RL5; S3-4 Homeostat)**

As in the RL4, (RL5; S3-4 Homeostat) does not exist.



### 7.9.8 System Five (RL5; S5)

The Director and the Deputy Directors of the Hospital sit in (RL5; S5). At this point, they are the source persons for official interactions of the whole hospital service. Therefore, (RL5; S5) must bear in mind that the image of the hospital service is largely reflected by the capability of (RL5; S1). Thus, accurate policy implementation must be applied that is suitable to gauge (RL5; S1) effectiveness. In this respect, algedonic links are frequently used to obtain rapid 'first hand' input. This allows (RL5; S5) to persistently request information from System Five at higher recursion levels, particularly (RL3; S5), (RL2; S5), and (RL1; S5).

In service policy matters, the (RL5; S5) role is more in the interpretation of policy formulated by the MoHM policy-makers or customising the facts that best suit the implementation of (RL5; S1) activities.

### 7.9.9 Findings From VSM Diagnosis

The following issues have been diagnosed under this level of recursion (RL5):

- The Head of the General Medical Department simultaneously performs roles at (RL5; S1) and (RL5; S3). This conflict may cause a strong bias to his/her own Department rather than to all other entities under (RL5; S1);
- Lack of opportunities for local initiatives, as most procedures are rigidly interpreted by the (RL5; S3), thus affecting the overall performance of (RL5; S1);
- (RL5; S3\*) and (RL5; S4) do not exist; and,
- (RL5; S3-4 Homeostat) is difficult to achieve.

### 7.10 Summary

The VSM diagnosis reveals significant issues at various RLs which expose the capability of system entities (S1 to S5) to respond dynamically to system environment requirements.

In this respect, the setting up of organisational structure has been diagnosed and mapped with the VSM system entities from which several gaps have been identified as shown in Table 7.3 below, which shows each system (i.e. S1 to S5) at every level of recursion (RL0 to RL5). Hence, from the outset of the VSM diagnosis, the existence of a complete set of systems elements is questionable.

Background to sustain discussions of this chapter flows from the data used based on feedback from a questionnaire, interviews, document analysis, and personal observation of activities involved by staff and management, as well as relevant literature on this subject.

This study further contends that a viable system should survive under various conditions of environmental turbulence. Such a system is therefore able to adapt to the notion of viability which underscores viable systems in the cybernetic sense. Hitherto, the study sets out to explore the lack or absence of specific roles, functions, and systems that violates certain cybernetic laws, within the scope of the diagnosis mode.

The Viable System Model is a powerful diagnostic tool to promote viability in an organisation. Therefore, the Viable System Model is applied as a methodology for understanding structures and processes of health care service delivery in selected agencies of the MoHM. The application of the Viable System Model in the context of health care service delivery is used as a consistent intervention tool to develop the organisational competence.

The core business of any public health care organisation is health care and medical care; thus its mechanisms for identity and viability determine survival and success. This demands that the service delivery programmes need to adapt to the changing environment and the new approaches require a new way of responses.



VSM System Entities						
Recursion Level (RL)	One	Two	Three	Three Star	Four	Five
RL0	<ul style="list-style-type: none"> <li>• Health Care Management Undersecretaries</li> <li>• Health Care Service Directors</li> </ul>	<ul style="list-style-type: none"> <li>• Financial Budget</li> <li>• Computer networks</li> <li>• Manpower</li> <li>• Office space</li> </ul>	<ul style="list-style-type: none"> <li>• Secretary General</li> <li>• Director General of Health</li> <li>• Deputies Secretary General</li> <li>• Deputies Director General</li> </ul>	Internal Audit Unit	<ul style="list-style-type: none"> <li>• Institute for Medical Research</li> <li>• Planning and Development Division</li> <li>• Public Relations Unit</li> <li>• Office of the Legal Advisor</li> <li>• Corporate Division</li> </ul>	<ul style="list-style-type: none"> <li>• Minister of Health</li> <li>• Deputy Minister</li> <li>• Parliamentary Secretary</li> </ul>
RL1	<ul style="list-style-type: none"> <li>• Perak State Health Department Director</li> <li>• State Health Departments (other 13 states)</li> </ul>	<ul style="list-style-type: none"> <li>• Financial Budget</li> <li>• Human resources</li> <li>• Computer networks</li> <li>• Health Facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Secretary General</li> <li>• Director General of Health</li> <li>• Deputies Secretary General</li> <li>• Deputies Director General</li> </ul>	Internal Audit Unit	<ul style="list-style-type: none"> <li>• Institute for Medical Research</li> <li>• Planning and Development Div</li> <li>• Public Relations Unit</li> <li>• Office of the Legal Advisor</li> <li>• Corporate Division</li> </ul>	<ul style="list-style-type: none"> <li>• Minister of Health</li> <li>• Deputy Minister</li> <li>• Parliamentary Secretary</li> </ul>

VSM System Entities						
Recursion Level (RL)	One	Two	Three	Three Star	Four	Five
RL2	<ul style="list-style-type: none"> <li>• Director of Ipoh State Hospital</li> <li>• District Hospital Directors (13 hospitals)</li> </ul>	<ul style="list-style-type: none"> <li>• Human Resource</li> <li>• Financial Allocation</li> <li>• Service Equipment</li> <li>• Medical Specialists</li> </ul>	<ul style="list-style-type: none"> <li>• State Health Department Director</li> <li>• State Health Department Deputy Director (Medical)</li> </ul>	?	Planning and Development Division	<ul style="list-style-type: none"> <li>• Secretary General</li> <li>• Director General</li> <li>• Deputies Secretary General</li> <li>• Deputies Director General</li> </ul>
RL3	<ul style="list-style-type: none"> <li>• Clinical Service Directorate Chairman</li> <li>• Clinical Support Service Directorate Chairman</li> <li>• Deputy Director (Administrative)</li> </ul>	<ul style="list-style-type: none"> <li>• Procurement/ Maintenance (Treasury Instructions/ Job Schedule)</li> <li>• Financial Resources (Financial Procedures)</li> <li>• Training (Training Schedule)</li> <li>• Human Resource (Public Service General Orders)</li> </ul>	<ul style="list-style-type: none"> <li>• Hospital Director</li> <li>• Deputy Hospital Director (Medical)</li> <li>• Deputy Hospital Director (Administrative)</li> </ul>	?	Hospital Visitors' Board	<ul style="list-style-type: none"> <li>• Medical Practice Division Director</li> <li>• State Health Department Director</li> <li>• Deputy State Health Department Director (Medical)</li> </ul>



VSM System Entities						
Recursion Level (RL)	One	Two	Three	Three Star	Four	Five
RL4	<ul style="list-style-type: none"> <li>• Medical Services Chairman</li> <li>• Surgical Services Chairman</li> <li>• Women &amp; Children Services Chairman</li> <li>• Diagnostic Services Chairman</li> </ul>	<ul style="list-style-type: none"> <li>• Bed occupancy</li> <li>• Medical equipment</li> <li>• Specialists service</li> <li>• Clinical support services</li> <li>• Medical Records</li> <li>• CME facilities</li> <li>• Doctors</li> <li>• Nurses</li> <li>• Allied Health Staff</li> </ul>	Clinical Services Directorate Chairman	?	?	<ul style="list-style-type: none"> <li>• Hospital Director</li> <li>• Hospital Deputy Directors</li> <li>• Clinical Services Directorate</li> </ul>
RL5	<ul style="list-style-type: none"> <li>• General Medical Department Head</li> <li>• Respiratory Medical Department Head</li> <li>• Dermatology Department Head</li> <li>• Psychiatry Department Head</li> <li>• Cardiology Department Head</li> <li>• Neurology Unit Head</li> <li>• Nephrology Unit Head</li> <li>• Hematology Unit Head</li> </ul>	<ul style="list-style-type: none"> <li>• Bed occupancy</li> <li>• Medical equipment</li> <li>• Specialists service</li> <li>• Clinical support services</li> <li>• Medical Records</li> <li>• CME facilities</li> <li>• Doctors</li> <li>• Nurses</li> <li>• Allied Health Staff</li> </ul>	Head of General Medical Department	?	?	<ul style="list-style-type: none"> <li>• Hospital Director</li> <li>• Hospital Deputy Directors</li> <li>• Clinical Services Directorate Chairman</li> </ul>

Table 7.3 Summary of VSM diagnosis

From the system diagnoses carried out, several limitations have been identified:

- Requisite Variety (S1).- difficult to match with system environment (lack of staff and resources, in addition to poor IMS);
- Inside and Now (S3) - 'grey area' of authority particularly at lower RLs, to enable S3 to act effectively;
- Future (S4) – obtaining for the viability of the 'whole' is susceptible, as S4 very guise is under the control of S3 instead of S5;
- Role of System 3\* - with the existing capacity of setting up of the agency, it truly incapable to provide effective function as an 'information service to System 3';
- S3-4 Homeostat does not exist at lower RLs – thus put the prime role of S5 at the respective RLs into handicap which subsequently give a negative impact to S5 to monitor the S3-4 Homeostat; and,
- S5 (insufficient input for effective policy issuance) as S5 must have sufficient views and understanding about the capacity/capability of MoHM machinery in order all S1 elements at each RL to match with the system environment needs for the effective policy mechanism to take place.

It is the 'gaps' found in Table 7.3 and findings expressed above that form the core of the discussion, which follows this chapter.



## **Chapter Eight: Discussion**

### **8.1 Introduction**

This chapter brings together the issues that concern the aims and objectives of this research study to triangulate findings. The information sources that support these discussions are from five major areas. First of all, the literature review set out in Chapter Four. Secondly, results from the Survey Findings in Chapter Five. Thirdly, the use of the transcribed interviews with senior management (see Appendices 4.1, 4.2, 4.3, 4.4, and 4.5). Fourthly, use is made of the systems intervention, that is discussion of the findings from the VSM in diagnosis mode, found in Chapter Seven. Finally, the whole discussion is predicated upon the Malaysian context, as described in Chapter Two.

The Chapter is structured to reveal the relevant issues under the following headings: System Infrastructure, the Capacity of ICT and IMS, Information Context, and Human Aspects in the IMS practice. Findings of this chapter subsequently provide an avenue for the advent of the overall conclusion and suggestion of this research.

### **8.2 System Infrastructure**

This section discusses the system infrastructures from three perspectives: Service Utilisation; Service Provision; and, Library Service.

#### **8.2.1 Service Utilisation**

In this sub-section, the utilisation of ICT equipment is discussed in the context of the distribution of computers, the use of computers, and the ICT strategic planning capability.

- **Distribution of Computers**

Being one of the largest agencies in the Malaysian civil service in terms of number of office locations and size of staff employed, computer facilities need to be furnished to ensure effective and efficient delivery of the service. Nowadays, ICT is naturally adopted as a tool in the networking environment, linking headquarters to remote offices (Ng & Li 2003). Hence, having computers alone without the internet connectivity is regarded as “a thing of the past” (Ng & Li 2003). The internet provides the ability to routinely access sources of information on a global scale, while at the same time having a profound local effect, such as enhancing personal experiences or gaining a better self-understanding (Little, Holmes & Grieco 2001).

The results from the questionnaire survey of this study reveal that distribution of computers among respondents at the various levels of organisations were between 75% (Health Clinics) and 97% (Headquarters), with the highest percentage at the Health Institutions (97.2%) (see Table 5.10, p.87). Although there was a high proportion of respondents supplied with computers in their offices, results from a cross-tabulation display that only 70.8% of them had networked computers (see Table 5.16, p.94). Results of a significant test furthermore suggest (see Table 5.16(a), p.95) that there was a statistically significant relationship between the provision and the requirement of computer networking equipment among respondents ( $p < 0.05$ ). To properly interpret this finding, it has to be remembered that respondents of this survey were officers representing the management teams and they have privileges in their respective organisations, including the provision of computers. Therefore, these results might not truly reflect the situation in the MoHM as a whole.

In the VSM analysis, at the (RL1; S2), it has been diagnosed that even though most of the development projects in the MoHM are centrally planned, the Ministry still fails to overcome the scenario of the uneven distribution of health facilities as concentration of resources is put on its agencies located in the developed areas. This phenomenon leads to



the existence of a digital divide within the MoHM, as raised during the interview with the Undersecretary of the ICT Division.

“...due to digital divide culture of the Ministry, even the main library at the Head Office of the Ministry is only equipped with a unit of desktop computer, and get connected to the internet via dial-up line (not dedicated leased line). The similar constraint is also being faced by other libraries at the other offices of the Ministry at the moment. The fact is that, previously, we did not take into account the allocation of network ports under the connectivity to the MoHM’s extranet programme for all libraries of the Ministry”

(Undersecretary of the ICT Division, response to Q.4; Appendix 4.5).

In addition, the VSM has also diagnosed that there is a similar distribution pattern of other health care facilities throughout the country (see sub-section 7.5.4, pp.159-161).

It is suggested that the MoHM should move towards a ‘one-to-one computer provision’ for all staff among the managerial groups although this is likely not to be fully achievable in practice. Because this recommendation will require a considerable capital expenditure, so in the short term for those officers who spend most of their time in meetings and whose computer facilities are therefore mostly lying idle, should share their ICT resources.

More generally, computer equipment could be categorised as a common facility and be shared among staff members of all grades. Here, the computers can be located at common staff areas rather than personalised to a specific officer. This measure not only lessens the financial burden, but also gives an opportunity to more staff to be exposed to ICTs to carry out their job duties.

- **The Use of Computers**

Once the distribution of computers is more equitable, issues related to how managers use their ICT resource emerge. Use of computers can be categorised into two major areas: software packages for office automation purposes such as components of *Microsoft*

*Office* package i.e. *MS-Word*, *MS-PowerPoint*, and *MS-Excel*; and, specifically developed application software that is customised for the organisation's functional needs. Results from Table 5.13 (refer p.90) show that responses for the use of computer software, particularly for the word processing and presentation tools, were high. Moreover, the response rate from the highest rank officers (JUSA) was very encouraging, at 100% usage. If their positive tendency in using these software packages were to be leveraged towards generating an impetus for their colleagues and subordinates to follow their good example, direct commitment and involvement of top management officers will be seen. This feature is vital for successful ICT implementations (Brittain & Abbot, 1993; sub-section 4.2.1, see p.44). Results from Table 5.11 (see p.88) reveal that the implementation of the IMS at the MoHM is still incomplete. Only 134 (35%) respondents specified that they were using any application systems. However, most of the applications were developed to serve for complementing non-medical purposes such as 'accounting' and 'finances' (see sub-section 7.7.7, (RL3; S2), pp.190-191) and other general managerial tasks.

Although the Government has embarked on a programme of ICT adoption in public health care services, only Selayang hospital (in 1999) and Putrajaya hospital (in 2000) have been noted successes for the successful implementation of the Total Hospital Information System (Suleiman 2001).

These findings fulfil Objective 3 (see p.5) that refers to existing IMS practice at various management levels within MoHM; the findings also map to the first aim of the study (see p.4) that refers to content from information driven context.

- **Strategic Planning Capability**

A crucial challenge for modern organisations such as the MoHM is to engage in the ISSP, this generates a set of strategic plans that provide ICT direction of the organisation. Molina (1999) specifies that the key components of ISSP comprise strategic and tactical aspects. Strategic goals tend to encompass a longer time horizon for achieving a set of



objectives. While tactical efforts consist of the particular actions to be taken to successfully accomplish the goals and objectives outlined in the strategic plans.

For the primary data sources of this study, the responses from the interview reflect the strategic management opinions, and the questionnaire survey gathered the perceptions of respondents from the tactical and operational management group. Results from the questionnaire survey demonstrate the degree of agreement about the existence of the ICT Master plan at all levels of organisation was low, only 40.8%. (see Table 5.29, p.112). This reflects that the perception of ICT activities is seldom based on an integrated long-range strategic plan at all levels of organisation. Opinions from the strategic management officers are also in line with this outcome. Thereby, most of the ICT projects were based on *ad hoc* decisions or to serve for the interest of a specific purpose. This leads the officers to compete against each others for what are already scare resources.

Ragu-Nathan et al. (2000); Stetson (2001); Cerpa & Verner (1998) reported that the adoption of a comprehensive ISSP is fundamental for any organisation. It allows the management to become more disciplined in implementing and prioritising information about the management activities (Kroenke & Hatch 1994). Even though MAMPU has issued guidelines about the ISSP Framework for all Government agencies since 2000, until recently ICT programmes of the MoHM are still not based on these standardised ISSP guidelines.

The ICT Division has just initiated an effort to address the ISSP guidelines, with the approval and effective backing from the senior management (Jordan 1999; Winter et al. 2001). In the interview, the Undersecretary of the ICT Division said,

“We are now embarking on our ICT blueprint among which to address the issue of ICT master plan for the overall agency of the Ministry”

(Undersecretary of the ICT Division, response to Q.12; Appendix 4.5).

He further explained,

“...with the comprehensive content of the proposed blueprint, we will be able to formulate a practical path for the adoption of an integrated manner for the whole ICT programmes and will be strictly adhered to by all parties of the MoHM”

(Undersecretary of the ICT Division, response to Q.12; Appendix 4.5).

The poor adherence to the directive of the Central Agency could mainly be due to lack of resources, low priority of ICT programmes in the MoHM, and ISOs are not getting due recognition to the activity. Furthermore, from the document analysis, the ICTSC of the Ministry was only formalised in the middle of 2001. However, senior management is responsible for ensuring the formulation of the plan (Jordan 1999). The strategic plan will drive towards the adoption of a holistic and long-term perspective being taken in the information management programmes, which enable them to become proactive rather than reactive in meeting the challenges in the information age (Mac Morrow 1992). Furthermore, the anticipated benefits of the IMS can only be realised if the Ministry engages in the appropriate ISSP because inappropriate ISSP leads to incomplete systems activities resulting to incompatible, redundant, and inflexible to IMS programmes (Lee & Pai 2003).

### 8.2.2 Training Needs

In accordance with the objectives of this research, this sub-section focuses on matters related to ICT training needs and ICT training plans.

Results from the questionnaire reveal that only 43.8% respondents were given opportunities to attend ICT training (see Table 5.20, p.99). In the provision of such opportunities among agencies at various levels of organisation, significant differences were observed between respondents working in the non-frontline services (such as management, training, and research agencies) and health care frontline services (at hospitals, health clinics, and district health offices) (see results of Table 5.20(a), p.100).



The interpretation of this result is that there is a significance difference ( $p < 0.05$ ) of training received between frontline and non-frontline staff, with the latter benefiting more from ICT training opportunities. This phenomenon is in contrast to the findings from the literature survey which have mentioned about the needs to enhance ICT knowledge particularly to the health care frontline staff (Lang 2000; Norris & Brittain 2000; Scheiber et al. 1998; Wyatt 1995 & Bauer 2002).

The reasons for the non-frontline service agencies receiving more training opportunities could be:

- Since the organisational resources are handled and managed by the non-frontline agencies, there was a strong tendency that their officers were given a higher priority in the selection for the training; and,
- Lack of awareness on the importance of ICT training among officers as a result of lack of ICT-based practice at the health care frontline agencies.

In addition, the results from the questionnaire also suggest that heavy workload and lack of information about ICT training opportunities are factors to be considered (see results in Table 5.21, p.102).

In designing training programmes, scope and content of the training should fulfil the needs of the participants or the identified target groups. Results from the questionnaire revealed that the current level of knowledge among officers differ with the majority of the officers (61.5%) specified that their level of ICT knowledge was 'moderate' (see Table 5.19, p.98). Even though there were a minimal number of officers who responded 'poor' (15.9%) to their level of computer knowledge, they are still given special attention in the project organised by the Federal Government for boosting level of computer literacy rate among the civil servants. Hence, this complies with the finding by Scheiber et al. (1998) that basic ICT training should be formulated to those who lack of ICT

knowledge. By acquiring a basic ICT knowledge and skill, the participants are enabled to continually update their level of competency subject to the availability of access to computers (Farmer, Richardson & Lawton 1999).

- **ICT Training Plan**

An ICT training plan is one of the essential components in the ISSP. At present, the provision of the ICT training programmes at the MoHM is derived from three sources:

- 1) **The Manpower Planning and Training Division**

It is responsible for organising basic training for pre-employed allied health personnel and in-service training for the career development of employed personnel (MoHM 2000, pp.20-22).

- 2) **Individual agencies**

Training programmes are scheduled with Consultants from external agencies.

- 3) **The Training Arm of the Malaysian Federal Government civil service (INTAN)**

It formulates and distributes the annual ICT training planners to all public agencies.

While the Malaysian government strives towards the knowledge-based economy, the core issue largely depends on the capability of the education and training system to ensure an adequate supply of qualified and skilled manpower (Malaysia Economic Planning Unit 2001, p.133). The success of the ICT training programmes in the MoHM demands for an integrated effort so that all pertinent actions are carried out in a manageable manner. In order to investigate the effectiveness of the ICT training plan of the MoHM, the interview and questionnaire responses will be discussed as follows.



At the strategic level, opinions given by the Director of Planning and Development Division of the MoHM were consistent with the evidence in the literature. It also indicates that for the effective outcome in the ICT training, it is essential that methods and content need to be suited with each identified targeted group (Hassan 2002; Norris & Brittain 2000; Carlile & Sefton 1998 and Ball & Douglas 2001).

Actions that have been taken by the MoHM as specified by the Director of Planning and Development Division of the MoHM are (responses to (Q.2) and (Q.3); Appendix 4.4):

- Specific training programmes for the defined target groups have been set up at three levels – fundamental, intermediate, and advanced levels;
- Providing sufficient financial allocation;
- Generally, broaden training opportunities; and,
- Forge strategic collaborations with local and overseas training institutions.

At the operational level, results from the questionnaire reflect that there was inconsistency with the strategic decisions. Only 6.6% of total respondents specified that there is an ICT training plan at their organisations (Table 5.22, p.103). In addition, results from the survey also suggest that the relevant factors; financial allocation, the appointment of training resource officers, capacity for in-house training, and collaboration with other training institutions were not carried out (see Table 5.23, p.105). At the same time, more than 88% of respondents perceived that their organisation were not in compliance the implementation of the ICT training plan. This indicates that there was a gap between the strategic decisions and operational actions in implementing the ICT training plan.

As the development and implementation of Tele-health (see sub-section 7.6.3, (RL2; S2), pp.173-175) and IT-based hospitals (see sub-section 7.5.4, (RL1; S2), pp.159-161) at the selected hospitals are the major themes in the IMS at the MoHM, the findings of Grant et al. (1998) on the experience of NHS in migrating from Training in Information

Technology to Education in Information Management and suggestions from Lorenzi & Riley (2003) that training the staff to the new system methodologies rather than heavily developing on IT technical competency are useful. Both studies have identified that developing relevant skills will enable the staff to be ready for dealing with the new environment and leads to an important condition for the successful implementation of the IMS.

Training needs provision refers obliquely to Objective 5 (see p.5) and Aim 3 (see p.5) which seeks to uncover information requirements for which personnel need appropriate knowledge and understanding. In practice, current training priorities within the MoHM relate to basic ICT competencies. The suggestions made here refer to future steps the MoHM should take if they wish to see a successful implementation of the proposed IMS.

### 8.2.3 Library Service

In all established health care institutions, the role of the library is given significant attention as it shifts from a place holding a collection to a knowledge warehouse that complements the information needs of staff. This is in line with the current trend that the role of library service is an effective resource centre.

The MoHM has established a network of library services and it is a component of the S1. Also, each library service reports to their own S3 of the respective recursion level. The following statement indicates the variety of the functions of the present library service.

“...there is without such a centrally planned programme for the enhancement of library services and facilities, it is solely on the individually organisational initiative”

(Secretary General of the MoHM, response to Q.4; Appendix 4.1).

On the quality of the service level, the following interview response even admits that



“...there is still a lot of room for further improvement for library services to truly fulfil the need of various disciplines of personnel in the Ministry. First and foremost, level of expertise of the library staff need further enhancement particularly equip with skills and expertise in managing library service efficiently”

(Director of Planning and Development Division, response to Q.5; Appendix 4.4).

With respect to access to the library, results from the questionnaire survey show the low tendency among the staff to visit library services (see Table 5.24, p.106). Whereas Ren (1999) suggested that users need relevant and up-to-date information to supplement their official requirements and this is also the main purpose for their library visit, the library service of the MoHM is almost constantly finding it difficulty to achieve the required level of service. The majority of respondents perceive the poor quality of the library collection handled by the libraries at the MoHM agencies. As a result, it is suggested that the current quality of the library service including the quality of the library collection is a fundamental area to be investigated.

Even though this research did not correlate the low tendency of library visits to reading habits, the library has rivalry for its information and book provision. Most of the officers can afford to subscribe to the relevant literature sources for themselves (Wadley, Broady & Hayward, 1997).

The results of the questionnaire survey also reveal that the physical location was not regarded as the main reason for the low frequency rate of visiting the library (see Table 5.25, p.107) because most of the libraries are situated within the respondents' office premises. However, the space and quality of environment; unfriendly or oppressive atmosphere will discourage the users to use of the library service (Wadley, Broady & Hayward, 1997; Muir & Douglas, 2001). The current divisional character of the MoHM library structure is divided by its nature, as the librarians that work within the individual organisation spectrum are not performing as a dedicated team. The library service demands skilled manpower to carry out its full potential but,

“...at the moment, most of the posts at the MoHM libraries are from the lower rank personnel”

(Director of Planning and Development Division, response to Q.6; Appendix 4.4).

Moreover, the use of ICT has complemented the library service, such as the application of electronic library and inter-library loan services (Gray & Lusignan 1999; Toth et al., 2000 and Pearson & Rossalt 2001). This service is also considered as an effective form of resource sharing. The wide range of subjects for the desired information sources demanded by the diverse group of employees of the MoHM is fulfilled, even within the context of the limited financial budget. However, none of the MoHM library facilities are equipped with the internet facilities. Hence, online services cannot be realised for the subscription to the established evidence-based medical databases such NeLH, NLM, and Medline®.

While the government recognises the importance of knowledge management, the role of the library service to instigate knowledge worker initiatives is fundamental (Ren 1999 & Dearstyne 2001). The Secretary General refers to this view when he says,

“We do formulate and develop various strategies to ensure that k-worker related programmes will be beneficial to every staff at all offices of the Ministry throughout the country for the interest of the overall health care service”

(Secretary General of the MoHM, response to Q.3; Appendix 4.1).

Thus, it is very important for senior management to seek solutions to enhance the quality of the library service in MoHM. In the long run, all the activities of the information service should be incorporated with the integrated IMS programme of the MoHM.

These findings refer to Objectives 3 and 5 (see p.5) that map to Aims 1 and 3 (see pp.4-5), although not explicitly stated. They suggested next steps for the MoHM goes further than increasing the value (or perceived value) of the library service. The proposed IMS may require an integrated content management system in order to fulfil the strategic



management requirements of the MoHM. The investigation of this final requirement is beyond the scope of this present study.

### **8.3 ICT/IMS**

The Existing Capacity of ICT Facilities, Constraints in ICT Implementation, and ICT Competency are discussed in the following sections.

#### **8.3.1 The Existing Capacity of ICT Facilities**

This sub-section attempts to identify the existing situation of the IMS and provide an indication of ICT enhancements required.

- **The Existing IMS**

Being the most powerful and authorised collector, producer and disseminator of health care information in the country, MoHM can make the best use of advanced information products and services in all its business processes. It can also disseminate the results of its own experience of information resource management, besides regulating and monitoring the situation of the private sector providers. Hence, the existence of an efficient and effective information management system is crucial.

Information-based activities in staff workflow have been explored in the questionnaire survey. Results of the survey demonstrate that the collection and compiling of information (70.5%), decision support (67.1%), and information dissemination (50.6%) were the three most prominent activities (see Table 5.9, p.86). Those areas cover the fundamental tasks of the IMS with respect to its operational, tactical, and strategic managerial functions.

Even though the basic function of the IMS is to satisfy the objectives of the management at the various levels of hierarchy, there is a wide variety of reasons for the procurement of such a system, ranging from staying abreast of daily activities, to communication and

manipulation of information for decision support (Horn Nord & Daryl Nord 1995). Moreover, from a VSM perspective, the complexity of the IMS requires interaction with a greater variety of the embedded systems environment. Currently the functions of the IMS are diversified across locations and responsible Units, for example:

- Technological issues is handled by the ICT Division;
- Information collection and dissemination functions is managed by the Information and Documentation Unit;
- Information provision is carried out via the various libraries service; and,
- ICT operational service level is performed at the Accounts Division of the MoHM and at three State hospitals that act as beacon sites for all others – Kuala Lumpur Hospital, Selayang Hospital, and Putrajaya Hospital.

The suggestion by Harris et al. (1998) to re-engineer business processes could become the driver for change that leads to an effective and coherent IMS. Such restructuring is alluded to in the response to an interview question,

“The outcome of disintegration in ICT activities is as a result of inexistence of an effective centrally controlled mechanism”

(Undersecretary of the ICT Division, response to Q.11; Appendix 4.5).

Through the VSM analysis, particularly at RL0 and RL1, several factors have been diagnosed for the contribution to the poor state of the present IMS of the MoHM. The factors identified were ineffectiveness of the local and global resource bargain processes and procedures, and the lack of formality in nature of the S4 and S5 interactions. This includes the phenomena of distribution of the information resources, balance for the ‘present’ and ‘future’ needs in the S3-4 Homeostat, and to preserve efforts for the initiation of the policy capability by S5. Hence, failure to adopt a holistic approach is an emergent reason for the disintegration of IMS practice. This finding is in contrast to data aggregation capabilities, where integration of various relevant information sources provide critical inputs for decision support.



As the public health care service absorbs a sizeable amount of public funds (see section 7.3, p.143) with a functioning IMS it would be possible to provide a meaningful indicator of value (or cost) of the service delivered. The experience of the NHS UK is useful to be emulated, where a specific IMS has been designed with the capability that can report health care provision costs down to the level of individual patients. This allows for a better informed decision about prioritising the use of scarce health care service resources. Eventually, with the introduction of such a mechanism, the NHS is able to control and monitor health care costs and simultaneously improve delivery standards (Heeks 1998).

With respect to use of specific application systems, findings from the VSM demonstrate that there are shortcomings being faced at the MoHM. This scenario is consistent with the study of Liang & Hung (1997) that the use of the existing IMS is with general office automation packages rather than specifically customised applications. The relevance of this issue has been highlighted by Sohail (2003) that hospitals in Malaysia do not have good databases systems. Thus, it seems that the suggestion by Atkinson et al. (2002) (refer sub-section 4.4.1, p.53) is an uphill task to be achieved.

On the other hand, there is evidence of the two to three years delay in the publication of the MoHM annual report, i.e. the report for the year 1999 and 2000 were published in 2002 and 2003 respectively, shows directly the issues faced in IMS at the MoHM. Immediate actions should be taken to improve effectiveness and quality of the IMS. The question when it is “relevant, accurate and current” (Wood & Wright 1997) to give support for efficient management decisions is crucial. These questions are covered in the next section.

- **The Needs For ICT Enhancements**

During the early implementation stage of the major ICT programme of the MoHM in the 1990s, most senior officers were given priority in the provision of the rolled out ICT service. Later, they realised that such facilities need to be shared with their subordinates. To cope with such requirements, the priority shifted according to a needs basis. As a

result, a larger capacity of ICT infrastructure was needed to accommodate for a larger number of users that were located in geographically widespread offices. In addition, the level of awareness of embracing ICT to enhance work processes increased among the senior management. Consequently, this led to a further increase in the demand for ICT infrastructure.

One of the critical missions under the ICT enhancement consideration is to bridge the gap between the digital divide and computer literacy among staff members. This phenomenon in fact has been diagnosed by the VSM, concerning the reality of the disparity in ICT implementation at the MoHM hospitals (see sub-section 7.6.3, (RL2; S2), pp.173-175). This outcome is agreed by the Undersecretary of the ICT Division when he says,

“...the existence of digital divide whereby many more offices and staff are not equipped with ICT facilities at their workplaces”

(Undersecretary of the ICT Division, response to Q.7; Appendix 4.5).

Bowns et al. (1999) and Tsiknakis et al. (2000) go further, when they report that sufficient provision and support of ICT equipment throughout the MoHM is necessary.

The existing MoHM ICT network infrastructure was planned in 1995 and implemented in 2000, with limited links to certain locations at Headquarters, SHDs, and Hospitals. Thus, ICT planning must take into consideration various enhancements for present and future requirements. In this respect, the capacity to communicate with external agencies must be addressed as well as the ability to fulfil internal business operation requirements.

The existing management system has been explored in terms of current capacity of ICT facilities and a critique of the present IMS, which led to the identification of enhancements needed in ICT deployment. Appropriate evidence from the questionnaire survey, the interviews, and the VSM in diagnostic mode have been used to support the required enhancements. This content can be mapped to Objectives 3, 4, and 6 (see p.5)



that cover all three aims of the study. This finding is consistent with the central core of argument used throughout this work.

### **8.3.2 Constraints in ICT Implementation**

The adoption of ICT in the civil service has intensified since the 1990's with the landmark launching of the MSC in 1996. From then, with strong encouragement from national leadership, including the MoHM, various steps have been put forward to promote the use of ICT in offices. However, there are constraints to the adoption of ICT in Malaysia, which are discussed below.

- **Resource Allocation**

The funding for the provision of the public health care service is primarily sourced from the Federal Government's budget. The nature of the role in the resource bargain activities of the S2 is based on the decision of the meta-system at each level of recursion. As the performance of the IMS implementation and inappropriate resource allocation can dampen the expected outcome, resources might have been channelled in to non-critical activities. This has an adverse impact on IMS programmes of the MoHM.

In this respect, results from the questionnaire (see Table 5.31, p.114) reveal three major constraints in the ICT implementation of the MoHM. Firstly, lack of ICT skills among its employees (76%); secondly, lack of sufficient number of the ISO's employed (69.4%); and finally, insufficient financial allocation (62.8%). The skills gap has already been discussed in sub-section 8.2.2, therefore this section will focus on the latter two issues; lack of ISOs and insufficiency of the financial allocation.

The implementation of the ICT programmes in Malaysian Government agencies is based on a defined priority setting. Priority in terms of financial allocation and implementation is accorded to systems that can enhance management efficiency and day-to-day business operations concerning productivity enhancement (Nair 2002). In reality, the priority of

implementation seldom serves these purposes, instead being at the discretion of the decision-makers. Most of the sizeable projects are centrally planned by Headquarters, with senior management acting as project champions (Ash 1997). These project champions convince the financiers to endorse the financial allocations for their 'pet' projects. In addition, the nature of the civil service structures in Malaysia, including the MoHM, is that politicians are in the uppermost position of the hierarchy of decision-making, i.e. the Minister, Deputy Minister, and the Parliamentary Secretary (see sub-section 7.4.7, (RL0; S5), p.154 and sub-section 7.5.9, (RL1; S5), pp.165-166).

During the project implementation process, the interference of the higher authority is avoidable. Among the prominent issue is the evidence from the decisions made by the Federal Treasury to privatise the implementation of ICT projects at 14 new hospitals<sup>3</sup> to an appointed consortium in 2003. This had been initiated without the advance knowledge of the MoHM. Consequently, this decision had a major influence on work carried out at the Ministry, with the counterintuitive behaviour of delaying all health-based ICT projects.

Since the financial budget of all agencies is sourced from the Finance Division at the Headquarters, there are strong indications from the questionnaire responses that officers from the lower hierarchies of organisation were not given a proper recognition to get involved in the development of ICT projects of the Ministry. This finding is also consistent with the outcome of the questionnaire survey of Table 5.32 (refer p.115) as it shows that the perceptions among respondents that the budget for ICT projects of the MoHM was more in favour to the agencies at the Headquarters. Hence, the results indicate that the provision of financial allocation for ICT activities needs to be reviewed further and to be strategic and systematic.

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<sup>3</sup> 14 new hospitals are planned to be built under the Eighth Malaysian Development plan namely as; Kepala Batas Hospital, Setiu Hospital, Kunak Hospital, Pekan Hospital, Pitas Hospital, Kuala Penyu Hospital, Pandan Hospital, Serdang Hospital, Ampang Hospital, Alor Setar Hospital, Sungai Petani, and Sungai Buloh Hospital.



Besides the constraint of financial allocation, the shortage of the ISOs should also be discussed as it reflects the effectiveness of human resource management in the IMS. The common criteria used in employing the service of an ISO is based on the request put up by the management of agencies to support the operation of their ICT activities. For example, the formation of ICT Units at three State hospitals and the Accounts Division of the MoHM. The impact of the fragmentation approach to ICT manpower requirement leads to indecisive shortage of ISOs across the MoHM. The fulfilment of the ideal ICT programmes of all the agencies of MoHM relies on the commitment of the staff at the ICT Division of the MoHM (see Table 4.1, p.49).

With large number of various ICT projects in the pipeline, the importance of the ISO has only recently been recognised. However, a decisive contribution to the ICT programmes requires the support from a sufficient number of ISOs. The officers at the strategic management level admitted this situation during the interviews.

The procedures in recruiting ISOs is under the jurisdiction of several central agencies (see sub-section 2.4.1, pp.16-17). Under normal circumstances each request for appointment has to be justified. Furthermore, most of the Malaysian civil service agencies have difficulty in recruiting qualified ICT personnel. In the era of the ICT thrust, ISOs have skills that are in great demand. Thus, they might prefer to join the sectors outside the government as the offers are more attractive. Worst still, it is very common for public employees to opt out the governmental service for a better scheme of service in the private sector (Grupe 2003).

The impact of the ISO shortage has greatly affected the performance of the ICT service provided in the MoHM. The overall level of satisfaction of the service provided by the ICT Division was only at 16.6% (see Table 5.27 p.110). Moreover, the role of this Division is mostly to serve the agencies of Headquarters. In other words, needs of the officers from other levels of organisation are being neglected. Bowns et al. (1997) suggested that a sufficient number of ISOs is crucial for the smooth running of the information-based services. Grant et al. (1998) reported that the NHS UK, with a total

staff complement of almost one million, has 55,000 Information Management and Technology staff. Compared to this, there are 110,000 staff at the MoHM, with only 65 Information System Officers – approximately a factor of ten difference (see sub-section 4.3.1, pp.49-50).

- **Rigidity in Procurement Processes**

ICT acquisition and supplier management are critical issues for many organisations including the MoHM. ICT acquisition is concerned with the provision of an organisation's need for ICT facilities and the impact on business processes. Also, there are some particular characteristics that require specific recognition. These include:

- The continually increasing dependence of the MoHM on ICT and the high risk entailed in many ICT acquisitions;
- The complexity of the ICT environment and the speed with which technologies are changing;
- The need for informed choices in a multiplicity of delivery options; and,
- The relative importance of the MoHM expenditure which provides sufficient leverage for the achievement of the Ministry's objectives.

There is a widespread perception that the volume of central guidance in the government procurement regulations as a form to control the process are widely perceived as excessive and an obstacle to speedy systems delivery and implementation.

Furthermore, the formalised procedures issued by the central agencies are not flexible for the adoption in the ICT system as there were formalised for the general procurements. Therefore, ICT procurement rules are seen to have moved from guidance to expedite the process to delay the decision making process. It seems that over-centralisation of the authority leads to the weakening of subordinate agencies with fewer opportunities for local innovation (Pizzaro 1998; Bowns, Rotherham & Paisley 1999).



For the purpose of controlling the consumption of the public funds, any procurement to be made is subject to the general directives of the Federal Treasury Instructions. However, there are some particular needs which have required the formulation of specific Federal Government policies by the GITIC (see sub-section 2.4, pp.15-16 and sub-section 7.7.4, pp.184-185). Adherence to such rules is mandatory and to a certain extent is too bureaucratic. In other words, the rigidity is very low.

The full cycle of procurement requires a long project gestation period. Most users experience the delivery of ICT projects beyond the period of expectation. Consequently, some equipment delivered is outdated as technology changes very rapidly. On the other hand, staff rotation and a longer period of delivery may upset the initial plan.

It is a statutory duty on public officials to use the public funding. The Minister and the SG of the MoHM in particular have to explain their fiscal policy to the Parliamentary PAC (Wyatt & Wyatt 2003). Moreover, the Tender Board is composed of executive officers with high authority and limited technical knowledge. The members might have difficulties to understand the technicalities of the proposed procurement. Thus, it can take some time before approval is granted for ICT projects.

The technical specification is set up by human endeavour, and as some variables change dynamically, it might only be reliable at the time when it was prepared. In order to avoid any possibility of manipulation by the powerful suppliers, a schedule for pre-delivery contract negotiation is required, and it is the responsibility of the Procurement Division of the MoHM to supervise or follow up. The emphasis is to ensure the latest version of equipment is delivered.

As the previous sub-section (sub-section 8.3.1) explored ICT enhancements in contrast to the above content that investigated the barriers to ICT deployment. It is not surprising to find that the objectives and aims covered are similar. Here, it is Objectives 1, 3, and 4 (see p.5) that once again map to all three aims.

### 8.3.3 ICT Competency

- **Transfer of Technology (ToT)**

One of the responses given by the Director of Medical Practice Division reflects that the senior management are not satisfied with progress made in the ToT area. He indicated that

“...the feedback from each of the project teams proved that most of them always raised unsatisfactory remarks on the progress of the project as well as unacceptable rate of transfer of technology”

(Director of Medical Practice Division, response to Q.10; Appendix 4.3).

It is often claimed that outsourcing vendors can offer a broad-range of state-of-the-art skills and technical knowledge to their clients. However, from the questionnaire results, only 49% of respondents perceived that the transfer of technology issues have been emphasised in the ICT procurement (see Table 5.30, p.114). Being the system users, the following factors may contribute to the outcome of those responses:

- Lack of satisfaction with performance of the acquired systems;
- Lack of knowledge to handle and operate the systems by themselves;
- Low level of confidence in using the systems;
- Lack of hands on training in using the systems; and,
- Absence or inappropriate User's operating manual.

Edejer (2000) reveals that ineffective ToT programmes lead to the failure of enhancing staff skills and knowledge in using the systems effectively. The MoHM in fact has enormous experience in various problems - besides costs, there are time delays in the delivery and implementation of ICT projects. The remarks made by the SG reflect that even though the technical specification for a project may have incorporated clauses that include technology transfer, it seems that most vendors are not taking these requirements seriously,



“I must also say that we rarely achieve their (ICT vendors) full commitment to the aspect of technology transfer, although it has been agreed upon in terms of the contract for each project”

(Secretary General, response to Q.12; Appendix 4.1).

In addition, vendors themselves often have a shortage of the skilled staff, this leads to non-compliance of the requirements of contracts, which eventually leads to non-conformance of the products delivered. There have been instances of staff adopting a ‘trial and error’ approach to system development as a result of inadequate technical knowledge. In return, the systems are not used to their full capability, and thus losing the full impact of the designed service (Currie 1998). This factor has been linked to the resistance of staff to the introduction of the new technologies (Mechanic 2002). Therefore, ToT should include the skills of staff to impart the gained knowledge to peers; willingness of the supplier to guide the users applying the systems effectively; and, standardised ToT guidelines from MoHM should be used in the system procurement process.

As technology has become increasingly complex and powerful, the application systems are becoming more sophisticated. Therefore, it takes time for the end users to be able to handle and to use the systems efficiently (McNurlin & Sprague, Jr 1998, pp.12-13). It is of course important that all potential users obtain adequate training in handling any new system from both a technical and practical standpoint. However, in many projects at the MoHM, the deployment of a well-developed and functional system has failed, resulting in years of confusion, irritation, and low performance (Sandblad et al. 2003). Suppliers also have valid reasons for not expediting the process of ToT to the users, as from a business point of view they seek to sell ‘after sales service’ and maintenance contracts.

- **Application System Integration**

System integration is a framework in which bespoke software enables individual system components in the MoHM to communicate with one another, to generate the integrated outputs and distribute identical features and appearance to the end-user (Camera et al. 1997). The purpose of application system integration is to ensure the provision of

integrated information and to serve the needs and expectations of users, as all interested parties demand for the quality of reliable information. For the various levels of management, in order to improve performance, their fundamental objective is to “get the right information to the right person at the right time” (McNurlin & Sprague Jr 1998, p.12).

The move towards the use of vendor-supplied application systems is as a consequence of problems in integrating data from different end-user developed systems to give more global information. End-user designed systems tend to develop software in their own way with little consistency between the developed systems (Taylor, Moynihan & Wood-Harper 1998). Redundant data that often caused information inconsistency is a common phenomenon, such as data regarding average BOR and number of outpatients per day, as an indicator matching case-mix with skill-mix. Performance management systems that assist in the dynamic reallocation of scarce health care resources need to supply the management with “the actual workload at each hospital and health clinic” (Yee 2004).

It is very clear from the VSM diagnosis that the success of any IMS to support the decision-making in the delivery of the hospital and other health care services depends critically on the success of the multi-systems integration of frontline service data. While the purpose of the setting-up of ICT Units (see sub-section 4.3.1, pp.49-50) is more to serve the individual agency’s operational purpose than on the ‘present purpose’ answerable to S3’s own management level. As far as the holistic MoHM ICT programmes are concerned, it seems that the ‘S3-4 Homeostat’ is not effective. In addition, the VSM also diagnosed a lot of disintegration issues which is of interest to the ICT investment aspects.

Moreover, the decision to implement an IMS is made at the senior management level, and the implementation requires the support and commitment of every officer working at the operational level (Ramani 2004). Very often, new initiatives and changes proposed at a senior level do not get implemented smoothly without appropriate preparation and explanation of operational level staff. To us, implementation of an IMS means it is used



and not merely installed. However, in some cases, the acquired IMS is installed but not used. To guard against this situation Ramani (2004) suggests a systematic approach to development is adopted, which includes the preparation of a sound proposal, ensure that acceptance is gained, provide for comprehensive testing, and the provide training to instil users' confidence in the system deployed.

The current instability and ineffectiveness of ICT deployment at the MoHM are as a result from poor enforcement and authority of the coordination agency which integrates the overall ICT programmes. The experience from the pilot implementation of THIS application at three hospitals (see sub-section 7.5.4, (RL1; S2), pp.159-161) shows the impact of 'islands of automation' to senior management and health care professionals. Due to the data collection system and operating system being incompatible, the expected outcome of data aggregation failed to be realised. This is in contrast with the findings from Tsiknakis et al. (2000) and Bauer (2002) that emphasised for the integration of the HIS with the wider scope of health care IMS.

In the VSM diagnosis, at RL1 (see sub-section 7.5.5, (RL1; S3), pp.161-162), S3 deals with the 'black box' situation in getting the true scenario in the various operational agencies of S1. Hence, S3 relies on the accuracy of the 'bottom-up' reports. Similarly, S3 reports upwards to S5, to provide summary reports to S5 and other agencies for the national development aggregation data. The (RL1; S3) aggregate data allows the Federal agencies to assess performance, plan, and prepare parliamentary debates. At the same time, data for *ad hoc* management reporting have to be ready from time to time for additional analysis for management and administrative purposes. However, the redundant data from various programmes and activities of the MoHM often cause information that is inconsistent. This inconsistency can lead to inaccurate reporting that may also cause the public to lose confidence in the service.

In fact, staff have high expectations of the integrated IMS of the MoHM, as revealed from the results of the questionnaire survey. The majority (94.1%) of the total respondents (see Table 5.18, p.97) agreed that the importance of HIS to support the needs

of management in the decision-making process. This is in accordance with the studies of Carter (2000) and Atkinson et al. (2002) reported in Chapter Four.

The previous approach of ‘piecemeal development’ of ICT programmes must be rectified by the future ‘integrated approach’ and to be included onto the MoHM ISSP. Even in the UK NHS, where IMSs have been subscribed to for the past 20 years, only a few could ‘talk to each other’ (Atkinson et al. 2002).

Having explored the required deployment and barriers to ICT adoption in the MoHM in the last two sub-sections, the above content reflects the human interaction with the technologies in terms of staff competencies. This content covers Objectives 5 and 6 (see p.5) that maps to Aims 2 and 3.

## **8.4 Information**

As the IMS complements strategic management the following factors are relevant: information needs within the context of information sharing, and information dissemination issues.

### **8.4.1 Information Needs**

The Government of Malaysia believe that the principal strategies to advance administrative reform in the Malaysian civil service are to provide more customer-oriented services and improve work procedures. With respect to supporting the work process, information sharing is crucial for better inputs to, and to expedite the process of, decision-making. This foundation depends on how well the information sharing culture has been assimilated into the work practices of the Ministry. The practice of information sharing will be more effective through institutional-driven efforts rather than on individual endeavours. The added value of information sharing among agencies in the health care sector has been studied by Zhu et al. (2001), Baker (2002), and Procter et al. (2002) (see sub-section 4.4.1, pp.55-56). They reported that information exchange within



and across the MoHM organisational boundaries will provide a significant impact for the guidance of the strategic and co-ordination processes in the provision of the quality healthcare service.

From the intra Ministry perspective, even though top management has taken utmost effort to streamline the machinery of all agencies within the MoHM, the demarcation nature and fragmentation within the public health care service itself is an obvious factor affecting integration and information sharing practice in the MoHM. The statements of the following officers are indication of the impact of the divisive phenomena:

“...We realise from the past experience that as a result of the lack of coordination in the ICT projects, thus most of them failed to adopt the interest of the whole of the Ministry, instead focus on within the boundary’s of the needs of their own programme or activity”

(Director of Planning and Development Division, response to Q.10; Appendix 4.4).

“...At the MoHM, the required information flows via several levels of hierarchy from various disciplines of services of the organisation, and it involves several levels of officers handling data and information”

and,

“...As far as information flow in the Ministry is concerned, it is rarely meeting the expected mark. Hence, difficulty in getting the accurate and timely information for input in the decision making purposes is a common phenomenon, and hardly felt particularly among the top level management”

(Undersecretary of ICT Division, response to Q.1; Appendix 4.5).

Essentially, the effectiveness of information sharing is dependent on the quality of interpersonal relationships; when individuals have a good rapport, they are more willing to respond to each other, thus enhancing and enriching the pool of valuable information.

In this regard, the responses reveal that the existence of lack of ‘sense of belonging’ among the MoHM has been perceived as a constraint to efficient and effective information flow. Whereby, lack of common awareness of staff can subsequently influence the performance of information sharing. Furthermore, they might regard that their commitment in the information sharing activities are additional workload instead of gaining incentives.

The information needs assessment is covered by Objectives 1 and 5 (see p.5) that maps to all three aims. This finding is not controversial as ‘information’ is a core concept to this study.

#### **8.4.2 Information Dissemination**

Issues pertaining to the current practice of information dissemination and the use of the electronic medical record will be covered for further discussion.

- **The Current Practice of Information Dissemination**

The crucial public health functions of the MoHM rely on the quality and reliability of healthcare-related information. So, efficiency of the service provision and effectiveness of the information dissemination are synergistic. The requirements of the relevant information are largely to be acquired from well-functioning information dissemination machinery in the MoHM. Subsequently, it works to improve the overall service outcomes.

However, the present poor record of information dissemination to a certain extent has been diagnosed via the VSM. Among other issues, ineffectiveness in the promotion of the *Health Promoting Hospital Concept* (see sub-section 7.6.4, pp.175-177) is blamed for the poor information dissemination machinery. Also, the message from the Headquarters was not properly interpreted and accurately conveyed by the SHDs to the operating agencies



at the respective States. Following that, staff at the subsequent operational agencies failed to fulfil the real aspiration of the designed programme.

This finding can also be generalised to lack of awareness among staff about the importance of any directive issued from senior management. In this respect, issuing health care service related directives are under the authority of the DGoH, while, the SG of the MoHM is responsible for general administrative and resources matters. Information may have varying periods of validity depending upon level of management, level of organisation, and time of issue. Thus, the ability of the staff to access the required and relevant information is a prime factor in successful dissemination. Overall, the poor behavioural outcomes of many MoHM health care promotion intervention efforts call into question about the effectiveness of the Ministry information dissemination approaches which are relevant to the study of the Neuhauser & Kreps (2003).

- **The Use of Electronic Medical Record (EMR)**

Information dissemination activities could be enhanced by building a comprehensive ICT infrastructure and ISs specifically designed for the public health care service delivery. If IMS use is concerned with speeding up and simplifying the dissemination processes, the prime aim of distributing official messages from senior management is to inform and motivate staff to be adaptable to the needs of change in work processes.

With reference to the results from the questionnaire, only 62.2% of the staff equipped with computers used electronic mail (e-mail), (see Table 5.11, p.88). This clearly reflects that communication through e-mail still has room for further improvement among the staff. Thus, efforts must be made to promote the use of e-mail among the staff members of the MoHM. It follows that from this research survey, it seems that some staff still have a greater preference for conventional communication methods, such as face-to-face meetings and telephone rather than through the e-mail.

Nowadays, the role of the EMR is irresistible. With respect to the implementation of the EMR in the MoHM hospitals, the VSM shows that other than the three hospitals which adopted the THIS and the 14 State Hospitals that are linked with the IPMS (see subsection 7.7.7, (RL3; S2), pp.189-190), MoHM hospitals still rely the manual-based patient charting practice.

The implication of an EMR is that it acts as an integrator for health information and can be a component of a wider decision-support system. However, the disintegration of the initial implementation of the THIS at Selayang and Putrajaya, as stated by the Director of the Medical Practice Division implies that the IMS investment is questionable.

“At this moment two new hospitals, Selayang and Putrajaya, have adopted HIS’s in complementing work processes since 1999. However, until now, the capability and scope of operations are still confined within the boundary of the respective hospitals only. The slow progress dampens the aspiration of the main objective for the establishment of the THIS, whereby to link all HIS’s into an integrated hospital system for the MoHM. This is as a result of the systems adopted having different operating systems, being developed by different vendors. Even though the need for interoperability has been specified in the contract documents, still the service providers fail to fulfil the agreed terms... ...With this scenario, within the context of the integration of various ICT applications, we still do not feel the real impact of THIS, particularly in meeting the initial aim of IMS, that is, to serve the needs of senior management of the MoHM”

(Director of the Medical Practice Division, response to Q.3; Appendix 4.3).

Initially, the EMR promised to capture whatever patient data are needed, in order to perform any EMR related tasks such as outcome analysis, profiling, costing etc. However, these promises seem futile to the management of the MoHM, which may be the result of dissatisfaction from the investment in the IMS system without much promise of a return on that investment.



Information dissemination activity is covered by Objectives 1 and 3 (see p.5) that maps to all three aims; as in the previous sub-section, ‘information’ is a core component of the study so this mapping was expected.

## **8.5 Human Aspects**

This section relates the relevance of the human and managerial aspects as the foundation to the successful development and implementation of the IMS. As such, the discussion will focus on: ICT Project Management (PM), End-Users Involvement, and Perceived Competency of ISOs.

### **8.5.1 ICT Project Management**

The perceived success rate and ICT PM Skills will be discussed separately in this sub-section.

- **Perceived Success Rate**

In general, the ICT development of the MoHM is based on several formalised initiatives; direct instructions from the Federal Government Central agencies; decisions made by the senior management; and proposals from individual agencies. The idea of the adoption of ICT application in the MoHM is relatively new and has been put into the Ministry’s action plan since early 1990s (Suleiman 2001). With potential benefits from the technology in the information age era, the MoHM has great concerns about the significance of the ICT capabilities to enhance health care service delivery.

At present, the use of ICTs in the MoHM remains at the early stage and procurement costs for the ICT implementations are considerably high. Furthermore, without a concrete foundation in implementing the ISSP and level playing field for distribution of the financial allocation, the projects might have been concentrated to serve for the benefits of certain purposes of the Ministry’s interest only. Actually, there have been numerous IMS projects that have been introduced at various agencies of the Ministry. The most

prominent are the THIS at Selayang and Putrajaya Hospitals, the Tele-health project under the Federal Government MSC flagship application, and the in-house development of the IPMS. Most ICT projects have started since 1996.

According to Beacon (1995), the success of the implementation of IMS projects is equivalent to “probability of project completion” and “probability of achieving benefits”. Basically, this regards the completion of the project according to time, cost, and stipulated quality requirements. In other words, it explains the ability to fully realise the expected benefits, or gains the enthusiastic support of users and the MoHM management. From the results of the questionnaire, the perception about the success rate seems not to be promising in terms of fulfilling the required acceptance criteria among respondents who have ever been involved in the Ministry’s ICT projects. Most of them (50.5%) perceived the success rate to be ‘average’ and ‘low’ compared to only 0.5% who opted for ‘high’ (see Table 5.17, p.95).

The MoHM is still at the early stage in adopting ICT. Thus, the introduction of new technology inevitably requires users to be enthusiastic towards the change. Without this attitude, the interaction of ICT can pose unexpected problems. Issues have arisen in the past with the lack of interoperability of health care application systems, with poor deployment of ICT-based patient care services, and lack of human competencies in the selected technologies. The obvious examples of unexpected problems are the Laboratory Information System (LIS) at the Seremban State Hospital and Batu Pahat District Hospital in 1999 and 2001 respectively. The main reason for the issue is related to a mismatch between the functionality of the developed system and clinical routines. No workflow model was used in its implementation and to make matters worse the system implemented can not be easily integrated into existing systems, such as the IPMS at the Seremban Hospital and the Out-Patient Management Systems at the Batu Pahat Hospital.

From the studies of Rudall (1997); Willcocks & Lester (2003); and Symons (1995), it follows that there is a lack of recognition by the management MoHM to promote the check and balance mechanism to evaluate the performance of the ICT projects



development. Clearly, the lack of System S3\* (internal audit) at this level of recursion is most telling.

- **ICT Project Management Skills**

Despite the enormous amount of resources devoted to the development of IMS, the MoHM is continuously experiencing the lack of implementation success. ICT projects may involve applications, infrastructure, supporting technologies, IM, and telecommunications, including the acquisition and/or maintenance of telephone, radio and network infrastructure. For the MoHM, an ICT project is a discrete initiative that is undertaken by the Ministry to meet a business need in the respective service delivered. Since managing the project is a team effort, the requirement for best practice in the management aspects of ICT projects must prevail. In other words, senior management should participate in the projects and to be responsible for each stage in the project life-cycle.

As has been discussed in sub-section 8.2.1 (refer pp.220-222), even though MAMPU has issued circular directives about the adoption of the ISSP, the effectiveness of the implementation is still hazy. In many instances, without the proper practice mechanism of the ISSP, the uncertainty about the role, authority, and responsibility are among the common issues that have been raised. This indicates that the present ICT project management (PM) capability of the MoHM is questionable with enormous potential for grooming ICT leadership skills with respect to the performance of the ICT implementation.

Besides the involvement of internal staff in the project team, one of the great areas of difficulty in managing an ICT project successfully tends to arise with the management of external parties of the MoHM. Commonly, representatives from other public and private agencies are appointed in addition to the selected vendors and project consultants. As these agencies are not under the direct control of the MoHM PM, there is a lack of control in the quality assurance level of project deliverables.

Ability to establish and standardise clear guidelines for authority and responsibility, as well as reporting links of each PM group of the MoHM are potential areas for building up team spirit among the team members. Moreover, the ICTSC of the Ministry has the pivotal role to provide the project manager with a clear line management reporting structure.

Even though ICT projects tend to be easily managed internally, the project will benefit from having dedicated team members. For example, a dedicated project manager is able to steer members, to juggle several roles, and to ensure the team is well focused and productive. Nevertheless, in a geographical dispersed organisation like the MoHM, the potential dispersion of team members is another major issue. The inability to have project teams and members working in a close proximity with each other consistently is having a particular adverse effect on overall performance of the project (Bryde 2003). There were cases that most of the vendors

“...do not have sufficient and skilled manpower and expertise to deliver the required system deliverables accordingly”

(Secretary General, response to Q.12; Appendix 4.1).

Other contributing factors to the staffing volatility of the PM team is mainly due to high staff turnover in the MoHM. This might disrupt the project team performance. Thus, the ICTSC must emphasise the enforcing of appropriate information standards and to ensure any transfer of knowledge is properly practiced.

It is entirely consistent that the human element that is embedded within ICT systems have a similar mapping to aims and objectives as the technologies themselves. Consequently, the human aspects of project management are covered by Objectives 1 and 3 (see p.5) that map to all three aims.



### 8.5.2 End-Users Involvement

End-user involvement in the MoHM IMS is very important as the collaboration of system designers and users can lead to the mutual understanding of needs, as well as understanding about technological capability. Under the exceedingly complex situation activities handled by agencies of the MoHM, the so-called a 'black box' system (Jackson 2000, p.69); the importance of involving users in the IMS development must be given priority.

Based on comments from the questionnaire survey, some of the respondents were from Head of Agencies at the lower level of recursion and are perceived that in most instances they are not dealt with or consulted until the last minute of the system implementation. It is only then when their commitment is considered crucial. It seems that users have been forced to acquire their own application systems, without sufficient commitment during the pre-procurement stage (Wholey et al. 2001). This attitude came out several times in the free text responses in the questionnaires, as indicated below:

"Some senior management are still unaware about the significant role and contribution of ICT in enhancing work processes"

(Alor Setar Dental District Officer, Kedah);

"Lack of understanding about the ICT programme at the Ministry"

(Medical Officer, Pokok Asam Health Clinic, Taiping, Perak); and,

"Staff are not aware about the plan of ICT programmes at the Ministry"

(Head of Occupational Health Division, Public Health Institute).

The assumptions of the senior management of the MoHM with respect to the PM of the IMS are in contrast with the reality demonstrated above. During the interviews, most of them expressed their satisfaction,

“Overall, the staffs of the MOH with commitment of the top management are enthusiastic and participate actively in any ICT projects carried out by the Ministry”

(Undersecretary of Human Resource Division, response to Q.2; Appendix 4.7).

The delivery of effective modern health care service via the use of the ICT in particular, relies heavily on cohesive multidisciplinary teamwork, with the well-balanced and spread opportunity among the staff members (Hill et al. 2000). In addition, lack of involvement of system users can easily lead to unnecessary mistakes made in the delivery (Mackie & Sommerville 1999). These are lessons that should be taken on board by all those involved in PM at the MoHM. The lack of apparent leadership can be demonstrated in the procurement of systems that do not integrate without recourse to middleware solutions. For example, the *Windows-based* MoHM Intranet and application systems at Putrajaya Hospital, the *Unix-based* (Oracle) Tele-health project, the *Unix-based* (Informix) IPMS, and the proprietary *Cerner* operating system at the Selayang Hospital will require a XML-based middleware solution to integrate data and information.

It is thus timely for the senior management to provide greater opportunities for staff at all levels of organisation to participate actively in the ICT programme. Some suggestions are:

- Formalising the formation of ICT project teams to cater for each programmes and activities of the MoHM;
- Determine the appropriate structure, authority, responsibility, and team's membership; and,
- Introduce an appropriate appreciation reward scheme for the boosting team spirit.

Through their immersed involvement, users who are representing different categories of agencies at the Ministry are able to bridge the communication gaps that may occur when discussing issues in the project development. Thus, staff can contribute to the rapid adoption of a changing environment, having ownership of issues and make change as less painful as possible (Anderson, Vimarland & Timpka 2002).



Also, Yetton et al. (2000); Edejer (2000), Martin (2001); Liaw & Huang (2002); Nicholas et al. (2001) agreed that the significance of this issue can be a key success factor, and several issues have been brought up:

- increases the level of business understanding of project;
- ensuring its business relevance and usefulness from the project initiation stage;
- tends to encourage suggestions for system to be adaptable to the real users' needs during the development stage;
- able to evaluate the information which is relevant for their use during the project evaluation phase; and,
- to ensure the developed systems are transparent to their needs and functionality.

For the MoHM, the involvement in the ICT projects is also used as a criterion by the management to test a variety of skills and behaviour of staff to work gracefully under pressure, manage conflict, and the ability to deliver projects successfully. Whereby, every project should be a platform for learning and enhancing staff skills and knowledge. Their involvement would allow them to top up their performance, and test their mettle against project risks and complexity as well as to justify staff career path and promotion exercise.

End-user involvement is a further human aspect that is covered by Objective 3 (see p.5) that maps to Aim 1.

### **8.5.3 Perceived Competency of ISOs in the MoHM**

ICT programmes in other Malaysian public agencies are managed by ISOs. Usually, they are led by the CIO and the Undersecretary of the ICT Division. In MoHM there are only 43 ISOs (see Table 4.1, p.49) and so they tend to be deployed too thinly to make an impact. In fact their impact on staff at the MoHM can be gauged from responses from the questionnaire. The evidence from the questionnaire outcomes reveal that only 17.2% of respondents 'know' the role of ISO at the MoHM. Another 14.1% of the total

respondents 'never heard of ISO', and the majority 'do not know' or are 'not sure' (see Table 5.26, p.108).

The senior management of the MoHM admit that the shortage of ISOs affects greatly the overall performance of IMS activities. As the number of ICT projects keep on growing, it is likely that the ISOs will be required to get involved in multiple projects simultaneously. However, the lack of focus on each project is at the cost of inferior quality outcomes. Over and above this issue, the ISOs are mostly burdened with 'fire fighting' tasks, leaving little space for more meaningful tasks such as activity related to strategic and career development programmes.

Hence, the current low profile of ISOs and the CIO of the MoHM when dealing with ICTs needs to be enhanced drastically to comply with the suggestions from the literature, which stress the necessity for ISOs to be in the leading role in IMS projects of the MoHM (Perstyne 2001; Korenke 1992; Bowns et al. 1999; Gibson 2001). For example, in providing in-service training, both authorities, should take a concerted efforts to enhance the skills of ISO for the sake of the IMS service of the MoHM.

It is equally important to realise that ISO's need management as well as technical competencies (Lorenzi & Riley (2003). Furthermore, the significant value of communication skills should not be overlooked (Enns, Huff & Higgins 2003 and Chelsom, Payne & Reavill 2005).

In the light of the greater adoption of the outsourcing in the ICT development of the MoHM, the tasks and functions of ISOs will have to be adaptable to suit the requirements directed towards skills in managing projects as well as relationship with ICT vendors and external agencies (Khalfan 2004). Hence, having an appropriate number of trained and skilled ICT staff will enhance overall capabilities of the organisation (Wholey et al. 2001).



The perceived competency of the ISOs has been explored using responses from the questionnaire survey and interviews. Findings and their interpretation map to Objectives 3 and 5 (see p.5) that cover Aims 1 and 3.

8.6 Contribution to Knowledge

At a gross level the contribution that this study has made to the knowledge base of case findings is an extensive of the use of methodologies and tools that have been designed for ‘western world’ applications by considering their use in a different culture, both organisationally (highly bureaucratic) and in context of Malaysian life. Clearly, the contributions generated are application-oriented and it is findings from the use of VSM in diagnostic mode that have the most compelling potential for impact and change. This system intervention is explored in greater detail in the ‘master table’ below (see Table 8.1). Here, each section/sub-section of the Discussion is highlighted by issues uncovered that form new application-based knowledge in Malaysia.

Section/Sub-section	Issues Emerged
8.2 System Infrastructure	
8.2.1 Service Utilisation	
Distribution of Computers (pp.218-219)	The Ministry fails to overcome the scenario of the uneven distribution of ICT facilities as concentration of resources is put on its agencies located in the more developed areas only (Divisions at headquarters, State Health Departments as well as State hospitals).
The Use of Computers (pp.219-220)	The implementation of the IMS at the MoHM remains incomplete. Other than a small number of system applications in operation, the systems have been developed to complement non-medical purposes such as ‘accounting’ and ‘finances’, as well as other general managerial tasks.

Section/Sub-section	Issues Emerged
Strategic Planning Capability (pp.220-222)	<ul style="list-style-type: none"><li>• The use of the ICT Master plan at all levels of organisation was low; most of the ICT projects were based on <i>ad hoc</i> decisions or to serve for the interest of a specific purpose; and,</li><li>• Poor adoption of ISSP for ICT development.</li></ul>
8.2.2 Training Needs (pp.	
Training Needs (pp.222-224)	<ul style="list-style-type: none"><li>• Feedback from the questionnaire revealed that staff working in non-frontline services (such as management, training, and research agencies) are benefiting more from ICT training opportunities than frontline services staff (at hospitals, health clinics, and district health offices); and,</li><li>• Basic ICT training should be formulated for those who lack requisite ICT knowledge. By acquiring basic ICT knowledge and skills, participants are enabled to continually update their level of competency subject to the availability of access to computers.</li></ul>
ICT Training Plan (pp.224-226)	As a result of lack of an integrated effort, there was a gap between the strategic decisions and operational actions in implementing the ICT training programmes.
8.2.3 Library Service (pp.226-229)	
<ul style="list-style-type: none"><li>• Library service of the MoHM is continually finding it difficult to achieve the required level of service;</li><li>• Lack of ICT/internet facilities;</li><li>• List of collections are insufficient and out of date; and,</li><li>• Lack of emphasis on employing qualified staff.</li></ul>	



Section/Sub-section	Issues Emerged
8.3 ICT/IMS	
8.3.1 The Existing Capacity of ICT Facilities	
The Existing IMS (pp.229-231)	<ul style="list-style-type: none"><li>• Organisationally, currently the functions of the IMS are diversified across locations and responsible Units; and,</li><li>• ICT professionals should be considered for a larger role at the strategic level of the IMS (System 4) of the MoHM, in addition to Operational role (System 1): which is presently carried out by the ICT Division.</li></ul>
The Needs For ICT Enhancements (pp.231-233)	The existing capacity of ICT infrastructure revealed that the ICT development must use a strategic planning approach, to serve for the <i>whole MoHM purpose</i> that must take into consideration the present and future requirements. In this respect, the capacity to communicate with external agencies must be addressed as well as the ability to fulfil internal business operation requirements.
8.3.2 Constraints in ICT Implementation	
Resource Allocation (pp.233-236)	<ul style="list-style-type: none"><li>• Political supremacy in the Malaysian civil service sector whereby the interference of ‘powerful politicians’ is a hindrance factor for smooth project development and distribution of limited resources; and,</li><li>• Limitation of resources (financial, internal ICT technical staff, and expertise).</li></ul>
Rigidity in Procurement Processes (pp.236-237)	The existing practice in the government procurement processes are too bureaucratic, as some regulations are widely perceived as excessive and an obstacle to speedy systems delivery and implementation.

Section/Sub-section	Issues Emerged
8.3.3 ICT Competency	
Transfer of Technology (ToT) (pp.238-239)	In many instances, ICT projects are delivered with the poor adoption of ToT. Some relevant factors are due to lack of confidence of vendors and poor understanding of system users.
Application System Integration (pp.239-242)	The current instability and ineffectiveness of ICT deployment at the MoHM are as a result of poor enforcement and authority of the co-ordination agency which integrates the overall ICT programmes.
8.4 Information	
8.4.1 Information Needs (pp.242-244)	
Information exchange within and across the MoHM organisational boundaries will provide a significant impact for the guidance of the strategic and co-ordination processes in the provision of the quality healthcare service. However, the demarcation nature and fragmentation within the public health care service itself is an obvious factor affecting integration and information sharing practice in the MoHM.	
8.4.2 Information Dissemination	
The Current Practice of Information Dissemination (pp.244-245)	The present poor record of information dissemination (to a certain extent) has been diagnosed via the VSM, which is blamed mostly due the poor information dissemination machinery.This finding can also be generalised to lack of awareness among staff about the importance of any directive issued from senior management.
The Use of Electronic Medical Record (EMR) (pp.245-247)	It seems that some staff still have a greater preference for conventional communication methods, such as face-to-face meetings and telephone rather than e-mail.



Section/Sub-section	Issues Emerged
8.5 Human Aspects	
8.5.1 ICT Project Management (pp.	
Perceived Success Rate (pp.247-249)	<ul style="list-style-type: none"><li>• Lack of auditing to justify the performance of ICT projects; and,</li><li>• The success rate seemed not promising in terms of fulfilling the required acceptance criteria such as the completion of projects according to time, cost, and stipulated quality requirements.</li></ul>
ICT Project Management Skills (pp.249-250)	The present project management capability of the MoHM is questionable with enormous potential for grooming ICT leadership skills with respect to the performance of the ICT implementation.
8.5.2 End-Users Involvement (pp.251-253)	
Users, in most instances are not dealt with or consulted until the last minute of the system implementation. It is only then when their commitment is considered crucial. It seems that they have been forced to acquire their own application systems, without sufficient commitment during the pre-procurement stage.	
8.5.3 Perceived Competency of ISOs in the MoHM (pp.253-255)	
Senior management of the MoHM admit that the shortage of ISOs affects greatly the overall performance of IMS activities. As the number of ICT projects keep on growing, it is likely that the ISOs will be required to get involved in multiple projects simultaneously.	

Table 8.1 Issues uncovered from Discussion

It is also conceivable to address the findings of the VSM in diagnostic mode, shown in Table 7.3 (see pp.213-215). Here, again the areas where no system component exists, or where there is a failure in the embedding process (of (RL0; S3) and (RL1; S3)) can be highlighted for further action.

Perhaps the most significant contribution from this research on the VSM remains the fact that six levels of recursion have been achieved in applying the model to the MoHM. No published work known has managed this level of detail, so the embedded nature of the methods used have been able to be explored at greater resolution than has been achieved before.



## Chapter Nine: Conclusions

### 9.1 Introduction

This chapter details the conclusions drawn from this research, the limitations identified in the model design, recommendations for senior management within MoHM, and suggestions for further work.

### 9.2 Conclusions

This research study applied Beer's VSM in a health care setting in Malaysia. The VSM provides an avenue to study, diagnose, as well as deduce suggestions for remedial actions to tackle the stated problematic situations. IMS in the public health care service of Malaysia was investigated from the perspective of information systems as an enabler to best identify strategic management issues. The research findings give a contribution to public health care practice within the context of developing countries, as discussed in Section 8.6 (pp.255-260).

Implementation of findings demonstrated in previous Chapter is outside the scope of this study, a key finding that although the MoHM is striving to manage and exploit ICTs for IMS, as yet there is an insufficient return from the invested public funds. As senior management support for ICT programmes has been demonstrated from findings from the interviews, there is still a need for them to be more consistent in supporting effective performance of the IMS function. Senior management needs to clearly understand and appreciate the strategic potential associated with the incorporation of ICTs, and empower staff to accept the Information Systems Strategic Plan (ISSP). They should set a clear example to staff via their active participation in all key IMS activities. The deployment of the IMS the crucial role of the Chief Information Officer as project champion should be announced to all, and the operational role of the ISOs be explained to justify their inclusion in project management teams.

### **9.2.1 Information Needs of the Proposed IMS**

One of the main objectives of this research was to study the information needs of MoHM personnel and the information flows and procedures of the proposed IMS, in context of the Malaysian national interest. Findings taken from the questionnaire, interviews, literature survey, and document analysis provided the evidence base to achieve this objective. In fact, the findings suggest that to fulfil the information needs of the MoHM personnel requires the compliance of several other essential factors such as the further development and integration of application systems including the EMR; increased capacity of ICT technical support staff and ISOs; provide further opportunities for ICT training for all staff employed by the MoHM together with a coherent training plan that allows continued professional development. These factors can be designed in to any implementation, but their impact can only be assessed after this has occurred.

### **9.2.2 MoHM Issue Generation**

To obtain the sufficient breadth and depth of analysis in this research study the current issues faced by the MoHM were structured via the use of a conceptual model. Information sources used to generate the issues stem from document analysis, journal articles, books, internal and external reports (including sources from the grey literature), conference proceedings, official publications, and electronic sources from relevant websites. The MoHM issue generation acted as the driver to the remainder of the primary research study, and fulfilled the objective to provide guidance and direction for this investigation, all activities undertaken being in a Malaysian context.

### **9.2.3 The Existing Practice of Information Management at the MoHM**

The investigation of the existing practice and procedures of information management at various levels of management of the MoHM was carried out mainly through the literature survey, document analysis, questionnaire survey, interviews, and in the VSM (diagnosis mode). In terms of an information management context, the research has identified



various issues that can attenuate the effectiveness of the IMS, namely: disintegration in the IMS organisational functionality, non-existence of a dedicated IMS auditing function, skills and competencies gap in computer literacy among staff members, and lack of both information management policy and ISSP.

#### **9.2.4 System-Based Diagnostic Approach**

To use a system-based method to investigate the IMS is a further objective of this study. Through the use of Beer's VSM in diagnostic mode, six levels of recursion have been identified. Findings from the model indicate the MoHM capability gap to be addressed for its long term survival. Specific features determined by the model is central control of S3\* which is ineffective, and the absence of S4 at higher levels of granularity which again points to ineffective central planning functions. Other features that were pivotal in the interpretation of findings at each level of recursion were the match between the variety of S1 and the internal System Environment (achieving 'requisite variety' in all cases) and the S3-4 Homeostat which provided telling interpretations of central versus local control and coordination of operational management functions.

During the formulation of the VSM, incorporation of social, economic, and political factors that influence both the service provision and the IMS practice in the delivery of public healthcare were unavoidable. These factors and those that are mentioned above are interrelated, and thus contribute to the ultimate service level of this sector. This finding also illustrates a limitation of the VSM, that is, not being able to incorporate fully the 'soft' issues associated with service delivery.

#### **9.2.5 Information Requirements**

Evidence from the questionnaire and interviews, together with support from findings from the VSM, allowed the examination and analysis of the information requirements for specified groups of management at the MoHM. From the interviews, the senior management of the MoHM were struggling to acquire high quality information in a

timely and effective manner. Workflow is also an issue, with, for example, operational staff using manual practices for dissemination of what can be high volumes of information. Also, although the work towards enhancing the IMS is highly appreciated by most staff at all levels within the organisation, it seems that there is a reluctance to formulate an agreed and practical plan of action to achieve it.

From the investigations in chapters Seven and Eight, information dissemination and information flow were lethargic with directives sometimes failing to reach target groups. This reveals that there is a considerable gap between senior management expectation and practical implementation. Poor teamwork and lack of opportunities to empower staff are other factors that emerged in the analysis that have a bearing on efficiency and effectiveness of information flow dissemination. Thus, any change management programme should include these factors so as to improve the problem situation.

#### **9.2.6 The Practice of Information Management Systems for the Public Health Care Provider in Other Countries**

The main source of content to satisfy this objective stems from the literature survey. To adopt the experiences of healthcare systems from other countries needs to be justified from various perspectives. It is worth noting that not all experiences are suitable for knowledge transfer and some customisations are needed. The questions of the willingness of senior management to accept change and resource constraints may be prominent barriers to reaching the desired outcome. Furthermore, being a public agency, the overburdensome bureaucracy in the Malaysian civil service is a factor to be considered in the proposal.

For example, staff recruitment, restructuring of organisation, and procurement, all come under the official jurisdiction of the Federal Government's Central Agencies' purview. The issues associated with the organisational structure have been explained during the interviews, in chapters Seven and Eight.



### 9.3 Limitations

Several limitations of this study need to be highlighted, as follows:

- Difficulty to obtain official data, particularly at the lower level of recursion; information is subject to Official Secrets Act;
- Lack of appropriate funding meant that a field survey was ruled out by the sponsor;
- Lack of documented data of detailed business processes at the higher levels of recursion (clinical department, individual wards, public health clinics), thus, the analysis of these levels is not in-depth; and,
- The sample size of 441 respondents may not be large enough to generalise results to the entire population of MoHM officers. The disproportionate sample size among the three management levels; strategic, policy, and operational, could lower the significance of the study results.

These limitations are indicative of the tautology between an overly bureaucratic system that produces lots of paper-based records and the right information getting to the right person in the right place at an appropriate time for decision-making to be effective.

### 9.4 Recommendations

The research identifies several critical issues that are likely to contribute to the successful implementation of the proposed IMS in the MoHM, they are:

- Restructure and integrate functions of agencies that are related to information-based activities, that is, technological (ICT Division), auditing (Internal Audit Unit), collection and provision (Information Systems Unit), and dissemination (libraries), (see sub-sections 8.3.1 (pp.229-231) and 8.3.3 (pp.239-242));

- Establish and/or strengthen the role of information management at agencies across the Ministry, (see sub-sections 5.12 (pp.114-115), 8.3.1 (pp.229-231), 8.3.2 (pp.233-236), 8.3.3 (p. 240), 8.5.1 (p.248), and 8.5.3 (pp.253-255));
- Establish a Unit dedicated to IMS auditing function, (see sub-sections 7.4.8 (p.154) and 8.5.1 (pp.247-249));
- Information Management policy and Information System Strategic Plan (ISSP) should be formally formulated, (see sub-sections 5.11.2 (pp.112-113) and 8.2.1 (pp.220-222));
- Enhance the image of the ICT Steering Committee, and review its respective role at all levels of recursion, (see sub-sections 8.2.1 (p.222) and 8.5.1 (p.250));
- Enhance the role of information provision at the MoHM's libraries, (see sub-sections 5.9.2 (pp.105-107) and 8.2.3 (pp.226-229)); and,
- Establish a strategy for continued professional development for in-service staff (see sub-sections 5.9.1 (pp.97-105) and 8.2.2 (pp.222-225)).

A general recommendation related to the use of the systems method adopted in this study is that the VSM should be promoted through seminars, meetings, reports, articles, and conferences to make researchers, managers, and practitioners in the healthcare sector aware of its wider application.

## 9.5 Suggested Future Work

Among the relevant areas for the further exploration in the public health care systems in Malaysia are:

- As this research focuses on the perspective of the internal MoHM staff only, future work is suggested to accommodate views of members of the VSM 'internal environment', for example, private sector healthcare providers, public/patients, medical/health care suppliers and NGOs;



- This study is based on a single country context, further research is required to examine if its findings can be extended to public healthcare IMS in other developing countries;
- To use the VSM in design mode to aid implementation of findings of this study;
- Expansion of the application of the VSM technique via appropriate knowledge transfer;
- To investigate the effectiveness of the investment in ICTs and to suggest the best possible model for the practice;
- To study and analyse organisational and manpower aspects for the proper implementation of the IMS;
- To study the area of the Information System Strategic Plan (ISSP) in terms of the implementation of the integrated IMS;
- To investigate and evaluate issues concerning the effectiveness of ICT training programmes; and,
- To study the effectiveness in the provision of the national health infrastructure for the health care system in Malaysia.

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# BIBLIOGRAPHY

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## BIBLIOGRAPHY

Al-Mutairi, S. & Burns, N., 2003. *A five-stage model for firm's expansion decisions*.

<<http://www.ifm.eng.cam.ac.uk/cim/imnet/symposium2003/papers/al-mutairi.pdf>>,

[accessed 14.10.2005].

Amaratunga, D., Baldry, D., Sarshar, M. & Newton, R., 2002. Quantitative and qualitative research in the built environment: application of “mixed” research approach, *Work Study*, 51(1), 17-31.

Ammenwerth, E., Graber, S., Hermann, G., Burkle, T. & Konig, J., 2003. Evaluation of health information systems – problem and challenges. *International Journal of Medical Informatics*, 71(2/3), 125-135.

Anderson, R., 1989. The need for formal development of the VSM. In: Espejo, R. & Harnden, R., eds. *The viable system model: interpretations and application of Stafford Beer's VSM*. Chichester: John Wiley, pp.30-40.

Anderson, A., Vimarlund, V. & Timpka, T., 2002. Management demands on information and communication technology in process-oriented health-care organisations. *Journal of Management in Medicine*, 16(2/3), 159-169.

Anderton, R., 1990. The need for formal development of the VSM. In: Espejo, R. & Harnden, R., eds. *The viable system model – interpretations and applications of Stafford Beer's VSM*. Chichester: John Wiley, pp.39-50.

Ash, J., 1997. Organisational factors that influence it diffusion academic health sciences centres. *The American Medical Informatics Association*, 4(2), 102-111.

Ashby, W. R., 1960. *Design for a brain*. 2<sup>nd</sup> ed. London: Chapman & Hall Ltd.

Ashby, W. R., 1973. *An introduction to cybernetics*. London: Chapman & Hall and University Paperbacks.

Atkinson, C., Eldabi, T., Paul, R. J. & Pouloudi, A., 2002. Integrated approaches to health informatics research and development, *Logistic Information Management*, 15(2), 136-152.

Avison, D.E. & Fitzgerald, G., 1995. *Information system development: methodologies techniques and tools*. 2<sup>nd</sup> ed. London: McGraw-Hill.

Baba, Z., 2002. *National Library of Malaysia*.

<[http://www4.irandoc.ac.ir/apin/reports/papers\\_1.htm](http://www4.irandoc.ac.ir/apin/reports/papers_1.htm)>, [accessed 20.08.04].

Bakker, A. R., 2002. Health care and ICT, partnership is a must. *International Journal of Medical Informatics*, 66(1-3), 51-57.

Ball, L. D., 2002. CIO on centre stage: 9/11 changes everything. *Information Systems Management Journal*, 19(2), 8-11.

Ball, M. J. & Douglas, J. V., 2001. Focus: patient safety and quality care. *Journal of Healthcare Information Management*, 15(4), 28-33.

Bauer, J. C., 2002. Telemedicine: insights on telemedicine: to succeed is human. *Journal of Healthcare Information Management*, 16(1), 14-15.

Beacon, J., 1995. Why companies invest in information technology. In: Willcocks, L., ed. *Information management – the evolution of information systems investment*. London: Chapman & Hall, pp.31-47.

Beer, S., 1965. *Cybernetics and management*. London: English University Press.



Beer, S., 1966. *Decision and control*. London: John Wiley.

Beer, S., 1967. *Management science – the business use of operations research*. London: Aldus Books.

Beer, S., 1979. *The heart of enterprise*. Chichester: John Wiley.

Beer, S., 1991. *Diagnosing the system for organisations*. Chichester: John Wiley.

Behling, R., Behling, C. & Sousa, K., 1996. Software re-engineering: concepts and methodology. *Industrial Management & Data Systems*, 96(6), 3-10.

Bell, J., 1999. *Doing your research project*. 3<sup>rd</sup> ed. Buckingham, UK: Open University Press.

Bell, L. 2002. Guerrilla tactics in information dissemination: developing a web-based resource for NHS managers. *ASLIB Proceedings 2002*, 54(3), 158-165.

Black, T. R., 1999. *Doing quantitative research in the social sciences*. London: SAGE Publication.

Blair, J. S., 1996. *An overview of healthcare information standards*.  
<<http://www.cpri-host.org/resource/docs/overview.htm>>, [accessed 20.06.02].

Botha, R. A. & Eloff, J. H. D., 2001. A framework for access control in workflow systems. *Information Management and Computer Security*, 9(2), 126-133.

Bouthiller, F. & Shearer, K., 2002. Understanding knowledge management and information management: the need for an empirical perspective. *Information Research* [online], 8(1). <<http://InformationR.net/ir/8-1/paper141.html>>, [accessed 12.11.02].

Bowns, I. R., Rotherham, G. & Paisley, S., 1999. Factors associated with success in implementation of information management and technology in the NHS. *Health Informatics Journal*, 5(3), 136–145.

Bozeman, D. P. & Kacmar, K. M., 1997. A cybernetics of impression management processes in organisations. *Organisation Behaviour and Human Decision Process*, 69(1), 9-30.

Briggs, C. L., 1986. *Learning how to ask a sociolinguistic appraisal of the role of the interview in social science research*. Cambridge: Cambridge University Press.

Brittain, J. M. & Abbot, W., 1993. *Information management and technology in healthcare*. London: Taylor Graham.

Brocklesby, J. & Cummings, S., 1996. Designing a viable organisation structure. *Long Range Planning*, 29(1), 49-57.

Bryde, D. J., 2003. Modelling project management performance. *International Journal of Quality & Reliability Management*, 20(2), 229-254.

Bryman, A., 2004. *Social research methods*. 2<sup>nd</sup> ed. Oxford: Oxford University Press.

Burger, R. L., 1993. *Information policy – a framework for evaluation and policy research*. Norwood, N.J.: Ablex Publishing.

Burrell, G. & Morgan, G., 1979. *Sociological paradigms and organisational analysis*. London: Heinemann Educational Books Ltd.

Butcher, H., 1998. *Meeting managers' information need - a managing information report*. London: The Association For Information Management (ASLIB).



Camera, R., Yen, D. C., Chou, D. C. & Lee, S., 1997. Information superhighway: current developments and future analyses. *Industrial Management & Data Systems*, 97(6), 207-213.

Canel, C., Mathieu, R. G. & Das, S. R., 1997. The successful development of information systems for FMS: some useful lessons. *Industrial Management & Data Systems*, 97(8), 316-319.

Carlile, S. & Sefton, A. J., 1998. Healthcare and the information age: implications for medical education. *The Medical Journal of Australia*, 168(7), 340-343.

Carter, M., 2000. Integrated electronic health records and patient privacy: possible benefits but real dangers, *The Medical Journal of Australia*, 172(1), 28-30.

Case, D. O., 2002. *Looking for information*. London: Academic Press.

Cerpa, N. & Verner, J. M., 1998. Case study: the effect of is maturity on information systems strategic planning. *Information Management*, 34(4), 199-208.

Chapman, R., 2003. New means for increasing data accessibility. In: O'Carrol, P. W., et al., eds. *Public health informatics and information systems*. London: Springer, pp.408-430.

Chelsom, J. V., Payne, A. C. & Reavill, L. R. P., 2005. *Management for engineers, scientists and technologists*. 2<sup>nd</sup> ed. Chichester: John Wiley.

Chen, T. S. & Gough, T. G., 1995. Building a fully integrated hospital information system. In: Ellis, K., Gregory, A., Mears-Young, B. R. & Ragsdell, G., eds. *Critical issues in systems theory and practice*. Proceeding of the Fourth International Conference of the United Kingdom System Society: University of Hull, 10-14 July. New York, N.Y.: Plenum Press, pp.609-614.

Choo, C. W., 1998. *Information management for the intelligent organisation*. 2<sup>nd</sup> ed. Medford, N.J.: Information Today.

Coiera, E., 1995. Recent advances: medical informatics. *British Medical Journal*, 310, 1381-1387.

Coiera, E., 1997. *Guide to medical informatics, the internet and telemedicine*. London: Chapman and Hall Medical.

Coiera, E., 1998. Medical informatics meets medical education. *Medical Journal of Australia* [online], 168, 319-320.  
<<http://www.mja.com.au/public/issues/apr6/coiera/coiera.html>>, [accessed 12.06.02].

Cook, J. E., 2001. *Healthcare technology management problems in developing countries*. <<http://www.wmrc.com/businessbriefing/pdf/hospitalfm2001/publication/cook/pdf>>, [accessed 22.04.02].

Cozens, J. F., 1998. Celebrating teamwork. *Journal In Health Care*, Supplement edition 1998, 7, S3-S7.

Currie, W. L., 1998. Using multiple suppliers to mitigate the risk of it outsourcing at ICI and Wessex Water. *Journal of Information Technology*, 13(3), 169-180.

Curry, A. & Moore, C., 2003. Assessing information culture – an exploratory model. *International Journal of Information Management*, 23(2), 91-110.



Dearstyne, B.W., 2001. e-Business, e-Government information proficiency. *Information Management Journal*, 35(4), 16-24.

De Vaus, D., 2002. *Surveys in social research*. 5<sup>th</sup> ed. London: Routledge – Taylor and Francis.

Diamantopoulos, A. & Schlegelmich, B. B., 2000. *Taking the fear out of data analysis*. London: Thomas Learning Business Press.

Doll, W. J., Deng, X., Raghunathan, T. S., Torkzadeh, G. & Xia, W., 2004. The meaning and measurement of user satisfaction: a multigroup invariance analysis of the end-user computing satisfaction instrument. *Journal of Management Information Systems*, 21(1), 227–262.

Duncan, W. J., Ginter, P. M. & Swayne, L. E., 1995. *Strategic management of health care organisations*. 2<sup>nd</sup> ed. Cambridge, Mass.: Blackwell Business.

Ducheneout, N.B., 2002. The social impacts of electronic mail in organisations. *Information Communication & Society*, 5(2), 153-188.

Easterby-Smith, M., Thorpe, R. & Lowe, A., 2002. *Management research: An introduction*. 2<sup>nd</sup> ed. London: Sage Publications.

Economic Planning Unit Malaysia, 2001a. *The 8<sup>th</sup> Malaysia plan 2001-2005*, Kuala Lumpur, Malaysia: Malaysia National Printing.

Economic Planning Unit Malaysia, 2001b. *The third outline perspective plan 2001-2010*. Kuala Lumpur, Malaysia: Malaysia National Printing.

Edejer, T. T. T., 2000. Disseminating health information in developing countries: the role of the internet. *British Medical Journal*, 321, 797-800.

- Eldabi, T., Irani, Z., Paul, R. J., & Love, P. E. D., 2002. Quantitative and qualitative decision-making methods in simulation modelling, *Management Decision*, 40(1), 64-73.
- Enns, H.G., Huff, S. L. & Higgins, C. A., 2003. CIO lateral influence behaviours: gaining peers' commitment to strategic information systems. *MIS Quarterly*, 27(1), 155-176.
- Espejo, R., 1989. The VSM revisited. In: Espejo, R. & Harnden, R., eds. *The viable system model: interpretations and application of Stafford Beer's VSM*. Chichester: John Wiley, pp.77-99.
- Espejo, R., 1996. Requirements for effective participation in self-constructed organisations. *European Management Journal*, 14(4), 414-422.
- Espejo, R., Schuhmann, W., Schwaninger, M. & Bilello, U., 1996. *Organizational transformation and learning – a cybernetic approach to management*. Sussex: John Wiley.
- Espejo, R. & Gill, A., 1997. *The viable system model as a framework for understanding organisations*. <<http://www.phrontis.com>>, [accessed 12.12.03].
- Espejo, R., Bowling, D. & Hoverstadt, P., 1999. The viable system model and the Viplan software. *Kybernetes*, 28(6/7), 661-678.
- Farmer, J., Richardson, A. & Lawson, S., 1999. Improving access to information for nursing staff in remote areas: the potential of the internet and other networked information resources. *International Journal of Information Management*, 19(1), 49-62.
- Feather, J. P., 2000. *Information society - a study of continuity and change*. 3<sup>rd</sup> ed. London: Library Association Publishing.



Fitch, C. J., Briggs, J. S. & Beresford, R. A., 2000. System issues for successful telemedicine implementation. *Health Informatics Journal*, 6(3), 166–173.

Flood, R. L. & Carson, E. R., 1990. *Dealing with complexity*. 3<sup>rd</sup> ed. New York, N.Y.: Plenum Press.

Forman, M., 2002. *E-government strategy, simplified delivery of services to citizens*. <<http://www.cio.gov/Documents/EgovStrategy%2Ehtml>>, [accessed 21.04.02].

Foster, L. A. & Herndon, B. T., 1997. *Implementation of a reengineered procurement process at Duke University, using technology and work process redesign*. <<http://www.educause.edu/ir/library/html/cnc9708/cnc9708.html>>, [accessed 09.06.02].

Foster, S. P., 2000. The digital divide: some reflections. *The International Information And Library Review*, 32(3), 437-451.

Fowler, A. & Jeffs, B., 1998. Examining information systems outsourcing: a case study from the United Kingdom, *Journal of Information Technology*, 13(2), 111-126.

Fuller, S. R., 1997. Government health information security standards: beat the clock by developing security strategies now, *Healthcare Informatics [online]*, November 1997. <[http://www.healthcare-informatics.com/issues/1997/11\\_97/privacy.htm](http://www.healthcare-informatics.com/issues/1997/11_97/privacy.htm)>, [accessed 02.06.02].

Galliers, R. D. & Sutherland, A. R., 2003. The evolving information systems strategy, *In: Galliers, R. D. & Leider, D. E., eds. Strategic information management – challenges and strategies in managing information systems*, London: Butterworth Heinemann, 3<sup>rd</sup> ed. pp.33-63.

George, F. H., 1971. *Cybernetics*. London: The English Universities Press.

- Gibson, M., 2001. Telling it likes it is – a personal take on information. *Business Information Review*, 18(1), 28–33.
- Gill, T., 2002. *Management cybernetics*. <<http://www.phrontis.com>>, [accessed 13.01 04].
- Golub, A. L., 1997. *Decision analysis an integrated approach*. New York, N.Y.: John Wiley.
- Grant , R. M., Horkin, E. J., Melhuish, P. J. & Norris, A. C., 1998. Tasks of educating and training information systems professionals within the NHS UK. *Journal of Medical Informatics*, 50(1-3), 171-177.
- Gray, J. A. M. & Lusignan, S. D., 1999. National electronic library for health (NeLH). *British Medical Journal*, 319, 1476-1479.
- Griew, A., Gold, G. & Philip, S. G., 1999. Need to know; allowed to know - the health care professional and electronic confidentiality. *Information Technology And People*, 12(3), 276-286.
- Grimwood, D. & Simmons, J. S., 1998. *Information management in the voluntary society*. London: ASLIB.
- Grupe, F., 2003. Information systems professionals and conflict of interest. *Information Management & Computer Security*, 11(1), 28-32.
- Hagland, M., 2000a. Smart card knock at healthcare's door, *Healthcare Informatics* [online], October 2000.  
<[http://www.healthcareinformatics.com/issues/2000/05\\_00/hagland\\_htm](http://www.healthcareinformatics.com/issues/2000/05_00/hagland_htm)>, [accessed 20.04.02].



Hagland, M., 2000b. The many hats of a CIO. *Healthcare Informatics* [online], May 2000. <[http://www.healthcare-informatics.com/issues/2000/10\\_00/hagland\\_h.htm](http://www.healthcare-informatics.com/issues/2000/10_00/hagland_h.htm)>, [accessed 21.04.02].

Hammond, W. E., 2004. *Electronic medical records – getting it right and going to scale*, Proceeding the Commonwealth Fund/Nuffield Trust Conference: Pennyhill Park, Bagshot, England, 11-13 July.

Harnden, R. J., 1989. Outside and then: an interpretative approach to the VSM. In: Espejo, R. & Harnden, R., eds. *The viable system model: interpretations and application of Stafford Beer's VSM*. Chichester: John Wiley, pp.383-404.

Harris, E., Webster, I. W., Harris, M. F. & Lee, P. J., 1998. Unemployment and health: the healthcare system's role, *The Medical Journal of Australia*, 168(6), 291-296.

Harris, I. & Mainelli, M., 1999. *Is your organisation viable?*. <[http://www.zyen.com/Knowledge/Articles/is\\_your\\_organisation\\_viable.htm](http://www.zyen.com/Knowledge/Articles/is_your_organisation_viable.htm)>, [accessed 05.01.04].

Harris, K., 1998. Information and communication in the community sector. In: Grimwood, D. & Simmons, J.S., eds. *Information management in the voluntary society*. London: ASLIB, pp.59-72.

Hassan, B. B., 2002. *Using electronic information resources: a study of end-user training needs and methods in selected public university libraries in Malaysia*, Ph.D. Thesis, Department of Information Science, Loughborough University.

Heath, A. & Martin, J., 1997. *Why are there so few formal measuring instruments in social and political research*. <<http://www.crest.ox.ac.uk/papers/p58.pdf>>, [accessed 23.05.05].

Heathfield, H., Pitty, D. & Hanka, R., 1998. Evaluating information technology in health care: barriers and challenges. *British Medical Journal*, 316, 1959-1961.

Heeks R., 1998. *Public sector management information systems*.  
<<http://idpm.man.ac.uk/idpm/ispswpf5.htm>>, [accessed 07.08.03].

Henderson, S. C. & Snyder, C. A., 1999. Applications personal information privacy: implications for MIS managers. *Information & Management*, 36(4), 213-220.

Hill, M. W., 1994. *National information policies and strategies – an overview and bibliographic survey*. West Sussex: Bowker Saur.

Hill, P., O'Grady, A., Millar, B. & Boswell, K., 2000. The patient care development programme: organisational development through user and staff involvement. *International Journal of Health Care Quality Assurance*, 13(4), 153-161.

Holmberg, B. A., 1989. Developing organisational competence in a business. *In*: Espejo, R. & Harnden, R., eds. *The viable system model: interpretations and application of Stafford Beer's VSM*. Chichester: John Wiley, pp.271-297.

Horn Nord, J. & Daryl Nord, G., 1995. Why managers use executive support system: selecting and using information for strategic advantage. *Industrial Management and Data Systems*, 95(9), 24-28.

Huotari, M. L., Leena, M. & Wilson, T. D., 2001. Determining organisational information needs: the critical success factors approach, *Information Research Journal* [online], 6(3). <<http://www.shef.ac.uk/~is/publications/infres/paper108.html>>, [accessed 10.08.02].



Information Management Steering Committee on Information Management in the Commonwealth Government, 1997. *Report of the Committee....*

<<http://www.dcita.gov.au/ogo/imsc/chapter7.htm>>, [accessed 04.06.02].

Jackson, M.C., 1990. Evaluating the managerial significance of the VSM. In: Espejo, R. & Harnden, R., eds. *The viable system model interpretations and applications of Stafford Beer's VSM*. Chichester: John Wiley, pp.407-438.

Jackson, M. C., 2000. *Systems approaches to management*. New York, N.Y.: Kluwer Academic/Plenum Publishers.

Janes, F. R., 1998. Interpretive structural modelling: a methodology for structuring complex issues. *Trans Inst MC*, 10(3), 145-154.

Jayasuriya, R., 1999. Managing information systems for health services in a developing country: a case study using a contextualist framework. *International Journal of Information Management*, 19(5), 335-349.

Johansson, A., Lundh-Snis, U., Stahl-Falck, P. & Svensson, L., 2001. *Attitudes to ICT in a healthcare organisation*. <<http://laboratorium.htu.se/pdf/publications/10.pdf>>, [accessed 02.01.05].

Jones, P. H., 2000. *Dissertation – research method*. <<http://redesignresearch.com/pde-3.htm>>. [accessed 27.10.05].

Jordan, E., 1999. Contingency planning: management roles. *Information Management & Computer Security*, 7(5), 232-238.

Juni, M. H., 1996. Public health care provision: access and equity. *Social Science Medical*, 43(5), 756-768.

Kamm, R., 1995. Information use in the 'new' organization: the organic metaphor and its implications. *In*: Ellis, K., Gregory, A., Mears-Young, B. R. & Ragsdell, G., eds. *Critical issues in systems theory and practice*. Proceeding of the Fourth International Conference of the United Kingdom System Society: University of Hull, 10-14 July. New York, N.Y.: Plenum Press, pp.315-322.

Kelly, J. T., 1998. 'After The Chaos': expected benefits of health information management. *Journal of Health Affairs*, 17(6), 39-40.

Kettinger, W. J., Teng, J. T. C. & Guha, S., 1996. Information architectural design in business process reengineering. *Journal of Information Technology*, 11(1), 27-37.

Khalfan, A. M., 2004. Information security considerations in IS/IT outsourcing projects: a descriptive case study of two sectors. *International Journal of Information Management*, 24(1), 29-42.

Kim, B. O., 1994. Business process reengineering: building a cross-functional information architecture. *Journal of Systems Management*, 45(12) 30-35.

Kock, N. & Murphy, F., 2000. *Developing a knowledge and information flow –based methodology for redesigning acquisition process*.

<<http://www.nps.navy.mil/earp/FY2000%20Research%20Reports/FY2000%20Kock.pdf>>, [accessed 31.05.02].

Kroenke, D., 1992. *Management information systems*. 2<sup>nd</sup> ed. London: McGraw-Hill.

Kroenke D. & Hatch, R., 1994. *Management information systems*. 3<sup>rd</sup> ed. New York: McGraw-Hill.

Kvale, S., 1996. *InterViews – an introduction to qualitative research interviewing*. London: SAGE Publications.



Lancaster, J., 2000. Planning the future by the present: a personal view. *Health Library Review*, 7(1), 2-6.

Lang, R. D., 2001. Leadership: human resource development: a key strategic initiative for the information management executive. *Journal of Healthcare Information Management*, 16(1), 19-21.

Leonard, A., 2000. The viable system model and knowledge management. *Kybernetes*, 29(5/6), 710-715.

Lee, G. G. & Pai, J. C., 2003. Effects of organisational context and inter-group behaviour on the success of strategic information systems planning: an empirical study. *Behaviour & Information Technology*, 22(4), 263-280.

Liaw, S. S. & Huang, H. M., 2002. How web technology can facilitate learning. *Information Systems Management Journal*, 19(1), 56-61.

Liang, T. P. & Hung, S. Y., 1997. Decision support systems and executive information systems application in Taiwan. *Information Technology & People*, 10(4), 303-315.

Little S., Holmes, L. & Grieco, M., 2001. Calling up culture – information spaces and information flows as the virtual dynamics of inclusion and exclusion. *Information Technology & People*, 14(4), 353-367.

Longman, A. & J. Mullin, 2004. Project management: key tool for implementing strategy. *Journal of Business Strategy*, 25(5), 54-60.

Lorence, D. P., 2002. Adoption of information quality management practices in US healthcare organisation. *International Journal of Quality and Reliability Management*, 19(6), 737-756.

Lorenzi, N. M. & Riley, R. T., 2003. Organisational issues = change. *International Journal of Medical Informatics*, 69(2/3), 197-203.

Loukis, E. & Spinellis, D., 2001. Information systems security in the Greek public sector. *Information Management & Computer Security*, 9(1), 21-31.

Mac Morrow, N., 1992. Information management at the national level: issues and initiatives. In: Cronin, B., ed. *Information management from strategies to actions*. London: ASLIB, pp.195-212.

Mackie, J. & Sommerville, I., 1999. Failures of healthcare systems.  
<<http://www.dirc.org.uk/publications/inproceedings/papers/29.pdf>>, [accessed 20.10.04].

Maguire, S., 2002. Identifying risks during information system development : managing the process. *Information Management & Computer Security*, 10(3), 126-134.

Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), 1999a. *The government general circular number 2 year 1999 - the government IT and internet committee (GITIC)*. Kuala Lumpur, Malaysia: Malaysian Government Printer.

Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), 1999b. *The government general circular number 3 year 1999 – the implementation of the smart partnership among government agencies in ICT scope*. Kuala Lumpur, Malaysia: Malaysian Government Printer.

Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), 2000a. *Information technology strategic plan (ISP) framework for government agencies*. Kuala Lumpur, Malaysia: MAMPU.



Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), 2000b. *The government general circular number 3 year 2000 – policy outline of ICT security and government communications*. Kuala Lumpur, Malaysia: Malaysian Government Printer.

Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), 2003. *Malaysian public sector ICT strategic plan*. Kuala Lumpur, Malaysia: MAMPU.

Malaysian Medical Association (MMA), 1999a. *Health for all – reforming health care in Malaysia*. Kuala Lumpur, Malaysia: MMA.

Malaysian Medical Association (MMA), 1999b. *MMA's proposed national health care plan*. a report presented to the Prime Minister of Malaysia, on 03-11-1999. Kuala Lumpur: MMA.

Martin, W. J., 2001. The role of knowledge content in e-commerce. *Journal of Information Science*, 27(3), 180-184.

Masys, D. R. 2001. *Information technology and healthcare quality: a national summit*. <<http://www.qualityforum.org/ITvision.pdf>>, [accessed 24.05.02].

McDonald, C. J., 1997. The barriers to electronic medical record systems and how to overcome them. *Journal of American Medical Informatics Association*, 4(3), 213-221.

McNurlin, B. C. & Sprague Jr, R. H., 1998. *Information systems management in practice*, 4<sup>th</sup> ed. Upper Saddle River, New Jersey: Prentice Hall.

Meagher, R., 2003. Putting “strategic” into information management. *The Information Management Journal*, 37(1), 51-57.

Mechanic, D., 2002. Improving the quality of healthcare in the United States of America, the need for a multi-level approach. *Journal of Health Service Research & Policy*, 7(1), 35-39.

Memel, D. S., Scott, J. P., McMillan, D. R., Easton, S. M., Donelson, S. M., Campbell, G., Sheehan, M. & Ewing, T. N., 2001. Development and implementation of an information management and information technology strategy for improving healthcare services: a case study. *Journal of Healthcare Information Management*, 15(3), 261-285.

Mendes, H. M. D. C., 1996. *Health information acquisition in British and Brazillian hospitals*, Ph.D. Thesis, Department of Information and Library Studies, Loughborough University.

Meyer, N. D., 1995. *Structural cybernetics*.

<<http://www.ndma.com/products/or/orovp4.htm#ch3>>, [accessed: 05.01.04].

Mingers, J. & Rosenhead, J., 2004. An overview of related methods: VSM, system dynamics, and decision analysis. In: Rosenhead J. & Mingers, J., eds. *Relational analysis for a problematic world revisited*. 2<sup>nd</sup> ed. Chichester: John Wiley, pp.267-288.

Ministry of Foreign Affairs Malaysia, 2001. *Malaysia in brief*. Kuala Lumpur, Malaysia: Ministry of Foreign Affairs Malaysia.

Ministry of Health Malaysia (MoHM), 1997. *Telehealth blueprint – telemedicine flagship application*, Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2000. *Resolution for the health sector*. Proceeding 8<sup>th</sup> Malaysia plan conference: Bangi, Malaysia, 21-22 July.

Ministry of Health Malaysia (MoHM), 2001a. *Ministry of Health Malaysia annual report 1998*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.



Ministry of Health Malaysia (MoHM), 2001b. *Draft paper on k-economy and the health sector in Malaysia*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2002. *Healthcare financing: views of the Ministry of Health Malaysia*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2003a. *Malaysia's health 2000*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2003b. *Annual report 1999*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2003c. *Posts establishment of the Ministry of Health Malaysia in the year 2002*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2004a. *Annual report 2000*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Ministry of Health Malaysia (MoHM), 2004b. *Report of MoHM hospitals inpatient particulars for the year 2000*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Mohan, J. & Raja Yaacob, R. R., 2004. The Malaysia telehealth flagship application: a national approach to health data protection and utilisation and consumer rights. *International Journal of Medical Informatics*, 73(3), 217-227.

Mohd Said, N., Abdul Ghani, H. & Hairi, F., 2001. *Does integration of ICT in a primary health care clinic improves client's satisfaction?*. Kuala Lumpur, Malaysia: Ministry of Health Malaysia.

Molina, P. G., 1999. *ISP*. <<http://www.cali.org/jlsc.molina.html>>, [accessed 16.08.04].

- Moser, C. A. & Kalton, G., 1977. *Survey methods in social investigation*. 2<sup>nd</sup> ed. London: Heinemann Educational Books Ltd.
- Muir, L. & Douglas, A., 2001. Where now for the uk public service library?. *Library Management*, 22(6-7), 266-271.
- Myburgh, S., 2000. The convergence of information technology & information management. *The Information Management Journal*, 34(2), 4-17.
- Nair, M. G., 2002. ICT security. *Khidmat*, 48(1), 4-9.
- Naeme, R., 1997. Smart cards – the key to trustworthy health information systems. *British Medical Journal*, 314, 573-583.
- National Committee On Vital and Health Statistics, USA, 2000. *Toward a national health information infrastructure*. <<http://www.ncvhs.hhs.gov/NHII2kReport.htm>>, [accessed 17.04.02].
- Neuhauser, L. & Kreps, G. L., 2003. Rethinking communication in the e-health era. *Journal of Health Psychology*, 8(1), 7-24.
- Ng, J. M. & Li, K. X., 2003. Implication of ICT for knowledge management in globalisation. *Information Management & Computer Security*, 114(4), 167-174.
- Nicholas, D., Hutington, P., Williams, P. & Blackburn, P., 2001. Digital health information provision and health outcome. *Journal of Information Science*, 27(4), 265-276.
- Norris, A. C. & Brittain, J. M., 2000. Education, training and the development of healthcare informatics. *Health Informatics Journal*, 40(6), 189-195.



Nussbaum, G. M., 1999. Nine hot technology trends – security, *Healthcare Informatics* [online], February 1999.

<[http://www.healthcareinformatics.com/issues/1999/02\\_99/nine.htm](http://www.healthcareinformatics.com/issues/1999/02_99/nine.htm)>, [accessed 02.06.02].

Office of the Prime Minister of Malaysia, 2005. *Government*.

<[http://www.pmo.gov.my/website/webdb.nsf/vf\\_Front\\_Gov?OpenForm](http://www.pmo.gov.my/website/webdb.nsf/vf_Front_Gov?OpenForm)>, [accessed 15.06.05].

Oppenheim, A. N., 1992. *Questionnaire design, interviewing and attitude measurement*. London: Pinter Publishers.

Oppenheim, C., 1997. Manager's use and handling of information. *International Journal of Information Management*, 17(4), 239-248.

O'Connor, P., 2002. Determining the impact of health library services on patient care: a review of the literature. *Health Information and Libraries Journal*, 19(1), 1 -13.

Pallant, J., 2002. *SPSS survival manual*. Buckingham: Open University Press.

Parnell, N., 2001. Managing information overload. *Journal Business Information Review*, 18(1), 45–50.

Patricia, J. V. & German, P. S., 1979. Development of an information system: a means for improving social work practice in health care. *American Journal For Public Health*, 69(4), 46-50.

Patton, M. Q., 1984. Data collection: options, strategies, and cautions. In: Rutman, L., ed. *Evaluation research methods*. 2<sup>nd</sup> ed. Los Angeles, California: Sage Publications, pp.39-64.

Pearson, D. & Rossalt, H., 2001. Developing a general practice library: a collective project between a GP and librarian. *Health Information And Libraries Journal*, 18(4), 192-202.

Perjasa, 2005. Perjasa Malaysia.

<<http://perjasa.net/modules/news/article.php?storyid=6>>, [accessed 14.06.05].

Pizzaro, M. B., 1998. *ICT in public expenditure management*.

<<http://www.adb.org/Document/Ma.Pizzaro.pdf>>, [accessed 28.06.04].

Procter, R., Clarke, K. M., Hartswood, M., Rouncefield, M. & Sharpe, M., 2002. *The electronic medical record and healthcare integration: some observation of inter-organisational working*. Proceeding current perspectives in health care computing 2002: Health Informatics Committee of the British Computer Society, Guildford, pp.219-222.

Protti, D., 2003. Local clinician involvement in clinical information systems: luxury or necessity? – a review of two international experiences. *The British Journal of Healthcare Computing and Information Management*, 20(10), 28-30.

Ragu-Nathan B., Ragu-Nathan, T. S., Tu, Q. & Shi, Z. Z., 2001. Information management strategy: the construct and its measurement. *Strategic Information Systems*, 10(4), 265-289.

Ramani, K. V., 2004. Practical applications a management information system to plan and monitor the delivery of health-care services in government hospitals in India. *Journal of Health Organisation and Management*, 18(3), 207-220.

Ranganathan, C. & Kannabiran, G., 2004. Effective management of information systems function: an exploratory study of Indian organisations. *International Journal of Information Management*, 24(3), 247-266.



Rashbass, J., 2000. Will technology kill the healthcare library?. *Health Library Review*, 17(1), 51-55.

Ratnachicam, I., 2001. Country profile: Malaysia. In: Sachs, J., Porter, M. & Schwab, K., eds. *Global competitiveness report 2001-2002*. Oxford: Oxford University Press.

Reel, S., 2000. The rudder in a white-water world, *Healthcare Informatics* [online], July 2000. <[http://www.healthcare-informatics.com/issues/2000/07\\_00/cio.htm](http://www.healthcare-informatics.com/issues/2000/07_00/cio.htm)>, [accessed 20.04.02].

Ren, W. H., 1999. U.S government information need, awareness, and searching: a study of small business executives. *Journal of Government Information*, 26(5), 453-465.

Richards, T. & Smith, R., 1994. How should European health policy develop? A discussion. *British Medical Journal*, 309, 116-121.

Riley, T. B., 2004. *E-government the digital divide and information sharing: examining the issues*.  
<[http://www.rileyis.com/publications/research\\_papers/track04/Divide1Vs.3.pdf](http://www.rileyis.com/publications/research_papers/track04/Divide1Vs.3.pdf)>, [accessed 19.10.04].

Ritonja, S. A. & Hocevar, Z., 2001. Redesign of healthcare processes classification to improve the processes of gathering information and data processing on professional and organisational quality in healthcare. *International Journal of Healthcare Quality Assurance*, 14(6), 254-259.

Rudall, B. H., 1997. Contemporary systems and cybernetics. *Kybernetes*, 26(8), 867-878.

Rudall, B. H., 2000. Cybernetics and systems in the 1980s. *Kybernetes*, 29(5/6), 595-611.

Sahan, K., 1998. *Nation's economy and health*, Proceeding the fifth public health national colloquium: The National University of Malaysia, Kuala Lumpur, 6<sup>th</sup> October 1998.

Salaun, Y. & Flores, K., 2001. Information quality: meeting the needs of the consumer, *International Journal of Information Management*, 21(1), 21-37.

Sandblad B., Gulliksen J., Åborg C., Boivie I., Persson J., Göransson B., Kavathatzopoulos I., Blomkvist S. & Cajander Å., 2003. Work environment and computer systems development. *Behaviour & Information Technology*, 22(6), 375-387.

Scheiber, A., Schneemann, R. & Wisher, R., 1998. Assessment of information needs in public health in Germany: results of a nationwide survey. *Information Research Journal*, 3(3), 1-5.

Schiemenz, B., 2003. *Managing complexity by recursion*.

<[http://www.wiwi.unimarburg.de/Lehrstuehle/BWL/BWL01/Forschung/Publikationen/Managing complexity.pdf](http://www.wiwi.unimarburg.de/Lehrstuehle/BWL/BWL01/Forschung/Publikationen/Managing%20complexity.pdf)>, [accessed 13.01.04].

Schonberg, R & Safran, C., 2000. Internet based repository of medical records that retains patient confidentiality. *British Medical Journal*, 321, 1199-1203.

Sekaran, U., 1992. *Research methods for business – a skill-building approach*. 2<sup>nd</sup> ed. Chichester: John Wiley.

Shaberwal, R., 2003. The evolution of coordination in outsourced software development projects: a comparison of client and vendor perspectives. *Information and Organisation*, 13(3), 153-202.

Siegel, S. & Castellan, N. J., 1988. *Nonparametric statistics for the bahavioral sciences*. 2<sup>nd</sup> ed. New York, N.Y.: McGraw-Hill.



Snowdon, B., 2003. *Active meta-process models*.

<<http://www.cems.uwe.ac.uk/~sjgreen/systemmodellinggroup/Workshop0103/BobSnowdon.doc>>, [accessed 03.02.04].

Snowdon, B. & Kawalek, P., 2003. Active meta-process models: a conceptual exposition. *Information and Software Technology*, 45(15), 1021-1029.

Sohail, M. P., 2003. Services quality in hospitals: more favourable than you might think. *Managing Service Quality*, 13(3), 197-206.

Spanos, Y. E., Prastacos, G. P. & Poulymenkou, A., 2002. The relationship between information and communication technologies adoption and management. *Information & Management*, 39(8), 659-675.

Spector, P. E., 1994. Summated rating scale construction: an introduction. In: M.S. Lewis-Beck, ed. *Basic measurement*. Volume 4. London: SAGE Publications – Toppan Publishing, pp.229-300.

Stetson, N. G., 2001. The IOM new health system and HIPAA: same sheet of music?. *Journal of Healthcare Information Management*, 16(1), 58–64.

Stewart, R., 1996. *Leading in the NHS – a practical guide*. 2<sup>nd</sup> ed. London: MacMillan Press.

Studnicki, J. & Stevens, C. E., 1985. Cybernetic appropriateness review – does it change physician hospital utilisation pattern. *Evaluation and Program Planning*, 8(3), 195-205.

Suleiman, A. B., 2001. The untapped potential of telehealth. *International Journal of Medical Informatics*, 61(2-3), 103-112.

Sutherland, K. & Dawson, S., 1998. Power and quality improvement in the new NHS: the Roles of doctors and managers. *Journal In Health Care*, Supplement edition 1998, 7, S16-S23.

Sweetland, J., 2000. Users' perceptions of the impact of information provided by a consumer health information service: an in-depth study of six users. *Health Libraries Review*, 17(2), 77-82.

Symons, V., 1995. Evaluation of information systems investment: towards multiple perspectives. In: Willcocks, L. P., ed. *Information management – the evaluation of information systems investments*. London: Chapman & Hall, pp.253-268.

Tajuddin, J., 2000. *Health system of the future*. Proceeding MoHM senior management officers conference: Malacca, Malaysia, 22 – 24 October 2000,

Taylor, M. J., Moynihan, E. P. & Wood-Harper, A. T., 1998. End-user computing and information systems methodologies. *Information Systems Journal*, 8(1), 85-96.

The Star Malaysia, 2003. *Government to check if kudos made status declaration*. The Star Malaysia, 6 June 2003.

<<http://www.thestar.com.my/news/story.asp?file=/2003/6/6/nation/odsam&sec=nation>>, [accessed 06.06.03].

Thornett, A. B., 2001. Computer decision support systems in general practice. *International Journal of Information Management*, 21(1), 39-47.

Toth, B., Gray, A. M., Fraser, V. & Ward, R., 2000. National electronic library for health; progress and prospects. *Health Library Review*, 17(1), 46-50.



Tsiknakis, M., Katehakis, D. G. & Orpanoudakis, S. C., 2000. *Information infrastructure for an integrated healthcare services*.

<[http://www.ics.forth.gr/ICS/acti/cmi\\_ha/publications/papers/2000/itabitis2000.pdf](http://www.ics.forth.gr/ICS/acti/cmi_ha/publications/papers/2000/itabitis2000.pdf)>, [accessed 23.04.02].

Turner, A., 1997. *The case for creating an international committee for standardization of healthcare informatics*. <<http://www.cs.tut.fi/~varri/busiplan.html>>, [accessed 05.06.02].

U.S. Department of Health & Human Services, 2001. *Information for health: a strategy for building the national health information infrastructure*.

<<http://ncvhs.hhs.gov/nhiilayo.pdf>>, [accessed 12.04.02].

Utusan Malaysia, 2004. *Hospital directors are required to carryout clinical routines*.

Utusan Malaysia, 8 October 2004.

<<http://www.utusan.com.my/utusan/archive.asp?y=2004&dt=0810>>, [accessed 24.11.02].

Vegoda, P., 2001. IHE: integrating the healthcare enterprise: introducing the IHE concept. *Journal of Healthcare Information Management*, 15(4), 22-24.

Vehkalahti, K., 2000. *Reliability of measurement scales - Tarkkonen's general method supersedes Cronbach's Alpha*, Ph.D Thesis, Department of Statistics, University of Helsinki, Finland. <<http://ethesis.helsinki.fi/julkaisut/val/tilas/vk/vehkalahti/reliabil.pdf>>, [accessed 23.01.05].

Vermeulen, C. & Von Solms, R., 2002. The information security management toolbox – taking pain out of security management. *Journal of Information Management and Computer Security*, 10(3), 119-125.

Wadley, A. L., Broady, J. E. & Hayward, T. E., 1997. An evaluation of current public library service to the full-time employed. *Library Management*, 18(4), 205-218.

Wegen, B. V. & Hoog, R. D., 1996. Measuring the economic value of information systems. *Journal of Information Technology*, 11(3), 247-260.

Wholey, D. R., Padman, R., Hamer, R. & Schwartz, S., 2001. Determinants of information technology outsourcing among health maintenance organisation. *Health Care Management Science*, 4(2), 229-239.

Wiener, N., 1962. *Cybernetics*. 2<sup>nd</sup> ed. Cambridge, Massachusetts: The M.I.T. Press.

Willcocks, L. P., 1995. *Information management – the evaluation of information systems investment*. London: Chapman & Hall.

Willcocks, L. P., 2003. Evaluating the outcomes of information systems plans. In: Galliers, R. D. & Leider, D. E., eds. *Strategic information management – challenges and strategies in managing information systems*. 3<sup>rd</sup> ed. London: Butterworth Heinemann, pp.239-260.

Willcocks, L. P. & Lester, S., 2003. Beyond the IT productivity paradox. In: Galliers, R. D. & Leider, D. E., eds. *Strategic information management – challenges and strategies in managing information systems*. 3<sup>rd</sup> ed. London: Butterworth Heinemann, pp.588-608.

Wilson, T. D., 2001. Information overload: implication for healthcare services. *Health Informatics Journal*, 7, 112–117.

Winter, A. F., Ammenwerth, E., Bott, O. J., Brigl, B., Buchauer, A., Graber, S., Grant, A., Haber, A., Hasselbring, W., Haux, R., Heinrich, A., Janssen, H., Kock, I., Penger, O. S., Prokosch, H. U., Terstappen, A. & Winter, A., 2001. Strategic information management plans: the basis for systematic information management in hospitals. *International Journal of Medical Informatics*, 64(2/3), 99-109.



Wood, F. & Wright, P., 1997. The impact of information on clinical decision making by general medical practitioners. *Information Research Journal*, 2(1), 1-10.

Wormwell, I., 1990. *Information quality: definitions and dimensions*. London: Taylor Graham.

Wyatt, J. C., 1995. Hospital information management: the need for clinical leadership. *British Medical Journal*, 311, 175-178.

Wyatt, J. C. & Wyatt, S. M., 2003. When and how to evaluate health information systems?. *International Journal of Medical Informatics*, 69(2/3), 251-259.

Wynekoop, J. L. & Russo, N. L., 1997. Studying system development methodologies: an examination of research methods. *Information Systems Journal*, 7(1), 47-65.

Xue, S., 2005. Internet policy and diffusion in China, Malaysia and Singapore. *Journal of Information Science*, 31(3), 238-250.

Yee, F. Y., 2004. *Doctors and nurses to be redeployed*, The Star Malaysia.  
<<http://www.thestar.com.my/nes/story.asp?file=/2004/8/14/nation/8665777&sec=nation>>,  
[accessed 14.08.04].

Yetton P., Martin, A., Sharma, R. & Johnston, K., 2000. A model of information systems development project performance. *Information Systems Journal*, 10(4), 263-289.

Zhu, H., Siegel, M. D. & Madnick, S. E., 2001. *Information aggregation – a value added e-service*. <<http://ebusiness.mit.edu>>, [accessed 15.05.02].

# **APPENDIX 1**

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## **Table for Determining the Sample Size**

\*\*\*\*\*



Table for Determining Sample Size From a Given Population

N	S	N	S	N	S
10	10	270	159	2,000	322
20	19	290	165	2,600	335
30	28	300	169	3,000	341
40	36	360	186	3,500	346
50	44	400	196	4,000	351
60	52	460	210	5,000	357
70	59	500	217	6,000	361
80	66	550	226	7,000	364
90	73	600	234	8,000	367
100	80	650	242	9,000	368
120	92	700	248	10,000	370
140	103	750	254	15,000	375
160	113	800	260	20,000	377
180	123	850	265	30,000	379
190	127	900	269	40,000	380
200	132	950	274	50,000	381
230	144	1000	278	75,000	382
250	152	1500	306	1,000,000	384

- Source: Sekaran (1992, p. 253), the table was developed by Krejcie and Morgan
- N is population size
- S is sample size



# **APPENDIX 2**

\*\*\*\*\*

## **Questionnaires**

\*\*\*\*\*



QUESTIONNAIRE

PUBLIC HEALTHCARE INFORMATION MANAGEMENT SYSTEMS

All responses remain confidential to the study.

Please tick ONE at the appropriate box unless indicated otherwise.

SECTION A - PERSONAL INFORMATION

1. Age (years):
- ☐ 21 - 25

☐ 26 - 30

☐ 31-35

☐ 36 - 40

☐ 41 - 45

☐ 46 - 50

☐ 51 - 55

☐ above 55
2. Gender:
- ☐ male

☐ female
3. Category of service:
- ☐ medical

☐ administrative

☐ information systems

☐ pharmaceutical

☐ engineering

☐ dental care

☐ research

☐ science officer

☐ other (please specify).....

.....
4. Grade of service:
- ☐ special (JUSA)

☐ grade 1

☐ grade 2

☐ grade 3

☐ other (please specify) .....
5. Current departmental position:
- ☐ head

☐ deputy head

☐ senior assistant head

☐ assistant head

☐ other (please specify) .....

6. Hierarchy and location of your establishment within the MoH:  
(please tick the appropriate box and specify your office location including of Unit/Department/Division name)

Hierarchy of Organisation (please tick)	Establishment Name (please specify Unit/Department/Division details )
<input type="checkbox"/> Headquarters	
<input type="checkbox"/> State Health Department	
<input type="checkbox"/> District Health Office	
<input type="checkbox"/> Institution (training, research, and other MoH institutions)	
<input type="checkbox"/> Hospital	
<input type="checkbox"/> Health Centre	
<input type="checkbox"/> Other	

7. Length of service (in years) at the Ministry of Health - MoH:

☐ below 1

☐ 1 - 5

☐ 6 - 10

☐ 11 - 15

☐ 16 - 20

☐ 21-25

☐ 26- 30

☐ above 30

8. Please indicate the nature of work with which you are involved in your organisation’s information management activities. (you may tick more than one box)

☐ 8(a). Planning and design

☐ 8(b). Technical support

☐ 8(c). Budgeting

☐ 8(d). Collecting and compiling of information

☐ 8(e). Disseminating of information

☐ 8(f). Archiving of information

☐ 8(g). Providing information for top management

☐ 8(h). Other (please specify) .....

9. Does your job currently require you to obtain information from external agencies (public and private) of the Ministry of Health (MoH)?

☐ yes

☐ no

if response to Q9 is “no” , please go to Q. 13 in Section B.



10. How frequently do you need information from external agencies?
- ☐ daily
- ☐ weekly
- ☐ less than weekly
11. How do you normally liaise with other agencies? (you may tick more than one box)
- ☐ official letter
- ☐ telephone
- ☐ facsimile
- ☐ electronic mail
- ☐ meeting/briefing
- ☐ unofficial discussion
- ☐ other (please specify) .....
12. Overall how do you rate your satisfaction in getting response from the external agencies?
- ☐ not satisfied
- ☐ quite satisfied
- ☐ satisfied
- ☐ very satisfied

SECTION B - YOUR EXPERIENCE IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

13. Are you equipped with computers in carrying out your duties?
- ☐ yes
- ☐ no
- if response to Q. 13 is “no” , please go to Q18 in Section C1.
14. How long have you used computers in the MoH?
- ☐ less than 1 year
- ☐ 1-2 years
- ☐ 3-5 years
- ☐ more than 5 years
15. How old is the computer that you normally used?
- ☐ less than 1 year
- ☐ 1-2 years
- ☐ 3-5 years
- ☐ more than 5 years
16. Is the computer networked (that is connected to the Internet)?
- ☐ yes
- ☐ no

17. What do you use the computer for? (you may tick more than one box)

- ☐ 17(a). Electronic mail
- ☐ 17(b). Internet
- ☐ 17(c). Word processing/typing
- ☐ 17(d). Spreadsheet
- ☐ 17(e). Presentation
- ☐ 17(f). Specific application systems
- ☐ 17(g). Others (please specify): .....

SECTION C - STRUCTURAL PERSPECTIVES

C1. Information Content

Please tick (✓) the number that best describes your response to each statement in Q. 18 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

18. Indicate the extent to which you agree with the following statements regarding to healthcare information systems:

	1	2	3	4	5
18(a). Active involvement of all systems' users is crucial in the development of healthcare information systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18(b). Information content must be made accessible to external users (public and private sectors) as well as staff members of MoH.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18(c). Information content must be able to generate input to support the needs of MOH management in the decision making processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18(d). Information content must be useful for the widespread adoption of public healthcare services.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



C2. Information Flow

19. Which of the following is/are constraint(s) to the smooth flow of information in your organisation?  
(you may tick more than one box)

- ☐ 19(a). Bureaucracy
- ☐ 19(b). Work processes
- ☐ 19(c). Office politics
- ☐ 19(d). Lack of common interest
- ☐ 19(e). Lack of common awareness
- ☐ 19(f). Lack of mutual understanding
- ☐ 19(g). Lack of coherence of organisational directions
- ☐ 19(h). Others (please specify) .....

Please tick (✓) the number that best describes your response to each statement in Q. 20 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

20. The following statements require you to relate existing work-based scenarios with information flows in your organisation:

	1	2	3	4	5
20(a). Smooth information flow is essential for effectiveness of decision making process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20(b). Smoothness in information flow can enhance an organisation's productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20(c). All work processes are documented in the office's Standard Operating Procedures (SOP).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## SECTION D - INFORMATION CULTURE

### D1. Training Needs

21. How do you rate your level of your knowledge in ICT at present?

☐ poor

☐ moderate

☐ good

☐ very good

22. Have you ever attended any ICT training programme provided by your organisation?

☐ yes

☐ no

**If your answer to Q. 22 is "no", please go to Q. 24.**

23. When was the last course/workshop you attended?

☐ 2003

☐ 2002

☐ 2001

☐ 2000

☐ 1999

☐ before 1999

24. If given the opportunity, would you be interested in attending any ICT training courses?

☐ yes

☐ no

25. Which of the following would you consider is the major constraint for you to attend ICT training (please tick only ONE box)?

☐ heavy workload

☐ budget constraint

☐ lack of information about the training opportunity

☐ do not know how to apply

☐ other (please specify) .....

**Please tick (✓) in the appropriate box your response to each statement in Q. 26, according to the selected option;**

26. Does your organisation have the following?

	yes	planned to have	not sure	no
26(a). An ICT training master plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26(b). A budget for ICT training programmes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26(c). A specific officer/unit to co-ordinate ICT training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26(d). Capacity to provide in-house ICT training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26(e). Collaboration with specific training institutions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



D2. Library Information Services Provision

27. How often do you visit the library?

- ☐ daily
- ☐ weekly
- ☐ monthly
- ☐ less than monthly
- ☐ never

28. Do you know about the existence of electronic library services?

- ☐ yes
- ☐ no

Please tick (√) the number that best describes your response to each statement in Q. 29 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

29. How do you relate the following factors with library services in your organisation?

	1	2	3	4	5
29(a). List of the collection of references are sufficient to serve for the need of the organisation's staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29(b). The location is easy to access.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29(c). The librarians handle the job efficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



SECTION E - RESOURCE PERSPECTIVES

E1. Organisational Aspects

30. Do you know what the role of Information Systems Officers (ISO) is within the MoH?

☐ yes

☐ not sure

☐ no

☐ never heard of ISO
31. Do you know what the role of the Chief Information Officer (CIO) is at the MoH?

☐ yes

☐ not sure

☐ no

☐ never heard of the CIO

Please tick (√) the number that best describes your response to each statement in Q. 32 below, according to the given scale;

32. How do you rate the existence of the following statements to the current situation of the ICT projects in the MoH?
- |   | poor                     | not<br>sure              | moderate                 | good                     | very<br>good             |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 32(a). Strong teamwork ( a close co-operation among all project team members)   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32(b). Good leadership (capable and knowledgeable leaders)  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32(c). Strong establishment of the ICT Division at the headquarters (with sufficient size and capable staff to support ICT programmes of the MoH) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

E2. Manpower

33. Have you ever been involved in the development of any of the MoH ICT projects?

☐ yes

☐ no
34. How do you judge the success rate of ICT projects at the MoH?

☐ low

☐ not sure

☐ average

☐ high

Please tick (√) the number that best describes your response to each statement in Q. 35 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

35. How do you justify the occurrence of the following statements in the development of healthcare information systems at the MoHM?
- |   | 1                        | 2                        | 3                        | 4                        | 5                        |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 35(a). Information systems (IS) officers need to fully understand the work processes of the Ministry to ensure the successful implementation of ICT projects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35(b). Many of the ICT projects in the MoH are developed by computer companies (outsourced) rather than by the MoH's Information Systems staff .              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



SECTION F - POLICY PERSPECTIVES

F1. Procedures

Please tick (✓) the number that best describes your response to each statement in Q. 36 and Q. 40 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

36. How do you evaluate the following statements related to the issues of information systems procedures at the MoH?

	1	2	3	4	5
36(a). A comprehensive policy should be developed as a guideline for the implementation of ICT programmes for the whole organisation within the MoH.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36(b). The Information Systems policy should be disseminated (and made to understand) to all staff members of the MoH.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36(c). Information systems security procedures should be enforced and practised by the MoH to protect official information from any potential threat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

37. Are you aware of the official circulation letters regarding Information Systems security issued by the MoH and the Government of Malaysia?

<input type="checkbox"/> yes	<input type="checkbox"/> not sure	<input type="checkbox"/> no
------------------------------	-----------------------------------	-----------------------------

38. Are you confident that your organisation’s information systems infrastructure is secure?

<input type="checkbox"/> yes	<input type="checkbox"/> not sure	<input type="checkbox"/> no
------------------------------	-----------------------------------	-----------------------------

39. Do you know how to protect the information which is stored in your computer files from any potential threats?

<input type="checkbox"/> yes	<input type="checkbox"/> not sure	<input type="checkbox"/> no
------------------------------	-----------------------------------	-----------------------------

F2. Standards

40. The following questions relate the issues of Information Management System standards of the ICT projects of the MoH. You are requested to respond to the respective issues:

	1	2	3	4	5
40(a). All ICT programmes for the whole organisations within the MoH are planned and coordinated systematically in the Ministry’s Information Management Systems master plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40(b). The importance of transfer of technology issue is emphasised in all of ICT procurement projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40(c). A special committee (steering committee) consisting of highest ranking officers in the MoH should be set up to coordinate all ICT activities of the Ministry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



SECTION G - TECHNOLOGICAL PERSPECTIVES

G1. Interoperability

41. Does your organisation use any specific office information management application systems (such as a billing system, electronic patient record system, clinical system, payroll system etc.)?
- ☐ yes
- ☐ not sure
- ☐ no

If answer to Q. 41 is “no” or “not sure”, please go to Q. 44 in Sub-Section G2.

42. If “yes”, since how long?
- ☐ less than 1 year
- ☐ 1 – 3 years
- ☐ more than 4 years

Please tick (✓) the number that best describes your response to each statement in Q. 43 below, according to the given scale;

(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

43. Indicate the extent to which you agree with the following statements with regard to the situation at the MoH and your current organisation?
- |  | 1                        | 2                        | 3                        | 4                        | 5                        |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 43(a). The establishment of strong project management teams must be emphasised for any ICT project in the MOH.             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43(b). Project team members must be well-represented from various categories of services of the MoH.                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43(c). Implementation of the Healthcare Information Systems (HIS) must be integrated with the whole activities of the MoH. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



G2. Infrastructure Requirements

Please tick (✓) the number that best describes your response to each statement in Q. 44 below, according to the given scale;  
(1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

44. How do you rate the following statements related to ICT infrastructure and the current scenario at the MoH?

	1	2	3	4	5
44(a). The existing ICT infrastructure needs to be enhanced to meet the requirements of staff members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44(b). Cost of ICT procurement is justified with the maximum utilisation of the systems provided for.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44(c). Most staff members in your organisation have been supplied with computers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

45. What do you think are the principal constraints of ICT implementation in your organisation ?  
(you may tick more than one box)

<input type="checkbox"/> 45(a). Lack of Information Systems Officers	<input type="checkbox"/> 45(d). Financial (insufficiency of financial allocation)
<input type="checkbox"/> 45(b). Methodology (inappropriate approach adopted in ICT projects)	<input type="checkbox"/> 45(e). Management commitment is not encouraging
<input type="checkbox"/> 45(c). Lack of skills among staff members in dealing with ICT projects	<input type="checkbox"/> 45(f). Others (please specify) .....

Please state your overall comments or suggestions pertaining to the issues discussed in this questionnaire:

I sincerely appreciate your time and cooperation in filling out the questionnaire. Please check to make sure that you have not skipped any questions and return to the following address before 01-03-2003;

MOHAMAD ZAINUDDI bin MAT TAIB  
Information Technology Division, Ministry of Health Malaysia,  
6<sup>th</sup> Floor, PERKIM Complex, Ipoh Road, 51200 Kuala Lumpur, Malaysia.

If you have any further queries please contact me at;  
Tel : 03-4045-7104 or mobile phone: 012-3908279  
e-mail: M.Z.Mat-Taib@lboro.ac.uk

## **APPENDIX 3**

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### **Letters Concerning the Survey:**

- Supervisor
- Secretary General Consent Letter
- Researcher Covering Letter

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url: <http://info.lboro.ac.uk/departments/dis/>

Monday, 23 September 2002

TO WHOM IT MAY CONCERN

**Mohamad Zainuddi Mat Taib**

Mr Mohamed Zainuddi is a doctoral research student in the Department of Information Science at Loughborough University, under my direct supervision. He is making excellent progress in his studies. To progress his research work, which relates to Public Healthcare Information Management in the Ministry of Health in Malaysia, he needs to collect primary data. This data collection exercise is scheduled to take place between January and March, 2003, and is crucial to his further studies.

I therefore strongly support this endeavour and commend him to you as someone who will greatly benefit from the proposed data collection work in Malaysia. Any assistance and co-operation from the Public Services Department and Ministry of Health in Malaysia would be greatly appreciated.

Please do not hesitate to contact me personally should you wish for further information.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Ron Summers'.

**Ron Summers**  
Professor of Information Science  
and Head of Department



(Secretary General)  
Kementerian Kesihatan Malaysia,  
(Ministry of Health, Malaysia)  
Jalan Cenderasari,  
50590 Kuala Lumpur

Tel : (03) 26923176  
(03) 26985077  
Fax : (03) 26928702

10 Januari 2003.

Y.Bhg. Dato', Datin/Tuan/Puan,

**ENCIK MOHAMAD ZAINUDDI BIN MAT TAIB**

**(Urusan Pengumpulan Maklumat Di Kementerian Kesihatan  
Malaysia Bagi Kajian Penyelidikan Pengajian Peringkat Ph.D)**

Dengan hormatnya saya merujuk kepada perkara tersebut di atas.

2. Seperti dimaklumkan matlamat bidang penyelidikan peringkat Ph.D. Encik Mohamad Zainuddi Bin Mat Taib adalah berkaitan dengan "*Public Healthcare Information Management System*" di Kementerian Kesihatan Malaysia. Di samping memenuhi pencapaian akademik beliau, diharapkan hasil kajian tersebut juga akan dapat digunakan sebagai input bagi membantu pihak pengurusan atasan ke arah usaha mempertingkatkan mutu pengurusan maklumat Kementerian Kesihatan Malaysia kelak.

3. Sehubungan itu, diminta pegawai-pegawai Kementerian Kesihatan Malaysia memberikan kerjasama yang sewajarnya dalam aktiviti pengumpulan maklumat termasuk memberikan maklumbalas terhadap soalan-soalan temuduga dan borang soal-selidik seperti yang diperlukannya.

Sekian dimaklumkan dan terima kasih jua.

Yang Ikhlas,

**(DATUK ALIAS BIN ALI)**



Department of Information Science,  
Loughborough University,  
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Telephone: 0044-(0)1509-223052  
Facsimile : 0044-(0)1509-223053  
Email : M.Z.Mat-Taib@lboro.ac.uk

24 Januari 2003

Y.Bhg. Dato', Datin, Tuan/Puan,

**Urusan Pengumpulan Maklumat Menerusi Borang Soalselidik Untuk Kajian Mengenai "Public Healthcare Information Management System" Di KKM.**

Dengan hormatnya saya merujuk kepada perkara di atas.

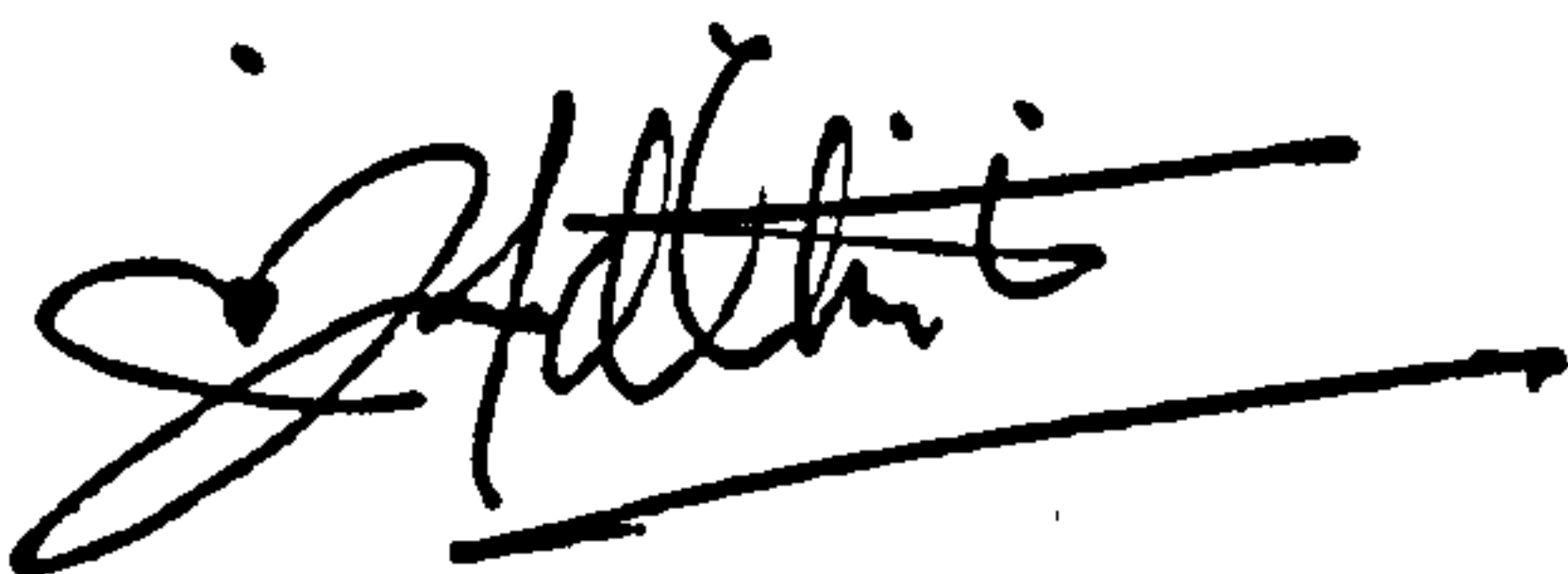
2. Sukacita dimaklumkan bahawa saya merupakan bekas Ketua Penolong Pengarah di Pusat Teknologi Maklumat, KKM kini sedang melanjutkan pengajian di peringkat Ph.D. di Loughborough University serta sedang menjalankan survey mengenai isu tersebut di atas di KKM. Tujuan survey ini ialah bagi mendapatkan maklumat daripada pegawai-pegawai kategori Pengurusan dan Professional di semua peringkat pejabat KKM berkaitan dengan senario pengurusan maklumat di organisasi setiap pegawai yang terlibat menerusi borang soalselidik yang disertakan bersama ini.

2. Borang: soalselidik yang dilampirkan mempunyai 11 muka surat dan mengandungi 45 soalan. Saya amat berharap agar Y.Bhg. Dato', Datin, Tuan/Puan dapat memberikan kerjasama dengan menjawab semua soalan tersebut. Disertakan juga bersama-sama ini surat sokongan Y.Bhg. Datuk Ketua Setiausaha KKM terhadap perkara ini untuk perhatian Y.Bhg. Dato', Datin, Tuan/Puan.

3. Diharap Y.Bhg. Dato', Datin, Tuan/Puan dapat memberikan kerjasama untuk melengkap serta mengembalikan maklumbalas di atas pada kadar segera atau selewat-lewatnya sebelum 01-03-2003 ke alamat seperti di muka surat 11 borang soalselidik serta didahului dengan ucapan terima kasih jua..

Sekian, terima kasih.

Yang Benar,



(MOHAMAD ZAINUDDI BIN MAT TAIB)

## **APPENDIX 4.1**

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### **Interview Questions**

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### **Secretary General of the MoHM**

\*\*\*\*\*



Interview Questions  
The Secretary General,  
Ministry of Health Malaysia

- Q1. How do you expect ICT as an enabler to enhance the flow of information and generating the required information for decision making purpose?
- Q2. Do you think that the Information Management Systems of the healthcare needs to be enhanced to support the needs for accurate information in the decision making process?
- Q3. Does the MoHM have any specific strategy for the knowledge worker (k-worker) programme?
- Q4. Does the MoHM have any specific programme to enhance the library and information provision service?
- Q5. Does the Ministry have any specific plan and strategy in nurturing reading habit and library visit for the staff members?
- Q6. How does the MoHM generate and maintain understanding among various groups of services of the staff members?
- Q7. How does the MoHM ensure that there is always sufficient number of Information System Officers (ISO) to carryout ICT programmes?
- Q8. What do you think about the need to enforce information security in order to protect healthcare information from any potential threat?

- Q9. Does the MoHM formulate any procedures on the healthcare information security?
- Q10. Do you think that the ICT Steering Committee (ICTSC) is a useful platform in coordinating information systems programme of the MoHM?
- Q11. Do you think ICT can overcome problem of redundancy and duplication in the work processes of the healthcare service delivery?
- Q12. What do you think of the contribution of the private sector in the development of ICT projects of the MoHM?
- Q13. Do you think ICT infrastructure is essential to complement for an effective delivery of healthcare service?



## **APPENDIX 4.2**

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### **Interview Questions**

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### **Undersecretary of Human Resource Division**

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**Interview Questions****Undersecretary of Human Resource Division,****Ministry of Health Malaysia**

- Q1. What do you think about the present organisation structure of the MoHM with respect to the smooth information flow?**
- Q2. Do you think there is active involvement of the system users in the Information Management Systems development of the MoHM?**
- Q3. What do you think about the need for a strategic training plan to equip the staff with ICT knowledge?**
- Q4. What do you think about the future role of healthcare librarians and their scope of services as sources of information?**
- Q5. Do you think the Chief Information Officer (CIO) carries out his duties effectively in managing ICT programmes?**
- Q6. Do you think the existing size of Information System Officers (ISO) is adequate to carryout the whole ICT programmes of the MoHM?**
- Q7. Do you think the issue to protect information security should be emphasised to staff members?**
- Q8. How do you relate the issue of sound ICT project management with the scenario of the success implementation of information systems programmes of the MoHM?**



Q9. How do you justify the level of utilisation of information systems among staff members?

Q10. Do you think that the available ICT facilities in the MoHM meet the needs and level of satisfaction of staff members?

Q11. How do you justify the rate of success of the ICT projects of the MoHM ?

**APPENDIX 4.3**

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**Interview Questions**

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**Director  
of  
Medical Practice Division**

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Interview Questions  
Director of Medical Practice Division,  
Ministry of Health Malaysia

- Q1. How do you regard the effectiveness of the existing practice of reporting system (bottom-up) in providing the required information for the needs of high level management of the MoHM?
- Q2. Do you think the Information Management Systems of the MoHM needs to be evaluated to ensure it is capable to serve for the purpose of current and future needs of users?
- Q3. How do you evaluate the existing capability of the Hospital Information System of the MoHM in meeting the needs of healthcare staff members to deliver service effectively?
- Q4. Do you think the present provision of ICT training is sufficient in achieving the expected level of efficiency in the healthcare service delivery?
- Q5. What do you think of the current situation of the healthcare-related sources in the MoHM library?
- Q6. Do you think it is very timely for the MoHM to establish a centralised healthcare related information sources to support the staff needs?
- Q7. How do you justify the success implementation of ICT projects of the MoHM?

- Q8. Do you think that MoHM needs to opt for outsourcing approach in the ICT projects implementation?
- Q9. What do you think about the need to protect patients' information confidentiality?
- Q10. Do you satisfy with the rate of transfer of technology in the healthcare information systems projects?
- Q11. How far is the International Classification Standards adopted in the healthcare service delivery of the MoHM?
- Q12. How do you justify the enhancement in the efficiency of the healthcare delivery service through the adoption of ICT?
- Q13. Do you believe ICT should have priorities in any Healthcare Information System programmes?



## **APPENDIX 4.4**

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### **Interview Questions**

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**Director  
of  
Planning and Development  
Division**

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**Interview Questions****Director of Planning and Development Division,****Ministry of Health Malaysia**

1. What do you think about existing capability of ICT infrastructure in enhancing the smooth flow of information in the MOH, Malaysia(top-down and bottom-up)?
2. How does MoHM regard the importance of ICT issues under the staff training programmes?
3. Does the MoHM forge any special collaboration with external training institution for the staff members in any ICT programmes?
4. Do you think that the existing library facilities of the MOH offices are adequate to accommodate the staff needs e.g for evidence based medicine?
5. Do you think that the existing sources at the library meet the various needs of MoHM staff in carrying out their duty?
6. Do you think that the existing setup of the Information Technology Centre Division capable to carryout ICT projects of the whole MoHM?
7. Do you think that the staff members are well equipped with any future trend in healthcare service delivery?
8. Do you think a comprehensive information system security needs to be formulated and adopted?
9. How does the MoHM new policy and directive reach all the staff members?



10. Do you think there is a need for comprehensive Information System Plan for the MoHM?
11. What do you think about the rate of success of the ICT projects of MoHM?
12. What do you think about the necessity in adopting information auditing programme in the healthcare information system projects?

## **APPENDIX 4.5**

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### **Interview Questions**

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#### **Undersecretary of ICT Division**

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Interview Questions  
Undersecretary of ICT Division,  
Ministry of Health Malaysia

- Q1. Do you think the present practice of information flow satisfies the information needs of users (senders and receivers)?
- Q2. Do you think there is a need to integrate various kinds of information at operational management to serve for the interest of strategic management group particularly for the decision making purpose?
- Q3. Does the MoHM formulate any specific training programmes for the Information Systems Officers (ISO)?
- Q4. Do you think ICT facilities in the MoHM libraries meet the requirements of the users?
- Q5. Do you think the present establishment and scope of functionality of the Information Technology Centre Division capable to achieve the integrated IMS programmes?
- Q6. Do you think the present organisational structure of the Information Technology Centre Division capable to meet the objectives of the MoHM's ICT programmes?
- Q7. How do you rate the level of awareness among staff members in utilising ICT in their work processes?
- Q8. How the Information System Security Officer should raise the awareness about information security among the staff members?

- Q9. Does the MoHM adopt any specific system development methodology in the information systems development?
- Q10. Does the MoHM have a standard description of the ICT procurement process?
- Q11. How is the issue of integration of multi systems in the healthcare information systems dealt with?
- Q12. Does the MoHM have a comprehensive plan in implementing ICT projects for the whole MoHM?



## **APPENDIX 5**

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### **Summary of the Questionnaire Reliability Test Analysis**

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Appendix 5 – List of Questionnaire Reliabilities Analysis Using Cronbach's Alpha Scale

Item-Total Statistics (Q.18):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.18(a). CONINVOL	0.5946	0.6938
Q.18(b). CONEXUSE	0.4327	0.8185
Q.18(c). CONINPUT	0.6571	0.6761
Q.18(d). CONWIDE	0.6825	0.6631

Cronbach's Alpha Reliability Coefficients = 0.7655

Item-Total Statistics (Q.20):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.20(a). WKBDECMK	0.7058	0.5553
Q.20(b). WKPRODT	0.6782	0.5916
Q.20(c). WBSOP	0.4459	0.8969

Cronbach's Alpha Reliability Coefficients = 0.7550

Item-Total Statistics (Q.26):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.26(a). TRMASPLN	0.5237	0.6971
Q.26(b). TRBUDGET	0.5000	0.6995
Q.26(c). TRUNIT	0.5897	0.6634
Q.26(d). TRINHSE	0.5495	0.6803
Q.26(e). TRCOLB	0.3886	0.7397

Cronbach's Alpha Reliability Coefficients = 0.7425



Item-Total Statistics (Q.29):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.29(a). LIBSUFF	0.9986	0.9994
Q.29(b). LIBLOCAT	0.9987	0.9993
Q.29(c). LIBRIANS	0.9992	0.9990

Cronbach's Alpha Reliability Coefficients = 0.9995

Item-Total Statistics (Q.32):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.32(a). PJSTTEAM	0.7673	0.8758
Q.32(b). PJLEADER	0.8385	0.8140
Q.32(c). PJICTDIV	0.7810	0.8642

Cronbach's Alpha Reliability Coefficients = 0.8962

Item-Total Statistics (Q.35):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.35(a). ISOFFUND	0.3890	-
Q.35(b). OUTSOURC	0.3890	-

Cronbach's Alpha Reliability Coefficients = 0.5549

Item-Total Statistics (Q.36):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.36(a). PRPOLDEV	0.8156	0.8558
Q.36(b). PRPOLDIS	0.8470	0.8292
Q.36(c). PRPOLENF	0.7638	0.8997

Cronbach's Alpha Reliability Coefficients = 0.9037

Item-Total Statistics (Q.40):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.40(a). STMASPLN	0.5997	0.4968
Q.40(b). STTRTECH	0.6683	0.4187
Q.40(c). STCOMTEE	0.3212	0.8250

Cronbach's Alpha Reliability Coefficients = 0.7005

Item-Total Statistics (Q.43):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.43(a). AGMGTEAM	0.8098	0.8257
Q.43(b). AGMEMBER	0.7990	0.8334
Q.43(c). AGINTEGR	0.7523	0.8758

Cronbach's Alpha Reliability Coefficients = 0.8909

Item-Total Statistics Q.44):

Question	Corrected Item-Total Correlation	Alpha If Item Deleted
Q.44(a). CSENHANC	0.2248	0.3158
Q.44(b). CSMAXIMA	0.3282	0.0755
Q.44(c). CSSTCOMP	0.1593	0.4853

Cronbach's Alpha Reliability Coefficients = 0.3796