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NATIONAL INFORMATION NETWORKS FOR THE ADVANCED DEVELOPING COUNTRIES: A STUDY ON THEIR FUNCTIONAL ORGANISATION

by

SUNG JIN CHOI, M.S.L.S.

A Doctoral Thesis

Submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy of the Loughborough University of Technology.

July 1979

Supervisor: P. Havard-Williams, M.A., F.L.A.I.

Department of Library and Information Studies

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Increasing demand in the advanced developing countries for more information more quickly has called into serious question the traditionally fragmented nature of information services by creating a need for greater inter-institutional cooperation. Libraries and information centres have responded to this need by the formation of networks serving limited geographical areas or various special interests. Unless an inclusive network is established on a national scale, expenditures, facilities and efforts will be unnecessarily duplicated and interconnection will become increasingly difficult as regional and specialised networks develop without a common approach. The time has come in every advanced developing country to create a national information network which would weld together its separate insulated information resources into a nation-wide network.

The purpose of this study is to identify common information needs and desires responsible for the present information services in the advanced developing countries, and to design a generalised structure of national information networks based on the common factors identified. This study was carried out by postal questionnaire, personal interview and literature review. The countries investigated are: Brazil, Colombia, Hong Kong, Iran, Iraq, Kenya, Korea, Kuwait, Malaysia, Malta, Mexico, Taiwan, Turkey, Venezuela and Yugoslavia. The data gathered by questionnaire and interview have been arranged in fifteen country reports to be summarised later by cross-section characteristics, requirements and constraints. By choosing between the alternative network models and configurations, a generalised structure of national information networks based on the common characteristics of the information needs and desires existing in the advanced developing countries has been presented.

The investigator has attempted in this study to view a network as an arrangement of different functional units working together to accomplish the purpose of the whole rather than an integrated set of different specialised networks such as those in agriculture, chemistry, economics, education, etc.
Chapter 1
INTRODUCTION

The category of the advanced developing countries (which will be defined in 2.2) has been chosen for the present study because a closely coordinated national network of information services is more urgently needed, as Cobb and Elder (43) have found, in the countries coming within this category "which are becoming increasingly industrialised and increasingly literate but which have not yet attained high per capita wealth" (p. 107) and also because the investigator is more familiar with their needs and opportunities.

1.1 Context of the Study

Man is fulfilled as he shares in his cultural heritage. His survival, his self-realisation, and his social enlightenment turn upon his knowledge of the concepts, habits, skills, arts, instruments, and institutions of that heritage. In modern societies his knowledge of that heritage depends increasingly upon information resources.\(^1\) To these resources every man, according to his needs, should have realistic access.\(^*\)

1.1.1 Pressure for Information Networking* in Developing Countries

Post-industrial societies are defining the centrality of information in their economic planning; industrial societies in their competition for world markets place a high premium on the possession and management of information; and pre-industrial societies in their process of industrialisation are assigning great importance to access to the information possessed by their industrialised neighbours. Information constitutes an important base for economic and social development of a

\(^1\) Definitions of words or terms followed by a * in the text will be found in the Glossary in Appendix 3. Words or terms are starred only when first used.
society. The pervasive role of this information is increasingly recognised by those concerned with the development process worldwide, as is illustrated by the following statement from a recent report of the Organization for Economic Cooperation and Development (136):

Perhaps the most important event of the next decade will be the recognition of the true value of information—the right information, reliable and relevant to our needs available in a useful form to all those who need it (p. 17).

The Advisory Committee on the Application of Science and Technology to Development for the Second United Nations Development Decade expresses similar sentiments (189):

The Second United Nations Development Decade should ... provide for a systematic and adequately supported effort to improve the facilities and arrangements for the transfer of existing knowledge and technology from developed countries to less developed ones. Developing countries require scientific and technical information systems of their own, suited to the type, capacities and location of the producers and users of such information, and giving emphasis to the type of knowledge most needed for economic and social development. Such internal system must be effectively connected with the information network of the highly developed countries (p. 49).

InterGovernmental organisations, international nongovernmental organisations and some individual industrialised countries have advocated or provided various types of information assistance to developing countries*. Thanks to their assistance, acceptance by the governments of the necessity for the planning of information services at the national level has been gaining ground and is receiving more and more attention in the developing countries. The more advanced of the developing countries have been making efforts to strengthen their capabilities to acquire and utilize the information available to them.

For the most part, developing countries have extremely limited capabilities and resources, both human and financial, to devote to the production of scientific and technical information. It has been estimated that they now produce less than five per cent of the world's scientific literature and perhaps an even smaller proportion of the total technical information (162). Thus, information must be added to the numerous other
gaps that separate the developing from the developed world. Moreover, the information gap is probably widening—a consequence of the rapid rate of the growth of scientific and technical literature in the industrialised countries. Clearly, the developing countries must turn to them to obtain much of the currently available scientific knowledge and technical know-how, as embodied in literature and other forms of information storage, needed for development. Yet the developing countries are lacking the essential capabilities required to transfer information and to channel it to ultimate users within a country. A country without such capabilities has no means of being aware of its own needs, nor of the opportunities existing in science and technology elsewhere. And as McElroy, quoted by Aines and Day (4), states "it does not help a country to be part of the international apparatus, able to draw from the world's knowledge bank rapidly, unless it has a growing infrastructure able to use and exploit knowledge ..." (p. 7).

The developing countries are generally deficient in such information facilities. In some instances, nationally coordinated information activities do not yet exist; in many others they are too rudimentary to meet growing requirements. As a result, such countries are unable to identify their information needs adequately, to acquire pertinent information, or to disseminate it to those who need it. The information gap between the developed and developing countries with few exceptions is very wide. The establishment of a well-functioning national information network, (which will be defined in 2.2), is a necessary first step in closing this gap.

This information network, capable of drawing on worldwide sources of information, will serve the individual country as the prime coupling mechanism between its users and the producers of information elsewhere. If developed properly, it should serve to stimulate an "information consciousness" among potential information users* (who are outside the network, but linked to it). They, in turn, will look
increasingly to the network for services. An adequate information network can help reduce the need for foreign experts, and encourage the more rapid training and utilisation of indigenous expert manpower. Improved accessibility to externally generated information can reduce a country's need to undertake time-consuming research and development for which its finances, facilities, and personnel are inadequate.

Librarians and information scientists in the developing countries are vitally concerned with network development for a number of reasons. Two principal reasons are service and economics. The network concept implies removal of all institutional and geographical barriers to information. Furthermore, it would have the additional benefit of encouraging those who bemoan the extensive duplication of materials among the libraries and information centres in the developing countries. Till an efficient information network functions, the blanket provision of more and more information would not of itself solve their problems. It might make them worse. Hutchings (81) points out the need for networking in providing library services in the developing countries:

Library cooperation recognises that no library is an island, none can be completely self-supporting; and in newly emergent countries it would be something of a tragedy if library development were to take the form of so many independent bibliographical empires, each trying to do similar things and none surpassing mediocrity, when, with foresight and intelligent specialisation, they could collectively build bibliographical resources which would encourage the advanced research which is the condition of intellectual and material progress (p. 12).

A network implies equal access by any individual for any purpose to the sum total of the nation's information resources. In other words, a network implies a degree of democratisation of information, a steady increase in the ability to serve at all points of service, and cooperative sharing without constraints of time, distance or its form. Librarians and information specialists are thus professionally motivated to pursue the network idea because of these potential service advantages. Economy of scale is the other reason. Financial pressures are forcing library and
information activities in the developing countries to consider ways of sharing rather than duplicating materials and other resources*. The publishing rate and the cost of printed materials are rising steadily, and libraries and information centres are well aware that they cannot afford the luxury of open-ended purchasing for their individual collections but are required to buy more restrictively. This means that appropriate local collections ought to be built to meet immediate needs, and a network ought to be devised to make readily available the resources of distant, specialised collections.

Where purchase funds can never be sufficient to acquire all that a country needs would it not be simple prudence to enjoin a degree of mutual cooperation through a network for the benefit of all? Such a cooperative approach would be particularly crucial in the developing countries where purchase funds are limited and will remain so for many years to come, and maximum use is expected to be made of each piece of material. Without cooperation through a network at the national level, increases in expenditure on information services would in national terms be decreasingly cost-effective, with the growth of unnecessary duplication and unwitting overlap. Swank (173) concludes one of his papers on information networking with these words:

The ideal of independent, locally self-sufficient programs must certainly give way to that of dependent participation in nationally sufficient programs. If national information networks were ever to be built, local libraries and information centres would have to be redefined as selective inlets to and outlets from those networks (p. 25).

1.1.2 Variations in Information Networking

For a network to be an information network, more than two participants should be engaged in a common pattern of information exchange through communications for some functional purpose. The idea of networking in providing information services assumes that few information institutions can be self-sufficient and that most institutions are (or should be) interdependent in pursuing their goals. Theoretically,
information networking permits individual libraries and information centres to narrow their scope, develop resource and service specialisations, and link together with other institutions in increasingly more sophisticated structures.

The development of national networks of library and information services can proceed via two principal approaches. If services and networks of services already exist whose objectives and functions are acceptable, the development of a network amounts to a transition from the present-day state of these services to a higher level. The primary goal of this development is an improvement in the efficiency* of the network processes* and performance. The other approach to the development of information networks is associated with a new network totally divorced from any previous one. This approach begins with a formulation of new objectives and functions for a network yet to be designed. The designer follows a procedure which embodies rigorous elements of the scientific method. For networks of information services, this procedure contains the following sequence of the three phases:

(a) Assessment of the market
   Definition of the market
   Identification of information uses

(b) Design of information services
   Standard products
   Special services

(c) Design of the information network
   Information store
   Process and operation design
   Quality control

The development of networks which retain their basic objectives and functions involves the second and more often, only the third phase. Using this distinction of approach, we can conveniently identify and distinguish between design efforts which propose (and are restricted) to the improvement of efficiency of existing information services, that is redevelopment of networks, and those which seek new objectives as the
basis for their services and networks, that is development of networks.

While the development approach assumes that the tortuously evolving efforts from below have failed, the redevelopment approach prefers to build upon existing institutions, which are, for better or worse, the only operational ones we know. In support of the former, certain points can be made. The understructure of local facilities, educated and experienced staff, and even informed readers is indispensable. The proof of any network is the goods actually delivered to people who understand what they can ask for from staff who know how to get it through well-developed organisations at the local level. In support of the latter, certain other points can be made. Existing institutions are bound by tradition and motivated by self-defense. They eschew new ideas and technologies that disturb their sense of security and success. They fail to face the future. The only way to make the work progress is to create entirely new networks based on broader concepts that exploit more advanced technologies. There appears to be some truth in both positions, but not the whole truth in either.

There is great variation in the organisational patterns that have been set up to facilitate the development of networks. At one extreme there are formal information networks with paid staffs and programme plans which may have the potential of ultimately dissolving the autonomy of the individual component libraries and information centres. As Becker (15) observes, the formal network assumes that "a group of participants recognise the value of belonging to a common information compact and are willing to accept the responsibilities of membership. More than lip-service cooperation is required" (p. 313). Participants should share a sense of common purpose and they should also be willing to undertake legal, fiscal and other contractual commitments to ensure and preserve the functional integrity of the network. Examples of commitments that network participants may be called upon to make include: provision of materials and information services to the users served by other parts of the network.
on the same basis as that provided to its own users; maintenance of an agreed-upon level of service; payment of a proportionate share of the expenses incurred in network operations; an understanding not to withdraw from the network without payment of penalties; and agreement on the responsibilities of central network authority. At the other extreme, common programmes are developed only if the autonomy of the individual institution is preserved. One example is interlibrary lending arrangements which leave compliance to the discretion of the lending library. Both kinds exist. But voluntarism is most common. The freedom to withdraw is defended by many authors in the literature such as Yavarkovsky, quoted by Miller and Tighe (123), who asserts:

The institution should protect itself from being locked into a network that is no longer optimal, and it should know in advance the penalties of withdrawing, if any (p. 179).

Separate information networks have been formed by type of library or information centres such as public, academic, or special libraries; by form or medium of record, such as technical reports, motion picture films, or journals; or by discipline, such as medical, agricultural, or chemical information services. Most of the existing networks are limited to libraries or information centres of the same type. Modern science is, however, frequently interdisciplinary and multi-institutional. The problem of access to information has become so vast and complex that networks of libraries and information centres of all types are needed.

Basic to any information networking is the principle of reciprocal borrowing and reference privileges. Within a network of libraries and information centres of all types, users of one type of institution may be permitted direct use of another type of institution. A great problem here is the exercise of these privileges at long distances—distances at which it is difficult to learn what resources exist, where they are, and how to obtain them. Users of one type of institution must depend primarily upon the interlibrary communications network for access to books or information in other types of institutions.
Methodological Problems in the Design of Information Networks

Some of the problems in information networking we see today have existed for many years. Many are more recently raised. With varying degrees of conviction and emphasis, the study on information networks has usually been viewed as a necessary or desirable component of efforts, the goal of which is the design of networks. The role and topical direction of such study is well summarised in a report submitted to the U.S. Senate:

The most pressing need therefore is for the development of reliable methods for studying and assessing requirements, for determining the role of information and information services in science, and for measuring the value of information and the utility and effectiveness of present and proposed service (197, p. 110).

When reviewing the methodologies utilised in the currently ongoing networking activities, it becomes apparent that they are primarily concerned with redevelopment of networks of existing services. They have as their goal an introduction of greater efficiencies in the existing and assumed functions of bibliographical control* and services. These efficiencies are to be derived through the sharing or networking of various selected processes and of bibliographical data in existing systems. The emerging networks thus provide for centralised bibliographical record-keeping on a geographical or subject basis; cooperative acquisitioning and technical processing of materials; coordinated production of various types of bibliographical aids; and optionally, for a capability of decentralised inquiry against compatible record files. While efficiency improvement of existing library and information services can be a desirable goal by itself, it is apparent that the current development of networks is not concerned with fundamentally new approaches to improve the effectiveness* of information communication in society, that is the development of networks in the true sense of the term. And it appears that we shall be committed to a networking of existing library and information institutions and services in many years ahead.

What studies are then necessary or desirable to assist in that redevelopment effort? The methods being used to induce efficiency are of
two types: technological and organisational, or political. The former relates primarily to the cost-effective application of modern information processing technology to the generation, storage and transmission of recorded information; the latter employs coordination and cooperation. To the extent that the success of the current efforts at networking of services will be reflected by the efficiencies attained, the necessary or desirable study can be expected to relate principally to these two methods. While the technological approach has been the centre of attention for the past two decades particularly in Western Europe and in North America, the organisational considerations of national information networks have been less intense. It is clear that major efficiencies in the existing library and information networks can be realised at the level of cooperative networking. The types, sizes and characteristics of these networks are subject to an interplay of a variety of factors—political, economical, geographical and human. Thoughtful analyses of the possible, desirable and permissible categories of networks and network nodes would yield the data necessary for the systematic development of a national network.

The study of organisational aspects of national information network is crucial to the goal of optimum network design. It is, however, also very difficult. In contrast to investigations of applications of technology, national networks do not readily lend themselves to empirical, real-world experimentation; and simulation studies of different structures of networks are usually inconclusive. The currently viable approach to studying the organisation of national information networks thus remains the comparative description and analysis of existing developed networks.

"No country ... has yet achieved a fully effective information system. We are all on the road to development" (4, p. 7). At this developing stage, what network designers really want is information on the ways how they get started rather than information on the cost-effective application to network operations, but strange to say, the study of the organisational nature has been rather neglected. More attention of the
information research community should be brought to this category of study.

One of the most urgent problems facing network planners in the developing countries is a general lack of alternative theoretical models to guide them in the development of information networks of their own. As Slamecka (166) concludes, such a network model must be based on needs, desires and value of the people to be served, that is, the market. The identification and description of markets is an early step in the design of any information network. The objectives and the functions of information networks are both dependent on an assessment of the target markets for their services. For the past two decades most of the efforts to help the developing countries in planning their national information networks have been made by the intergovernmental organisations, such as Unesco and the United Nations Industrial Development Organisation, and the international nongovernmental organisations, such as the International Federation of Library Associations and the International Federation for Documentation. As a matter of policy as well as of economics, these organisations have had their programmes on the regional basis. The programmes have dealt with information needs and problems in common within each of the geographical regions rather than with those in individual countries. By the end of the year of 1974, Unesco alone sponsored fifteen regional conferences on the development of information networks and services in the developing countries, hoping that the conclusions reached at the conferences would accelerate bringing a national information network into reality in every country within the regions, by detailing the tasks and also the research required for planning. The conferences have afforded librarians and information scientists in the developing countries the opportunities of looking at new modes of transferring information and encouraged them to be more generous in discovering methods of expediting the sharing of the nation's information resources. These regional conferences, however, have seldom attempted to develop a truly workable model to be used, or to
establish a pilot network to be followed, by the developing countries concerned.

The principal assumption of the regional studies is that there exist common information needs, desires and values of people in developing countries within a geographical region, such as the countries in Latin America or those in Southeast Asia. Therefore, it may be assumed that common guidelines need to be developed and provided for each region. But the fact that few of the recommendations made at the regional conferences have been implemented (143), has led some authors to express scepticism about the validity of the assumption, which has not effectively demonstrated itself to be valid. Writing of the situation in Southeast Asia, Lim (109) states that "the various Southeast Asian countries with their different political and colonial backgrounds, their different languages and their varying levels of economic, educational and library development would find it difficult" to implement the recommendations made at the regional conference (p. 36). Lwanga (112), in a paper presented to the fourth East African Library Association Conference at Kampala in 1970, states "categorically" that "our library development can only be achieved on a national basis. It would be futile to think of interlibrary cooperation on an East African basis" (p. 9). A United Nations agency (190) too admits this problem with the regional approach when it states that:

While developing countries as a group face more or less the same general problems of underdevelopment, the difference between the poorest and the relatively more advanced among them is quite substantial ... The least developed among them cannot always be expected to benefit fully or automatically from such general measures adopted in favour of all developing countries (p. 12).

It seems plain that geographical proximity is not the only variable determining what a national information network should be, and the regional nature of the opportunities, if any, which it may offer to developing countries must be subjected to careful scrutiny.

The Working Group on Scientific Information in Developing Countries (187), one of the working groups which prepared the UNISIST study
report on the feasibility of a world science information system, has found that an "objective determination of science information is economic" (p. 75). An ad hoc advisory panel of the Board on Science and Technology for International Development of the U. S. National Academy of Sciences (162) points out that "developing countries require scientific and technical information systems of their own ... giving emphasis to the type of knowledge most needed for economic and social development" (p. 7). Unesco, which had advocated the regional approach for two decades, too, seemed to be aware of the need for studies on close relationship between levels of development and national information networks when the organisation decided to conduct a "Study on National Structure for Documentation and Library Services in Countries with Different Levels of Development, with Particular Reference to the Needs of Developing Countries" (184), even though again in this study the developing countries were treated as a single group as contrasted to the group of the developed countries.

These, and other similar assumptions about the range of influence of the common variables on international cooperation are held, not only by librarians and information scientists, but also those concerned with the wider field of political integration. No serious attempts seem to have been made to test the validity of such assumptions in relation to the design of a model for national information networks, but a recent study by Cobb and Elder (43) attempts to do this in relation to political integration, and their findings may be relevant to an aspect with which this study is concerned. The study carried out by Cobb and Elder attempts to establish the relative importance for political integration of three groups of background factors. These are geographical properties, or the influence of geographical proximity; societal properties, or common internal characteristics such as language, culture, level of development and so on; and systematic properties, arising out of past experience of international interaction and collaboration. The general conclusion of the study is that "whilst there is a positive interrelationship among the various forms of
international intercourse the link is much less substantial than is commonly supposed" (p. 87). Despite the general conclusion, some background factors were discovered to have greater importance than others in predicting patterns of mutual relevance, and it may be useful to identify them here. The examination of geographical factors led to the conclusion that "geographically more proximate countries tend to show greater mutual relevance in the global system," a sample of forty-nine countries and that this tendency is most pronounced when a common boundary is involved (p. 134-135). This tendency is, however, by no means universal. "Proximate and common boundaries were not influential in predicting patterns of mutual relevance in the North Atlantic area," another sample of fourteen countries (p. 135).

The examination of societal properties suggests some of the possible variables which may be significant. "Like shared political values, cultural homogeneity is often cited as a factor making for the sort of mutuality of understanding and feelings which breeds mutual involvement" (p. 100). Cobb and Elder found, however, that the influence of cultural homogeneity was, at best, a moderate one. Similarly, the influence of common historical experience, as, for example, in countries formerly ruled by the same colonial power, was found to have an "exceedingly limited" influence, "perhaps of negligible importance", and political homogeneity and stability were also found to be much less important than is commonly supposed. In contrast to these rather negative findings, three factors, two of which appear to have some significance in relation to the design of information networks, were found to have a positive influence on mutual relevance. The two factors are homogeneity and level of social welfare and of socio-economic development. Countries at a similar level tend to show greater relevance. Since the provision of information services may be regarded, at least to some extent, as one aspect of social welfare, the findings that common perspectives, values and interests in regard to social welfare tend to foster mutual behavioural relevance (p. 104), is of some
importance in the context of the present study. Cobb and Elder see that "the greater the homogeneity of two nations in terms of realised social welfare and the greater the average level of welfare realization, the greater these nations' mutual relevance" (p. 104). In investigating the relationship between socio-economic development and mutual relevance, Cobb and Elder attempted to test the assumption that developed countries are likely to be more interactive than less developed ones. The results show "a substantial relation to exist between the level of internal development and mutual relevance" (p. 107). Another assumption tested by Cobb and Elder is that "the level of development within a country may be the source of common identifications and functional interests with countries at a like state of development (i.e., shared problems will tend to foster common interests). This assumption that homogeneous development leads to mutual relevance, has also been proved to be valid (p. 107-110).

The results of this study have been examined at some length because they appear to have considerable relevance to the methodological problems in the design of generalised structures of national information networks. To summarise the main implications of this study for the present purpose, it appears that geographical proximity is not a determinant of mutual relevance in all regions; and that countries with a similar level of social welfare provision and socio-economic development will be more likely to show mutual relevance. In considering these findings in relation to the network designing situation, one may, where appropriate, substitute the words "common information needs" for "mutual relevance" and consider their applicability to design of a model of national information networks for a group of countries at a similar level of development.

When the United Nations created a dichotomy which identified countries as "developed" and "underdeveloped", the parameters devised and applied in determining whether a country was to be considered "developed" or "underdeveloped"—this term was dropped in favour of "developing" later—were compounded in the socio-economic and cultural status of the country.
concerned. This was expressed by measuring (a) overall national wealth in terms of gross national product and per capita income, (b) the technological advancement and skill of the country and the equipment that it has for carrying out development, and (c) the level and scope of education and personal development and health facilities. These lead to the resultant degree of industrialisation, which becomes a common measure of development (5). As explicitly described above Cobb and Elder's concepts of the terms "social welfare provision" and "socio-economic development" are the two basic components of the concept of the inclusive term "development". Thus, using the simple term "development" instead of "social welfare provision" and "socio-economic development", the findings of the study may be restated as follows:

Geographical proximity is not a determinant of mutual relevance in all regions, and countries with a similar level of development will be more likely to show mutual relevance.

Further, if the words "common information needs" could be used for "mutual relevance" in this statement, it would present the virtually same assumption made by Unesco (184) and the U.S. National Academy of Sciences (162) which conceived the idea that if properly designed, countries with a similar level of development, regardless of their geographical location, could use a common network model based on their common needs as general guidelines in building their national information networks.

1.2 Objectives and Value of the Study
1.2.1 Objectives of the Study

The advanced developing countries (hereafter abbreviated to ADC) are assumed to have reached a developmental stage which necessitates them to formulate and implement a plan for a national information network. Most of the governments in the ADC are well aware of the necessity for such a plan, and some of them have actually commenced their studies on the feasibility of a national network of their own (162). In their process of development, the ADC have a need to evolve a national network to achieve
maximum utility of available information resources. Such a network could achieve coordination and cooperation, eliminating unnecessary duplication of efforts. Network planners in the ADC would benefit greatly if they are provided with a properly designed, generalised structure of national information networks which could be adopted as a working prototype in their various situations. A generalised structure could help the planners assess their constraints and opportunities and choose appropriate network configurations at their designing phase.

The major objectives of the study are:

(a) to elicit and describe common information needs, desires, and value of the people using information, and other common factors which are responsible for the present information services in the ADC and which have implications for the basic structure of the national information network; and

(b) to design a generalised structure of national information networks based on the common factors existing in the ADC.

1.2.2 Value of the Study

The value of this study is threefold:

(a) It is intended to aid administrators in the ADC who are responsible for making national policies and who are now beginning to recognise the need for integrating plans for information services with the planning of economic and social development so as to enable all the groups in the community to have access to the information which are essential for decision making, research work, studies and even for recreational reading. This recognition will hopefully give them a rational basis for formulating right policies on information services.

(b) It is designed to introduce in the information community a new research direction in dealing with information problems in the developing countries. The new direction suggested in this study is based largely on the assumption that there are common information needs, desires and value of the people in countries at a like state of development,
regardless of their geographical proximity which has been the central element of traditional approach.

(c) Finally, and of great importance, this study is directed to network planners in the ADC where the generalised structure to be designed in this study may serve as a working model to guide the development of their national information networks.

1.3 Review of Literature

1.3.1 Definitions of Information Networks

The purpose of this subsection is not to organise the concepts of information networks but to review some of the statements made by librarians and information scientists, hoping to provide the reader with a picture of what some of the leading minds in the library and information community consider the concepts of information networks to be.

According to the Oxford English Dictionary, the term "network" has been existence since 1560. Confusion over what constitutes a network has continued ever since. It seems that precision in the use of the term declines as network-like activities proliferate. In his review of the literature, this investigator has found that a number of authors present definitions of information networks that overlap with those of information systems, (which will be defined in 2.2), or cooperative activities in providing information services. He was particularly attracted to the publications of Becker and Olsen, Carter, and Swank. Becker and Olsen (17) has compiled a list of properties of an ideal information network:

(a) Formal organization. Many units sharing a common information purpose recognize the value of group affiliation and enter into a compact.

(b) Communications. The network includes circuits that can rapidly interconnect dispersed points.

(c) Bidirectional operation. Information may move in either direction, and provision is made for each network participant to send as well as to receive.

(d) A directory and switching capability. A directory look-up system enable a participant to identify the unit more able to satisfy a particular request. A switching center then routes messages to this unit over the optimum communications path (p. 290-291).

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Becker and Olsen note that the term "network" also is widely applied to "... the banding together of existing information systems into some type of communications cooperative, e.g., referral centres, information analysis centers, industrial departments, airline ticket offices, and police precincts, in order to satisfy a functional goal" (p. 291). Carter (132) takes a similar line with minor differences. He includes the terms "data base" and "remote users" in his definition:

An information network, or a library network, I think, has the following characteristics. First we have two or more nodes, or centers of intercommunication and of data bases. One node or center, by itself, is not a network ... The nodes are interconnected and are able to use each other's data base, and that is very important. Each node has a unique data base or capability—in terms of a bibliographical apparatus, in terms of unique holdings, in terms of the power of the computer center—and each one is able to call upon the others for assistance. You have nodes, then which are interconnected by communications, and that is my second point. Third, each node in this system has remote users—the users are separated from the nodal center. Nodes in, say, Olympia, Bellingham, Hoquiam, Vancouver, Spokane, etc., could all be switched more or less automatically to a node in, say, Seattle or some other place. Those, then, are the three characteristics I think of a network as having: it has nodes, with a unique data base at each node; it is of course electronically switchable and has high-speed communications; and it has remote users (p. 405-406).

Becker and Olsen, and Carter, while acknowledging the importance of networks of existing library and information institutions, they define information networks in the modern sense as utilising communications by electronic signal transmission. This may be appropriate as an ideal but there are two reasons this investigator does not think that discussion should be limited to networks that specify particular types of communications channels. First, many of the evolving networks of existing library and information institutions do use, in varying degrees, electric signal communications through telephones, teletype, and sometimes with computer applications. As Clapp (41) states, library networks did not come into existence with the computer and are not dependent on it. He continues:

They have existed for a long time by dint of teletype, or telephone, or telegraph, or even the postal service (p. 122).
We know that there are many communication networks in which the important element is the communication rather than the communicator. The information network is an obvious example. Second, overemphasis on the communications technology sometimes obscures other essential components of information services that are not dependent, strictly speaking, upon any particular technology. For example, Becker and Olsen include "a directory look-up system" in their definition. This appears to be an understatement of the central problem of the intellectual organisation of documents and data—a problem that grows more and more crucial as information activities are elaborated into networks. Carter includes the "data base" in his definition, and this appears to be an abstraction of the tremendous problems of the selection, acquisition, and purging of the information resources to which access is the very reason for networks. Carter also includes "remote users", which leads us again into the confusion of user studies—the audiences to which network services should be addressed and the needs to be met. Technology changes and grows more powerful, but these problems remain essentially unchanged. The more widely networks spread, the greater should be concern about these indispensable components of all library and information services.

Swank (174) presents a more reasonably general definition with reference not to any particular class of communications equipment or type of data but to what Becker and Olsen call the "banding together of existing information systems"—in this case libraries and information centres:

The network concept includes the development of cooperative systems of libraries on geographical, subject, or other lines, each with some kind of center that not only coordinates the internal activities of the system but also serves as the system's outlet to, and inlet from, the centers of other systems. The concept is also hierarchical in that the centers of smaller systems are channels to centers of larger networks at state, national, and even international levels. A familiar analogy is the telephone service, in which local systems were first coordinated and then hooked up into national and international networks (p. 2).

Finally, a list of what Olson and others (134) see as the
essential characteristics of an information network, may also be worth quoting:

(a) A network's function is to marshal resources from its environment to accomplish results beyond the ability of any one of its members.

(b) A network has developed an organizational design and structure that allows it to establish an identifiable domain and exercise appropriate influence over the members.

(c) It has a base in communications technology (p. 279).

A caution needs to be added here. Thinking of information networks for developing countries, this investigator has been frankly biased in the reviewing process towards literature that relates to library or bibliographical networks rather than that describing remotely accessible computational centres or standard service bureau operations.

1.3.2 Previous Studies on Information Networks

Introduction

This subsection reviews a selection of previous studies on the organisational and other problems of information networks in general and those for developing countries in particular. The major purpose of this subsection is to present the reader with a comprehensive overview of the properties of the various aspects of information networking and its recent developments. Excellent bibliographies of the works on the subject can be found in the publications of Samuelson (157), Miller and Tighe (123) and Hindle and Raper (77). The reader is also referred to an annotated bibliography compiled by Stenstrom (170). This bibliography lists cooperative efforts of libraries covering 1940 to 1968, and Babcock (10) has updated it through 1971. Kruzas and Schnitzer (105) have developed an encyclopaedia of information networks and services that include approximately 1750 networks and cooperative programmes in 32 countries.

Most studies in the literature are descriptive and narrow, focusing a single aspect of network performance or a single network function (such as facsimile transmission or interlibrary loan). Some studies provide examples of good analysis but most studies show limited
efforts to verify stated assumptions. The significance of such studies is only to the specific context in which they were performed, since they do not provide any sound basis for generalising or comparing results.

"A network is a vehicle for cooperation" (66, p. 330). And cooperation in library and information services is not a new phenomenon. The need for a cooperative approach towards the achievement of their individual service objectives has long been recognised in the library and information field as many articles and papers appearing in professional journals within the past decades attest. Clapp (41) states:

Libraries have collaborated—either within or across jurisdictional lines—for a long time, creating what is euphemistically called the library system ... We have had many years increasingly effective arrangements by which, if one had the time, the energy and sufficient funds, an enquirer could secure information in the form of library material from a distant part. Bibliography and interlibrary loan were not invented yesterday. Examples of both can be found in the fourth century, B.C. and no doubt earlier (p. 121, 123).

What succeeding centuries have done is to improve the network, by reducing the amount of energy, time and expense required to make it operate and by improving the quantity and quality of the information obtainable with its use. Germination of national planning of information networks was occurring long before the advent of modern information technology. This is seen in the writings of many philosophers, educators, scientists and statesmen, who saw the need for better organisation of knowledge for the manifold purposes of society. From the encyclopaedists of the eighteenth century to Vannevar Bush and J. D. Bernal in our own, this need for organisation has been often articulated. Kochen (100) provides a brief but thoughtful history. With few exceptions, earlier writers and thinkers on the subject of knowledge did not link their ideas with national information programmes requiring deep involvement and resource underwriting by governments. The entry of national governments is a recent development. As seen in the following statement made by Piganiol and others (149), societies today are challenged to respond to new realities, new opportunities and new dangers.
The present information handling system that is found all over the world is the result of innumerable spontaneous responses to urgently felt needs ... Technical information of all kinds is now recognised as far too essential to the orderly development of society to allow its availability and quality to remain unguided by broad governmental policies for national and international development (p. 55).

It is not, however, universally agreed that governments should alone be involved in national planning. In the United States, for example, considerable planning of information services takes places in the private sector (194). A decade ago, a group of American library researchers prepared a report for the National Advisory Commission on Libraries. A part of the report predicting a rosy future of library networks may be worth quoting here to help the reader see if there is any progress or if the same problems remain a decade later:

A most dramatic change could be in improved and expanded communication and cooperation among libraries. Communication networks could provide data processing capabilities to small public, educational and special libraries; reduce duplication and costs of purchasing and processing; and at the same time, increase their service to users through rapid interlibrary loans, improved reference support, and the outright distribution (rather than loan) of certain kinds of material. Active dissemination of certain types of information could be commonplace. Nonbook materials could be exploited by libraries of all sizes and types, and could be available virtually anywhere in the nation (176).

A fairly extensive selection of the literature is reviewed in this subsection under the following headings:

(a) Rationale and impetus for networks
(b) Communication networks
(c) Theory and model building
(d) Standardisation and compatibility
(e) The demand environment
(f) Networks and resource sharing
(g) Regional networks
(h) Information transfer structures
(i) Organisational aspects
(j) Political and legal bases
(k) Support problems
(l) Network methods and technology
(m) Towards international networks
Networks for developing countries

The future

Rationale and Impetus for Networks

Adeyemi (3) identifies four reasons which have been adduced for library networking:

(a) Current developments in the publishing industry
(b) Limited budgets in libraries
(c) Advances in the field of microfilms
(d) Advances in computer and telecommunications technologies (p. 2).

Becker and Olsen (17) see that innovations in communications technology are providing tools for increasing the capacity and versatility of information networks. They believe that the impetus for information networking of any kind stems from the following three sources:

(a) Economic and time pressures, which are forcing organizations to share rather than duplicate information and other resources
(b) Advances in communications technology, which make it possible to integrate multimedia information into a communications channel and to distribute it as easily as one distributes voice communication
(c) A rapidly increasing stockpile of machine-readable information (p. 291).

External pressure from political funding sources has also forced cooperation in many areas. Olson (133) reports that over one half of all networks in his survey attribute their formation to the availability of government funds or the development of government programmes. Heaps and Cooke (74), in discussing the growth of scientific and technical information networks in Canada, conclude that networks spring from an awareness of the social responsibilities of scientists for information transfer; a feeling on the part of governments that information transfer is important for economic and military reasons; and a sense of frustration among those who need information about innovations in science, and who are hampered by the lack of knowledge and understanding of the most recent developments in science. Document overlap among member libraries of a network may be a good or bad thing, depending on whether the network is envisioned as a
device to reduce acquisition cost in individual libraries or as a device to enlarge each library's access to materials. Havard-Williams (71) sees the network development in the United States primarily as a means of cooperative acquisition and that in Europe primarily as a means of inter-library lending. He states:

> While the North American continent has been conscious of the need to build up its stocks of material ... Europe has been more insular and has started from the assumption that it has everything worthwhile, and so the real need is for an efficient inter-loan system to make the existing material more available (p. 1).

His thesis is supported by a group of American librarians (156), who found the 90 per cent of the books published in the United States during 1968 were in one or more of ten libraries in the State of Washington, and saw network development in the state as a means of avoiding needless duplication of materials. Sloan (167) suggests that it would be useful to view networks as exchange systems into which libraries enter because they expect to receive benefits in exchange for the resources they contribute.

Perhaps the most commonly cited impetus for network development is the inability of a single library to provide adequate library service if programmes are based only on local initiative and local resources (153). Casey (33) agrees that no library can be self-sufficient, regardless of the size of its resources or user population. Chapin (37) disagrees. He says that most types of libraries for most types of user groups are self-sufficient, citing the availability of materials in microform and the users' needs for mostly recent material. According to Chapin, most users already have access to most of the documents they need; the development of expensive networks will do little more than make available three or four per cent of additional material which is of minor importance to the users. This investigator would not agree with Chapin about the self-sufficiency of libraries, especially in the developing country situations, but he agrees that a network must demonstrate a favourable cost-benefit ratio to justify its worth.

Communications Networks
The impact of the recent acceleration of knowledge has been strong in many aspects of the society, particularly in the operation of library and information institutions where this knowledge must be made accessible to all who have a need of it. The first level on which technology has been extensively applied towards the solution of this problem is the improvement of communications between institutions that participate in an inter-loan arrangement. Thus we recently find an increase in the number of teletypewriter links between institutions or in experimentation with facsimile transmission, etc. Communication networks for information transfer differ among one another not only in the character of signal (audio, video, digital data) and methods of transmission (wire, radio), but also in the structure of the network. Overhage (140) observes that:

Some systems (centralised networks) consist of a set of terminals clustered around a single central station, while others (distributed networks) consist of interconnected stations, each of which can communicate directly with each other station (p. 342).

The teletypewriter network that connects the head office with its branch offices is typical of centralised networks. In the press wire service situation, a number of regional centres serve as secondary network nodes between local bureaux and the national headquarters. In much the same fashion, library and information institutions in many countries are grouped into multilevel organisations, with community centres being backed up by a regional reference centre, and ultimately by the national centre. The telephone system of a country is a prototype of a distributed network. It is the ubiquitous communications facility, in which locally centralised networks are interconnected by multiple paths. The network serves its subscribers in a variety of functions. Many different activities are embedded in the telephone network today: we can obtain prompt information from directory services, weather bureaux as well as reference librarians. Telephone and teletypewriter communications between information institutions have been extensive, although economics have generally limited their use.
to short references and distances. Communications potentials available today are the subject of an article by Becker (14), which summarises the uses to which multi-media transmission will be put in libraries in the future. Some state libraries in the United States have attempted to develop a communication network suited to fill the needs for their respective statewide library networks under development. In the State of New York, an expanded interlibrary loan service programme was organised around the State Library, which now serves as the referral agency and the hub and monitor of transactions supported by three major public libraries and nine of the largest subject resource libraries. All are interconnected by teletypewriter; a set of facsimile links was used experimentally but discontinued since 1968. Local libraries wishing to use the network forward their loan request by teletypewriter or mail to the State Library. An evaluation of this programme was made by Nelson Associates, Inc. (130). Notwithstanding their limitations, state networks have been of tremendous value in placing the total library resources of a large region at the disposal of users whose needs could not be fully met by their local libraries.

A major increase in information transfer effectiveness of a communications network is achieved when a high-speed computer is used to store and process digitally encoded information. Such computer-communication technology has been used primarily to construct bibliographical data networks that greatly extend the power of the reference librarian and enable many users to conduct effective searches directly from a computer terminal. An important feature of such a network is its capability for combining the resources of different institutions. In the introduction to a paper that seeks to place the field of computer-communications networks in an overall perspective, Bauer (13) predicts that:

Nearly all computers will be imbedded in, and integrated with, communications systems. As time goes on, these computer/communications systems will grow increasingly from relatively simple systems to larger, more complex and more comprehensive systems, with smaller systems integrated to form larger systems,
and these used to form still larger systems in an ever-increasing interconnecting network (p. 13).

Perhaps one of the most successful computer-communications networks in the operation of libraries is the Ohio College Library Center (OCLC) in the United States (111). OCLC, which is a computerised bibliographical data base with terminals in participating libraries, provides cataloguing data. The primary service performed by OCLC consists of on-line cataloguing and off-line catalogue production, based on MARC tapes modified to suit users' needs (93). The growth of OCLC and the development of new programmes have been described in so many articles that it will suffice to say that it now serves more than 800 participating libraries in 35 states (132). The technical means to develop regional processing centres seem to be clearly established with the success of OCLC. What remains to be solved are the organisational and financial problems.

Theory and Model Building

Many different kinds of networks share some general features and problems in common, and most specific applications of network design and evaluation are enhanced by being based on clear, unambiguous descriptions of such aspects of the network being considered. The mathematics can be used as the medium for constructing descriptive models for many such empirical phenomena. There is a range of highly general models, deeply mathematical in their exposition and treatment, contained in various journals and texts. This mathematical emphasis is quite often a source of communication difficulties between the information manager and the analyst. Bommer (21), in reviewing "Operations Research in Libraries," states that far too much attention has been devoted to the construction and solution of complex mathematical models. His solution is to suggest that the information manager and the analyst act as a team even at the stages of model formulation to ensure that the mathematician is not "playing game" and that the information manager will have a real grasp of the modeling capability.
Important groundwork in the development of theoretical models of networks has been undertaken by Kleinrock (96), by Duggan (56), by Davis (48), by Kochen (99), and by a group at Southern Methodist University in the United States (126), who provide a mathematical look at an information network, including measures of network structure, in particular the accessibility and flexibility in message transfer. An analytical model by Nance (125) suggests how a network can provide the greatest possible benefit for the total group by providing for the optimal flow of messages from node to node in a communication transfer. His work on the design of information networks has also used concepts developed by graph theorists (18).

Models of specific network functions and their interrelation are also useful. For example, Reynolds and others (156) developed quantitative models (linear equations) for functions of interlibrary loan, technical services, and the collection management for each of the three network configurations: the present system in the State of Washington, regional networks and a statewide network. Bhat and others (18) developed a model for total network costs associated with each of the three decisions about whether to satisfy a request, reject it, or refer the message to the succeeding node in the network hierarchy.

Standardisation and Compatibility

Aines and Day (4) bemoan the lack of standardisation in information activities in the United States:

In the absence of concerted planning on a national scale, there is emerging a profusion of information systems and networks in the United States where growth and interconnection may suffer from a lack of standardization. The problem becomes even more serious on an international scale. A good deal of ingenuity and buffering hardware and software is necessary to overcome the resulting incompatibility (p. 12).

What is true in the United States seems true also in many other countries. Some may argue that, in the long run, the willingness to put up with the chaos of unique languages, techniques, formats and machinery may prove to have been a good investment in preventing premature freezing
of technology. Only time will tell. In the meantime, virtually all
major studies on developing national and international information
networks have urged action to overcome the obstacles that this lack of
standardisation imposes. Duggan (57) observes that:

... just as the unit card concept in cataloguing has been an
acceptable standard practice, the concept of a standard format
of each record in machine readable form has become increasingly
attractive (p. 320).

As far as the progress of MARC development in the U.S. Library
of Congress is concerned, work on developing new compatible standard
formats continues—the format for manuscripts being the most recent issued
(193). In describing plans for the development of an Austrian network for
scientific libraries, Stock (171) points out a major problem that any
national bibliographical network must face, namely, the interchange of
bibliographical data among national networks. He illustrates his problem
with references to MONCIL, the American and British version of MARC, and
other variants of the standard. He bemoans the need to develop complex
programmes that will put the various versions of MARC into a format
suitable for Austria's use in achieving bibliographical control of its own
records and those produced by other countries. Stock's article is
significant for its design approach, which is to plan an integrated
national information network that will be dependent upon centralised
national data bases accessible through a communication network and used to
provide subject searching, as well as acquisitions control.

The dominant purpose of standardisation of the bibliographical
record and the provision of means of rapid communication is to facilitate
the pooling of bibliographical information. If these conditions are met,
the amount of information in the network will tend to equal the sum of
the information in all of the individual libraries.

The Demand Environment

For information networks, the problem of the network's demand
environment is mainly one of predicting the pattern of near-future
information needs, whose satisfaction will be used to justify the network's operations. The study of information needs and uses is becoming a technical specialty in its own right. The mission of an information network is to provide service. What services are offered depends on the nature and needs of the users. Unless their needs have been clearly defined by the network authority, the analyst will have to do it. Demand environment studies are essential in network building because they lay the groundwork for establishing the benefits to be derived from various network services. Despite their utility, there are relatively few studies on this subject.

Excellent papers depicting relations between information needs and uses, and network building activities have been published by Wooster (210), Lawson (106), Bill (19), and Marron and others (116). In a series of their papers, Orr and others (137, 138, 139) present some methodological tools for designing a specific type of network to gather and articulate data on network capabilities and usage and patterns. A useful category of the demand environment study is one of the more traditional forms of information networking: interlibrary loan. Palmour and others (141) give detailed costs of interlibrary loan functions, as performed by a sample of twelve major research libraries, the primary focus being the calculation of pre-transaction costs. In addition, a simple cost model is presented that could be used by other libraries to estimate the cost of their own interlibrary loan activity. The report also presents an extensive analysis of interlibrary loan patterns of use based on a sample of seventy-one academic libraries. A major finding reconfirms the heavy lending load born by major academic libraries in today's interlibrary loan network.

Sedlacek and others (163) develop an information-transfer-demand taxonomy and project trends for each demand category, using expert opinion plus correlations with economic and demographic variables. One conclusion is that the lack of "highly specialised" terminals, capable of meeting detailed user requirements, is a major problem in current network development. The study illustrates how a fairly "macro" approach can
partially overcome severe data limitations concerning specific individual demands for information. The methodology developed for this study provides a promising approach to tackling some key issues in estimating demands for network outputs in a number of other contexts.

Networks and Resource Sharing

One of the major reasons libraries and information centres join together in networks is to share resources. Hendricks (75) puts it this way:

Whatever the method, the name of the game is still the provision of material, and in order to do this we must know where it is. Any other benefit of networks still hinges on this task (p. 21).

In other words, networking is basically resource-sharing. As a general term, resources may include materials, equipment, people, time and money. As applied to libraries, "sharing of resources usually means the sharing of library materials" (123, p. 182). Sharing resources by lending books from one institution to another is probably the oldest, and certainly the easiest, method since a single loan requires only a borrower, a willing lender, and a means of transmission. Most of the research on sharing resources have concentrated on interlibrary loan network (77). Urquhart (200) believes that the information explosion is causing the change in attitudes responsible for the development of interlibrary loan networks. He argues that resource limitations will force librarians to formulate strategies of interdependence and to place greater reliance on national networks. More and more, the sharing of resources has come to mean the sharing, or pooling, of equipment and services, as well as library materials, as time-sharing and computer-based networking activity increases (20). The sharing of resources can take place in any of the ways which resourcefulness and technology provide. The System Development Corporation, as quoted by Pettitman (62), has identified four general types of networks which may serve as a model:

(a) Large networks concerned primarily with computerized, large-scale technical processing; e.g., the New England Library
Information Network, and the Ohio College Library Center.

Small networks concerned primarily with user services and everyday problems; e.g., Dayton Miami Valley Consortium Ohio, and Tri-State College Library Cooperative in Pennsylvania.

(c) Limited purpose networks cooperating with respect to limited special subject area; e.g., the Consortium of Western Colleges and Universities Headquartered in California.

(d) Limited purpose networks concerned primarily with inter-library loan or reference network operation; e.g., Delaware Rapid Interlibrary Loan in Delaware (p. 9).

Delaney and Cuadra (50) proposes some very real and objective goals to orient the activities of resource sharing through network formation. Objectives like the following are suggested:

- Assist member libraries in the selection of materials.
- Purchase, catalog and process library materials.
- Coordinate cooperative acquisitions, interlibrary loans and the reproduction of materials for the member libraries.
- Promote the development of programs for the expanded use of library resources.
- Stimulate the improvement of library facilities and services.
- Cooperate in the development of library personnel.
- Provide, through cooperative acquisition by voluntary agreement, materials beyond the reach of individual libraries.
- Achieve economies in the use of resources, both human and material.
- Facilitate sharing of materials among members of the group (p. 23).

Fetterman (62) concludes his recent paper on resource sharing in libraries, with the following statement:

There is an information system challenge facing us. The flow of information from all sources will continue to increase at an even faster rate than in the present. Indications are that expenses associated with acquiring, processing, storing and retrieving will continue to increase at a faster rate than library budgets ... Attempts at self-sufficiency will not allow the library organism to survive in this changing environment. Adaptations as radical as the environmental changes are needed. Adaptations through resource sharing activities are feasible now. Examples of major activities in this area show that the technology is available. The need to share can be satisfied in a variety of ways ... The fact that the need can be satisfied imposes on us the obligation of doing something and not just talking about it (p. 30-31).

Regional Networks

Markuson (115) distinguishes two types of networks. One is an "equipment-centred" network whose main purpose is to distribute computerised
information in somewhat the same way that electricity is reticulated by a public utility. The other network type is "activity-centred". This network is a kind of intermediary acting as a broker between equipment-centred networks and the separate information institutions. It does not manipulate major data bases like equipment-centred services. The aim of an activity-centred network is to improve the standard and efficiency of information services generally for a region. Its role is somewhat like an electricity substation. As Peake and Cassidy (146) have found, the value of the activity-centred concept is that it encourages close cooperation at local and regional levels.

Such networks at local and regional levels are probably more advanced in Great Britain than in any other country in the world. There are many traditions dating back hundreds of years that have contributed to the present condition in this country. It would be useful therefore to turn to some of the important actions which have had effects on those traditions in Great Britain for comprehension of the properties of regional networks within a national information network. A royal charter was granted to the National Central Library (NCL) in 1931 and its functions were:

(a) To supply on loan to libraries ... books for study which cannot conveniently be obtained any other way ...
(b) To act as an exchange or clearing house for mutual loans of such books between other libraries
(c) To act as a centre of bibliographical information, both for national and international purposes ... (201, p. 661).

In 1927 the Kenyon Committee presented an important report which recommended the setting up of a network of library regions covering the whole country which should be linked by the Central Library for Students, which became NCL in 1931. Public libraries were mainly in the minds of members of the committee but it was thought equally important not to ignore special libraries. One of the most significant recommendations of the Kenyon Report was that a union catalogue would be created in each region to enable material in the constituent libraries to be located quickly.

The Central Library for Students was to hold the master key to the contents of all regions by combining all these regional catalogues into one national
union catalogue. When NCL took over the functions of the Birmingham University Clearing Office of the Joint Standing Committee on Library Cooperation of the Association of University Teachers, university libraries gradually became affiliated to the regional library bureaux. After a number of conferences to discuss the project and its progress, the Northern Regional Library System was inaugurated in 1930 and interlibrary loan began in 1931. The pattern was so successful as to be followed by other areas, and the early 1930s saw the creation of ten regional library bureaux throughout England and Wales. A union catalogue was maintained in each of the ten regions with one exception, i.e. the Yorkshire region, with the aim of making known the contents of each library in the region. Any library which is unable to satisfy a request from its own stock forwards it to the regional bureau, and if the item is available in the region, the holding library is asked to send it to the library making the request. In the case of failure, the request is forwarded to NCL. NCL purchases some works which are not available for loan in any British library, but does not purchase any book published in Great Britain since the beginning of 1959, these now being covered collectively by the regions. On the basis of the Vollans Report (202), the Joint Working Party of the Executive Committee of NCL and the National Committee on Regional Library Cooperation (representing the regional library bureaux) framed its own series of recommendations which, after approval by the trustees of NCL, appeared in 1954 (127). The recommendations involved schemes for self-sufficiency within the regions to alleviate the strain placed on the National Union Catalogue as a result of requests for general books. Cooperative arrangements were recommended for setting up Joint Fiction Reserves and other more specialist reserves. Suggestions were also made for regional investigations into the improvement of the availability and range of periodicals, including matters relating to their permanent preservation. The main idea was that the regions should be self-sufficient in British books, so that the National Union Catalogue need only record those books not published in
Great Britain. Eventually, an interregional coverage scheme was introduced. Each region was allotted a part of the Dewey Classification Scheme so that the whole scheme was covered. The earliest of this scheme was begun by London public libraries in 1948 with their Metropolitan Special Collection Scheme (80).

Information Transfer Structures

Recent attempts to organise the concept of information networks generally have followed one of two approaches. The first approach is to define a network in terms of its functional organisation. Swank (172) provides an excellent description using this approach. The second approach is to dwell on the structure for information transfer and be less concerned with the functions served by this transfer. Nance (125) offers an example of this approach. A few authors have followed both approaches to some degree.

Duggan (56) describes the "twelve critical components ... essential to orderly, planned development of the objectives (of a library network)" (p. 159-160). She then cites several network configurations, thus recognising the different possible structures by which information transfer can be accomplished. Duggan suggests six structural forms. She also presents the number of "channel links" required by each structure. Davis (48) uses both approaches in her description of the National Biomedical Communications Network and a design procedure for networks in general. With respect to the structure for information transfer, she identifies four types of network organisation. The centralised and decentralised structures identified by Davis correspond to the directed and nondirected forms of Duggan (56). Her composite centralised structure is analogous to Duggan's representation of the interface of two directed networks. The fourth structure offered by Davis, the hierarchical network, is of interest. She notes that while the control system complexity increases with the hierarchical structure, more flexibility in intercommunications and greater reliability of the network are gained (p. 35).
In a different context, Kleinrock (96) has used different terminology to identify the identical structures in communication networks. His star-net configuration (p. 28) corresponds to the centralised structure shown by Davis (48), and his fully connected net (p. 101) to Davis' decentralised configuration. Duggan, Davis and Kleinrock have used the theory of directed graphs to enable them to identify different structures, but this particular technique only models a few attributes of networks. A fundamental work on graphs is found in a comprehensive book by Harary (70).

No one had sought to examine the relationships among information transfer structures in a comprehensive and definitive manner until Nancy (125) attempted to define the structures to answer questions concerning which structure is best for accomplishing certain objectives. His efforts were to develop a unifying concept of the term "information network" by employing a graph-theoretic approach, and from this concept, to construct a methodology by which structures for information transfer could be evaluated and compared.

Organisational Aspects

Slamecka (166) reminds us that networks can be developed in one of two ways—by beginning with existing systems and services and improving their efficiency or by formulating new objectives and functions for a to-be-designed network. Usually, however, networks are built upon the foundation of existing institutions and enterprises. A working group of an important conference on information networking (211) felt that networks should evolve out of existing systems to preserve freedom of choice and local autonomy for individual libraries and information services (211).

There is great variation in the organisational patterns and management structures of networks. From one point of view, information networks can be looked at in the light of their geographical coverage, e.g., UNISIST (215) and EURONET (7) at the international level. The telecommunications services and organisations in Japan are described by Hiroto (78) at the national level. Also at the national level, the Soviet Union
is represented by Kirson (95) and Canadian national operations are described by Mauerhoff (122). The United States is characterised by diversity. Organisational concerns are pervasive in many of the documents reviewed. Plaister (151) tells us about the formation of the British Library, which has brought together the former British Museum Library, the National Reference Library for Science and Invention, the National Central Library, the National Lending Library for Science and Technology, and the British National Bibliography. These institutions are now in one organisation under the British Library Board, with the resources to create a national library service probably without a rival in the world.

Organisational activities at the regional level within a country are well described in the literature, including those in Birmingham, Manchester, Newcastle upon Tyne and Sheffield in Great Britain, and those of the Ohio College Library Center and the New England Library Information Network in the United States. Organisational considerations for statewide networks in the United States have appeared in many journals and proceedings. An interesting phenomenon to watch is the activities and organisation of the Interuniversity Council (IUC) of the North Texas Area described by Hendricks (75). IUC is a subregional organisation allied with a private microwave network used by several institutions and corporations for two-way video transmission to share educational resources. Buckle and others (30) describe the organisational pattern of the Birmingham Libraries' Cooperative Mechanisation Project. Established in 1969, its aim has been to design and develop a system to utilise centrally produced machine-readable bibliographical records in MARC format in local libraries, and to assess the practicality of a regional data bank, accessible to a number of libraries, using these records as well as locally produced records.

In addition to network activities that are geographically delimited, there are also discipline-oriented, mission-oriented, and special-service networks, which are not limited by geography; for example, networks for museums, chemists, humanists, social scientists, and
economists have been proposed (88). The relationship of their management of such various network components are treated in some discussions (79, 144, 164).

Finally Reynolds (155) discusses authority and responsibilities of a network director. She thinks that a network director should be an individual who:

is visionary yet practical; possesses understanding of the human animal; has good interpersonal relationships; is committed to the user not the institution; is knowledgeable in regard to the various types of participating institutions; recognises the network must be built strength on strength; is a skillful change agent; comprehends the need for research and development before implementation; recognises the role of management improvement; recognises the need for retaining; has the ability to generate fiscal support; utilises various disciplines; understands the place of law; and is knowledgeable and effective politically (p. 278).

In performance these characteristics of a network director become responsibilities. No one individual will ever be able to handle all of these responsibilities equally well. Perhaps then the most important responsibilities of a network director are to assess personal weakness and attract top-flight personnel with strengths in the needed areas. Having succeeded in this, the next responsibility would be to assign personnel where they can operate most effectively for the benefit of the network and the individual. The task of information networks involving a variety of types of institutions is an uncharted area. From what we know now, the task is so complex that no one individual will have the necessary skill to properly discharge the responsibility. Therefore, networks will bring about new organisational structure and methods of management. The amount and kind of authority will develop somewhat gradually as the concept takes form and levels of development are put into operation.

Political and Legal Bases

The political environment—a network's power resources and the limitations upon its authority and influence—varies widely from one network to another. In the networks surveyed by Olson (133), many of the member units are virtually autonomous. The members are often located in
different political jurisdictions and have strong bonds to parent institutions. Often the financial base is not under the network's control. Duggan (55) believes that formal written agreements of some type are essential in operating a successful network because contracts imply commitment and networks cannot operate without full commitment from participants. About one-half of the library networks and consortia surveyed have some kind of written agreement such as a contract, a constitution, articles of incorporation, or a charter, according to Olson (133). Yet only in rare cases do networks penalise any member who wishes to withdraw—an indication of the great autonomy of members and the meager stakes members have in network membership.

Healey (73) examines the organisational arrangements for public-academic library cooperation in the State of Rhode Island of the United States and discusses the importance of a government structure as a base for networks. He believes that states are the obvious basis for a general-purpose network because:

- **(a)** The use of state boundaries eliminates innumerable boundaries of local political jurisdictions
- **(b)** Most states are large enough to serve as a base for most network purposes
- **(c)** States are sources of fiscal support with revenues not available to local governments
- **(d)** State library agencies can provide leadership to all types of libraries (p. 122).

Duggan (55) has attempted to outline the legal aspects of (a) establishing interlibrary activities or network services as a legal entity, and (b) operating networks and providing services from the viewpoints of participants, information base, and network development or extension. Based on her experience and findings, the legal and contractual aspects of network establishment and operation are somewhat unclear. Networks are a relatively new type of "social organisation" which do not fit into the existing laws, yet networks are very much in evidence and very much operational. Since laws are a codification of social behaviour, she believes that the following actions need to be taken:

- **(a)** A legal review of existing local, state and federal laws
(b) A legal opinion on the legal nature of networks and their right to enter into contracts, receive funds, convey funds, collect taxes, etc.

(c) A standardisation of contract forms and elements.

(d) A national networking law applicable to all federally funded networks to codify current and future practices and legal bases for establishment and operation (p. 222).

Support Problems

No one doubts that network development must be based on realistic estimates of the resources to be made available. Green (65), in discussing the U.S. National Commission on Libraries and Information Science, points out that the first prerequisite for network development is:

A survey of existing resources, physical, financial, institutional, technical and human and how they are allocated (p. 117).

Nevertheless, there are numerous instances of development efforts that have failed in this respect, and many resultant examples of badly degraded compromise networks for which some considerable portion of the original development effort has been wasted because funds ran out or did not materialise. Less frequently, a development manager is caught with unanticipated excess funds that have to be spent during the fiscal year. This creates another kind of wastefulness. A concrete grasp of the overall support level of the planned network is a necessary condition for a clear conception of most other aspects of the plan.

With respect to stable, predictable funding, there are two problems that must be clearly distinguished. One concerns funds for network development and the other concerns funds for operation of the network. Regarding the former, one problem is that of justifying systems analysis. Government views of network development are heavily conditioned by political considerations. Schlesinger (159) evaluates the role of systems analysis as it functions in a highly political environment. After detailing many kinds of apprehensions about systems analysis in this setting, he concludes that while he is hopeful and enthusiastic about applications, systems analysis "cannot transmute the dross of politics into the fine gold
of Platonic decision-making. The maintenance of stable and predictable funding for the network itself may involve selling the network's services to users. In support of such sales activities, user needs for service may be discovered, invented, created and more or less carefully evaluated for their differential strengths. Hayes (72) discusses membership fees. Membership or access fees, when assessed, open the doors to users under limitations stipulated by the institution levying them. Some are entrance fees only; actual service is provided by payment of additional fees. Some are self-inclusive and allow access to all services tendered. The basis of the fee may be population, enrollment in academic institutions, a percentage of operating or book budgets of affiliates; or volume of interlibrary loan. Hayes (72) also discusses user fees:

User fees ... may be arrived at by a simple division: cost of the service divided by use. Few of them have been determined as the result of any truly comprehensive cost analysis, and in fact, this represents one of the real dilemmas of developing formulas. User fees can be many things: a search fee, a current-awareness charge, a transaction fee for processing an interlibrary loan or a charge for the performance of a service or combination of services (p. 250).

Hayes believes that there is near-unanimous expectation that the national government must be the source of major library and information funding, at least initially. So pervasive is the belief in this as a justified expenditure that it is reflected in the consistent conclusions in the literature whenever support of networks is discussed.

Network Methods and Technology*

With the growth of machine-readable data bases, the increase in the amount of work carried out on teletypewriter circuits and the beginnings of on-line computerised cataloguing and reference services, the special communications needs of libraries and information centres are forcing an upgrading in kind and quality of technical effort in communications. This, along with a number of independent developments and new technologies, is revolutionising the kind, quality and pattern of service of library and information institutions. Byström (31) presents a
comprehensive overview and analysis of these activities in telecommunications both public and private, that may contribute to a growing base for progress in the development of networks for libraries and information facilities. The concept of using the computer in information networks combines computing power, telecommunications and network control with easy access by users in much the same fashion that telephone service and electricity are provided to their subscribers. The data transmission function among libraries and information centres will benefit from the developmental work in computer networks, most of which now use telephone facilities. The U.S. National Library of Medicine (NLM) already introduced a new service, MEDLINE (196) through a commercial computer network service using telephone lines. This service provides access to the NLM computer via telephone in a number of cities throughout the country. MEDLINE provides an on-line bibliographical searching capability for medical schools, medical libraries, hospitals, and research institutes throughout the country.

The regional sharing of computing facilities appears to be the viable way to extend computing capabilities and the concomitant specialised manpower to small campuses for educational and interlibrary information services. In the library setting, the success of the concept is evidenced by the inauguration of on-line cataloguing services by the Ohio College Library Center (OCLC) in the United States in 1971. More than 800 libraries are now cataloguing by remotely accessing the OCLC computer (132). Greenberger and Aronofsky (67) presents arguments in favour of the advantages of a single central time-sharing system over the interconnection of dispersed centres to provide computer-based information services. The authors assume that all services required by a user population can be provided by a single all-purpose centre. This assumption, however, is not clearly mirrored in the present reality, and the opposite situation, as described by Combs (45), seems to be more widely spread. Since the full gamut of services is not available from a single processing installation,
the best alternative now appears to be to connect the users of several processing centres through a common communications network so that the user has access to what appears to be a single system.

There is a growing awareness that the various manifestation of television recordings, transmission, and display technology must have some partial symbiotic application in interactive library and information networks. Knudson and Marcus (96) propose and describe their vision of the future library as part of a computer network, with distributed data bases, all of which are interconnected, coupled with a capability to display and reproduce text from microimages. A partial realisation of that vision is already operating in a system that combines interactive file searching by computer with video display of text from a microform source, demonstrated in the New York Times Information Bank. This system, a commercial installation, resembles Project INTEX, the research approach to comprehensive text search and retrieval systems undertaken by the Electronic Systems Laboratory at Massachusetts Institute of Technology in the United States. This project was completed in 1973 and reported in a series of semi-annual reports (120). It is not yet clear if this type of system will find widespread use, particularly because of the apparently high costs involved, but the experience and demonstration of this type of system has great value for the profession.

Communications satellite extend the range and number of high quality communications channels for all purposes. Because a satellite can see a vast portion of the earth, oceans and mountains are eliminated as difficult hurdles for communications links, and the cost of communication is independent of the distance between sender and receiver. These are major advantages of a satellite-based communication network. It seems still too early to predict the specific role of satellite facilities in information networking. But Sloan Commission on Cable Communications (168) foresees the development of station-to-station communication without the need for national centres, and the linking of the many thousands of
cable television systems, as likely areas of special impact.

Towards International Networks

National plans for the improvement of information networks are influenced by international development—cooperative as undertaken by international organizations, and competitive as a consequence of economical, political and social tensions. Conversely, the existence of comprehensive national plans may consequently have an impact on the programme of international organizations, cause and effect being so interwoven as to make it difficult to determine which influences come first. Adams and Werdel (2) see two traditions of cooperation in international information programmes: that of international cooperation among scientists and that of international cooperation among librarians. The authors' principal thesis is that contemporary economical, social and political priorities, coupled with developments in communications technology, are putting a stress on conventional modes of cooperation developed under both traditions and are accelerating the exploration of new forms.

In the field of bibliography, the International Catalogue of Scientific Literature, initiated by the Royal Society in 1896 and the Concilium Bibliographicum, authorised by the Third International Congress of Zoologists in 1895, share the honours with the International Institute of Bibliography, established by Otlet and Le Fontain in Brussels in 1895 (24) as early international cooperative efforts involving the participation of scientists in the organisation of published scientific information. The common programme strategy underlying these early efforts were to pool national efforts to provide bibliographical access to the worldwide production of scientific literature.

The international exchange of scientific and technical information since World War II has achieved a place in the policy structure of national governments, and international cooperation has thereby become politicised. While the older forms of nongovernmental cooperation for purposes of world scholarship survive (as in the case of Universal
Bibliographical Control), they have faced competition for financial and human resources during the last thirty years by programmes of national interest. There is still participation by individuals in the affairs of international organisations purely for professional purposes, but this participation is being joined, and in some instances displaced, by the participation of instructed national delegation (9, 54).

Unesco has for several years operated two information programmes—one dealing with the development of a world scientific and technical information system known as UNISIST (215), the other promoting the activities of libraries, archives and documentation systems as a vehicle for cultural development (183). Inevitably, there has been duplication of effort and some rivalry between these two programmes. To overcome these difficulties, the Director General of Unesco, at the urging of member countries, has brought together these two programmes to form the General Information Programme of Unesco. An Advisory Committee of eighteen members, with developing countries well represented, has been set up to advise the Director General on the activities of this combined information programme. The committee should speed up efforts taken by Unesco to assist in the establishment of national information centres or focal points leading in turn to a wider exchange of information on an international scale.

Adams and Herdel (2) observe the three main avenues to cooperation in the development of sectoral bibliographic information networks: (a) the internationalisation of a network developed in one country (e.g., WESLASS, Chemical Abstracts Service), (b) the cooperative development of a network under the sponsorship of an intergovernmental agency (e.g., the International Nuclear Information System of the International Atomic Energy Agency), and (c) the development of a network by two or more cooperating agencies (e.g., the International Food Information Service under cooperative development by the Commonwealth Agricultural Bureau in the United Kingdom, the Institute for Food Technology in the United States and the Institut für Dokumentationswesen in Germany) (11, 58, 178).
Networks for Developing Countries

Developing countries in their process of industrialisation have been assigning great importance to access to the information possessed by their industrialised neighbours. As they have gained political strength in the United Nations and its specialised agencies, they have naturally insisted that these agencies function to increase their resources of scientific and technical information. In 1960, agencies of the United Nations undertook a concerted effort, known as the First Development Decade, to assist their less developed member states (188). This effort was continued by the Second Development Decade, initiated in 1970 (191). In both the First and Second Development Decades, United Nations agencies were dedicated to assisting developing countries in cultivating their information service networks. The United Nations Development Programme (UNDP) has played an important role. As individual countries identify scientific and technical information assistance as a need to be funded by UNDP, it turns to an operating agency, such as Unesco or the United Nations Industrial Development Organization (UNIDO), to implement the project. Thus, on Unesco determination, both the UNISIST programme (192) and the Department of Libraries, Documentation and Archives (181) conduct UNDP-funded development projects relating to information for developing countries. By far the majority of these programmes are concentrated on the development of institutional and manpower resources considered essential to provide the basic information support for national development. Unesco's UNISIST programme has urged developing countries to recognise the importance of a national policy and focal point for scientific and technical information (39,60) while a primary purpose of the NATIS Conference was to encourage the "integrated planning of national documentation, library and archives infrastructures" (182).

Most of the recent efforts to develop information networks in developing countries have been made by the intergovernmental organisations of global scope, Unesco, UNIDO and others, which as a matter of policy as
well as of economics, prefer to deal with multinational regional networks rather than with individual countries. Regional conferences on the development of library and information services in developing countries (154), organised by Unesco, include the Seminar on the Development of Public Libraries in Latin America in Sao Paulo in 1952 and fourteen other seminars. More regional conferences of similar nature have been held by other intergovernmental agencies and international nongovernmental organisations. These conferences have made a number of recommendations on how to develop library and information services at the national or regional level. It is, however, rather sad to discover the fact that few of these recommendations have been implemented. At the Regional Seminar on Library Development in Arabic-speaking States, held in Beirut in 1959, it was felt that the existence of a common language and of common tradition, and also the similarity of technical problems facing individual countries of the area, strongly favoured a regional approach to library development. The seminar went on to recommend the establishment of a regional library school, a regional federation of library associations, a regional scheme for the cooperative acquisition of foreign publications and a union catalogue of such publications, and the adoption of a standard catalogue code and classification scheme adapted to the needs of the region (172). None of these recommendations had been implemented fifteen years later, when the Expert Meeting on the National Planning of Documentation and Library Services in the Arabic Countries met in Cairo in 1974. The gap between the promise and reality of these regional approaches, of which the situation in the Arabic region is but one example, has led some authors, such as Lim (109), to express skepticism about the opportunities afforded by such approaches. Lim concludes that the opportunity for the regional problems in the Southeast Asian countries are limited because the political backgrounds and languages are different, and levels of economic, educational and library development vary in the countries within the region. Perhaps the most important point made in this context is that, as the Committee for
Development Planning of the U.N. Economic and Social Council (190) has pointed out, the difference between the poorest and the relatively more advanced among the developing countries is so great that the least developed among them cannot always be expected to benefit fully or automatically from such general measures adopted in favour of all developing countries.

Finally, a joint Unesco/FID study on national structure for documentation and library services in countries with different levels of development, with particular reference to the needs of developing countries (184), may be worth mentioning. The study has attempted to summarise characteristic data and information on the present state of documentation and library services in selected developing countries to compare these data with those from selected developed countries, in order to provide guidelines and recommendations for developing countries. Two of the important findings of this five-year project were: (a) clear differences in documentation and library services between the main categories of countries with different levels of development, and (b) close relationship between the gross national product per capita and level of documentation and library services.

The Future

Some authors, such as Mason (118), question the future existence of library and information networks but majority opinion seems to be that networking is here to stay (16, 68) though Greenberger and others caution us that networking must be viewed as a means, not as an end in itself. Despite the lack of intervening research, predictions of the future abound, not necessarily because it is fun to make them, but because a more serious purpose can be served. As Parker (142) puts it:

It may be advantageous to develop a scenario of what could happen, in case the policy makers choose to try to make it come true (p. 61).

An important Delphi study appears in the literature. As part of
An insight gained through this study is the understanding that the techniques for storage and transfer of information will assume a strategic position in the information networks of the future. Developments in this field will lead to a large-scale use of new media, e.g. by 1995 the videophone will be almost as common as the ordinary telephone is today and about half of the world's newly published scientific literature will be available (in full text) in computer-readable form. This will result in the replacement of the paper medium by electronic media of various types. The electronic media will permit high-speed transfer of vast volumes of information at low cost between places far apart. The impact of the new media on information use in society will be profound. Far-reaching geographical decentralisation of various societal functions is not unlikely. The Delphi study also predicts the expansion of demand into areas not previously covered by information and documentation units:

In the future, information and documentation units will not confine their activities to storage and dissemination of information; retrieval, processing and analysis of information will be new tasks. Developments on the computer side may result in the mechanisation of the storing and disseminating functions of information and documentation units. Processing and analysis of information will probably remain manual (p. 252).

Another Delphi study was undertaken in France by Anderla (6). The work by Anderla was a forecast of information needs. There are followers of cable television (27), who see this medium as a means to rejuvenate and broaden the techniques available to libraries to reach their users.
1.4 Present State of the Art of Information Networking

Introduction

Several industrialised countries have already established national information networks of one kind or another, and others are evolving national authorities with the responsibility to plan and implement them. The purpose of this section is to provide the reader with an overview of what today's well-organised information networks at the national level are like and how they function. Four examples which, in this investigator's view, have a message for the ABC, are selected from the successfully working networks in the the world today, and are briefly described under the following headings:

(a) Consolidation and improvement of the existing programmes in the United Kingdom

(b) Elaborately planned national network in Canada

(c) Management problems and network solutions in the United States

(d) Bold projection in Japan

Consolidation and Improvement of the Existing Programmes in the United Kingdom

Instead of elaborate national planning*, the thrust of the British librarians and information scientists have been toward consolidation and improvement of the existing information programmes and processes. There is no single government department with total central responsibility for the publicly supported library and information services in the United Kingdom, although two departments—the Department of Education and Science (DES) and the Department of Trade and Industry (DTI)—have major interests. In the private sector, learned societies and commercial publishers are engaged in primary and secondary publishing. Universities and learned societies sponsor seminars, conferences, and workshops, which contribute to the dissemination of information.
DES is the major source of financing for the independent British Library. With the advice of two library advisory councils, the Secretary of State for Education and Science superintends the public library service of both England and Wales which is operated under the Public Libraries and Museum Act, 1964 by local government authorities with defined responsibilities and considerable autonomy. DES also has certain responsibilities for libraries in academic institutions such as universities, polytechnics, colleges and schools. Its library interests (national, public, academic) are largely concentrated in the Arts and Libraries Branch. Within the Science Branch was the Office for Scientific and Technical Information (OSTI) until recently, but it was transferred to the British Library in April 1974. DTI is responsible for the Government's relations with commerce and industry and for most of the Government's contribution to industrial research. It operates a network of 76 Industrial Liaison Centres, based on Polytechnics, which maintain contact with local firms and encourage them to make greater use of existing scientific and technical information as well as providing advice on particular problems. DTI also controls a number of research establishments with information services and the Technology Reports Centre. It channels grants to the industrial cooperative research associations, many of which have fully developed library and information services. Both the Industrial Liaison Centres and the research associations include in their services a particular responsibility for serving the many industrial firms too small to set up their own viable information units.

Strong moves have been made recently in the United Kingdom to develop a coordinated national library network. The British Library Act of 1972 coordinated all national library services in England under a single national authority, reuniting scientific and technical information with social science and humanities resources. Authority was vested in the British Library to plan the national development of information services. The means to coordinated development lie in large measure in the British
Library's power to contribute funds to "library authorities within the meaning of the Public Libraries and Museum Act, 1964, or any other persons providing library facilities, whether for members of the public or otherwise." In July 1973, the British Library was created with three functional components: a Reference Service, a Lending Service, and a Bibliographical Processing Service. Each of these services resulted from the consolidation of ongoing activities in several organisations. With the transfer of OSTI in 1974 to the British Library, the Library acquired a strong research and development arm. DES did retain responsibility for coordination at interdepartmental and intergovernmental levels and a new Interdepartmental Coordinating Committee for Scientific and Technical Information has been formed that seeks harmonisation of Government policy in the field of scientific and technical information including its international aspects. Other Government departments, such as the Ministry of Agriculture, Fisheries and Food, the Department of Environment, and the House of Commons continue to control and support their own library and information facilities. The National Libraries of Scotland and Wales and other libraries of national importance remain independent of the British Library.

The Dainton Report (51) points out that the purpose of the new library structure in the United Kingdom is not merely to consolidate six different organisations (the British Museum Library, the National Reference Library of Science and Invention, the National Central Library, the National Lending Library for Science and Technology—a quick-service library in Boston Spa, the British National Bibliography, and OSTI), but to "develop the concept of the national library as a major influence in the development of library and information network and services."

Elaborately Planned National Network in Canada

Canada has for some years been developing a strong national network of information services, founded on the following three developments which took place in 1969:
(a) The National Library Act of 1969 gave the National Librarian the responsibility for coordinating and implementing federal library services, including scientific and technical information services and their extension or linkage with others in and outside of Canada. He established a Canadian Government Libraries Committee to advise him.

(b) In 1969 a Federal Department of Communications was established to plan, develop, utilise and coordinate communication systems and services, including telecommunications, giving speedier transmission of information at more acceptable costs.

(c) A cabinet decision of December 1969 instructed the President of the National Research Council (NRC) to develop under the general direction of the National Librarian a decentralised national scientific and technological information network encompassing the natural science and engineering, based on the National Science Library (NSL) created from the NRC Library by statute in 1966, when the Federal Government delegated responsibility for the provision of bibliographical services in the medical and health sciences.

Brown (29) sees NSL not as a conventional library but as an information transfer agency, working in close harmony with all major libraries in Canada. Through local libraries and NSL, Canadians have access to most of the world's literature. The Canadian Selective Dissemination of Information System (CAN/SDI), which provides access to a number of computerised bibliographical data bases covering more than 15,000 journals in all fields of science and technology, became operational in 1969, after three years of testing. As a result of the passage of the National Library Act of 1969, planning was set forth for improved library services. According to Côté (47), a key element of the plan was wide use of the computer. In 1970, NRC established the National Advisory Board for Scientific and Technological Information (ABSTI) made up of twenty leaders from science, industry and education, to represent users, producers, and processors of information. ABSTI is supported by a full-time Executive
Secretariat and a Network Planning and Development staff. NRC also directed its National Science Library and the Technical Information Service to work with the NRC Computer Centre in developing a spectrum of computer-based services now available coast-to-coast.

During the early 1970s, there was a concentrated effort to establish modern information services in the central and provincial governments, in universities, and among publishers and other private-sector groups. Also reported by Côté was the inauguration of the new Canada Institute for Scientific and Technological Information (CISTI) in the NRC's laboratory complex in Ottawa in October 1974. The merger of the National Science Library and the Technical Information Service into CISTI resulted in the establishment of a single focal point for national scientific and technological information services, a centre to link Canadian scientific and technological information services to those of the world, and a locus for planning and supporting research and development for scientific and technological information services. CISTI's CAN/SDI program now provides about 2,000 profile subscriptions and serves an estimated 6,000 users.

Management Problems and Network Solutions in the United States

Library networking in the United States grew out of the difficulty libraries had in the 1960s to provide cost effective service. Until then libraries mainly used the nineteenth century methods that required more staff to cope with increasing quantities of information. As salaries rose up, so did library processing and service costs. At first, computers looked like a panacea but the capital cost was so high that few libraries could afford to buy or even lease one. Librarians had to share computers chosen for other types of applications. They were often denied priority times and guaranteed access. Suitable software and experienced systems staff were scarce. Librarians were faced with an obviously unsatisfactory situation. Many were disillusioned with library automation particularly when many automation programmes were not cost effective (119). Some librarians
realised that they could justify purchase a computer suitable for and de-
dicated to library applications if it was to be used by a number of
libraries. Only a small systems team would be needed to write a satisfactory
software. Thus many of the difficulties individual libraries experienced
in automating library processes could be avoided by cooperation. This view
was encouraged by two major developments: the availability of the Library
of Congress cataloguing in machine-readable form (MARC), and improved and
cheaper communication links.

MARC is a large and growing file that can reduce the amount of
original cataloguing done in individual libraries. If cataloguing records
of other libraries are also available the amount of cataloguing data is
significantly increased and individual libraries need do even less original
cataloguing. Library of Congress cataloguing has been available since the
late nineteenth century. At first cataloguers used it to help them
formulate their own original cataloguing. As cataloguers' salaries rose
administrators began to replace cataloguers with clerks who uncritically
copied the Library of Congress cataloguing. Funders were pleased by these
developments. Readers were pleased, too, when books reached library shelves
more quickly. Improved communication technology meant that cataloguing
records could be transferred over large distances, displayed on video
screens, edited to suit individual needs (such as adding a local identifi-
cation for circulation records), and used to produce a variety of outputs
such as catalogue cards.

The only hardware individual libraries needed was an interactive
terminal that displayed information. Their major administrative effort
concentrated on design and implementation of manual procedures that made
best use of computing power accessed by the terminal. The systems effort
was accomplished centrally elsewhere by a special team. The first large
operational network to supply computing power to subscriber libraries was
the Ohio College Library Center (OCLC). The OCLC was an immediate success
because it recognized that by combining the activity of many individual
libraries a large computing facility dedicated to library needs could be amply justified. Indeed as reported, some libraries recorded a seven fold increase in productivity after joining the OCLC (93).

Even then small libraries (less than 4,000 titles catalogued a year) found it hard to justify the cost of a terminal and communication links. Libraries at a great geographical distance, even large, found communication costs a heavy burden. Libraries have also recognised that the OCLC did not meet all their needs, particularly the provision of subject reference services from periodical literature. The same principle of cooperative interaction appeared to offer solutions to some of these difficulties. A new type of networks, which Markuson (115) called the "activity-centred" network, was established to complement the existing one. This type of network has been described at some length in the proceeding section.

**Bold Projection in Japan**

The responsibility for national policy on science and technology in Japan is vested in the Council for Science and Technology, established in 1957 and chaired by the Prime Minister. In 1957 the Council laid out plans and policies that resulted in the establishment of the Nippon Kagaku Gijutsu Joho Sent (Japan Information Centre of Science and Technology--JICST). The JICST was given the mission of collecting, processing, storing and disseminating scientific and technical information. At the outset, the JICST gave priority to secondary information services, publishing a series of abstracting journals, applying computer technology to information processing, and applying microphotographic technology to document storage and retrieval. The Ministry of Education is responsible for library planning and services in Japan. The board of education of each local body is responsible for public and school libraries in its jurisdictional area. The national library is the National Diet Library (NBL), which is the official depository for Japanese publications and publishes the national bibliography. The NBL's primary assignment of service is to the Diet and
to the Government. Furthermore, the library bears much of the burden of concern for the reading and research needs to the entire nation and has willingly performed a national lending and central bibliographical services for the country since its establishment in 1948.

Starting in 1970, the Japan Computer Usage Development Institute, a nonprofit organisation established in 1968, prepared several white papers culminating in a final report in 1972: *The Plan for Information Society— a National Goal towards Year 2000* (121). The report is unique document that presents a picture of Japan's planned information society, which the author hopes will be established by 1985, together with the blueprint for attaining this national goal. The report concludes with these words:

It is our conclusion that Japan has to change its goal from industrialization to informationalization ... We propose that the final national goal be a new information society which will bring about a general flourishing state of human intellectual creativity ... (p. 41).

There are two plans suggested in the report, one a medium-term plan and the other a long-range one. The two plans cover multiphased projects. The medium-term plan will require about 1.7 million pounds, and the accomplishment of the long-range plan, about 32 billion pounds. This is probably the most enterprising plan of its kind ever prepared, in or out of government, in any country. Japanese officials have made it clear that it has not been adopted by their government for a number of reasons, one of which is obviously the huge amount of capital that will be required to support it. Nevertheless, it is a bold projection that will receive attention and piecemeal implementation in the year ahead. It is plain that the Japanese are making impressive achievements in national planning. By their own admission (91) progress is slow, but objectives and targets have been laid out to be followed when conditions will make it possible.

1.5 Summary

Development of a national information network is a complex and
difficult assignment. It is worthy of our effort, but not something to be worked out overnight and without a great deal of careful, deliberate planning. A nation-wide information network connecting local, regional and national resources in a country will involve highly complex network design, the utmost technical skill, and above all sense of purpose and commitment on the part of all those concerned with the effort. Many problems and obstacles must be overcome before such a network can be realised. We need to develop acceptable criteria for determining what is to be placed on the network, we need to clarify the rules of network participation, we need to agree on network organisation and operation, we need to adopt communication standards and other common practices, and we need to investigate the implications of integration of information institutions from a social, legal, financial and technical point of view. What we need most of all is a workable plan and a network model to guide implementation of the plan.

The need for a national information network is growing rapidly in the developing countries, particularly in the ADC. Some of them have already initiated their studies on the feasibility of having such a network of their own. To help develop information networks in the ADC, a generalised structure to be used as a working prototype in their various situations is needed.

To discuss the problems emerging in the progress of improvement of information services in the developing countries, frequent regional conferences, forums, etc. have been organised by intergovernmental organisations, international nongovernmental organisations and individual countries. As a matter of policy as well as of economics, these organisations and countries have preferred to deal with the problems on a regional basis rather than on a national one. Many conclusions have been reached and recommendations made at the conferences. These have been hoped to provide a starting point for planning and implementing information networks in the developing countries. This hope, however, has not been satisfactorily realised. In fact, few of the recommendations made at the regional conferences have been so far implemented. This has naturally led some
authors to express scepticism about the validity of the principal assumption with the regional approach. According to Cobb and Elder's findings (43), there is no firm base to believe in the assumption that countries located within a geographical region share common information needs and problems.

A new research direction in dealing with information problems in the developing countries was suggested in this study. The new direction is based on one of Cobb and Elder's findings. They have found that countries with a similar level of development will be more likely to show mutual relevance. This has been developed to assume that there are common information needs, desires and value of the people in countries with a similar level of development, regardless of their geographical proximity. In order to deal effectively with the information problems in the developing countries as a group, they ought to be broken down into several subgroups, each with a different level of development. For there is more or less continuous scale of development from the least developed to the more advanced developing countries, and the difference between the two is quite substantial. The category of the ADC is a product of such a dividing attempt.

This thesis has been divided into five chapters. In this introductory chapter, the context, objectives and value of the study have been described and the previous studies related to the present topic reviewed. In Chapter 2, the hypotheses and research methods of this study are presented and the key terms used in this thesis are defined. The statistical and descriptive data supplied in the questionnaire responses are analysed in Chapter 3 to elicit and describe the common needs, desires and value of the information users, and other common factors responsible for the present status of information services in the ADC. In Chapter 4, a generalised structure for national information networks for the ADC is designed utilising those common factors elicited and selecting the theoretical alternatives available in the literature. Finally, in Chapter 5, the work of the present study is summarized, the principal conclusions are repeated, and some recommendations for further study made.
Chapter 2
METHODS

2.1 Hypotheses

The scientific approach to research provides the researcher with concrete guidelines for objectifying his hypothetical insight. This approach shifts the basis for data gathering in a research process from a reliance on the researcher's intuition or serendipity to the identification of a set of assumptions on which the study is based. In some cases assumptions constitute the foundation for the research endeavour. In other cases they serve as the material and building blocks for the development of a set of hypotheses which the researcher seeks to verify or nullify by following a procedure established for the purpose in a research design. This study, however, does not lend itself to the development of a hypothesis in the experimental sense of the word. This is because it does not seek to prove or nullify a cause and effect relationship deemed to exist between a set of variables. Rather than that, this study is concerned with discovering factors responsible for the present status of information services in the ADC, and with developing a generalised structure for the information networks which can be used to foster effective information services in those countries.

Based upon the theories, findings and experiences reviewed and discussed in the preceding chapter, the following basic hypothesis has been developed for testing by gathering relevant data. The hypothesis is that a generalised structure for the national information networks for a certain group of countries with an identical level of development, can be built and used as a working prototype at a network design phase in each constituent country of the group. This general prediction can be broken down into the following two subhypotheses which are more specific and testable:

(a) Common information needs and desires exist in a group of countries with an identical level of development, for instance, in the ADC chosen for this study.
(b) Identical information needs and desires lead to identical objectives, functions and configurations of a national information network.

These two subhypotheses are to be tested by the evidence and opinions gathered by questionnaire and by the previous experiences accumulated in the literature.

2.2 Definitions

In order to provide clarification, several terms basic to the topic and the hypotheses of the present study are defined in this section. Definitions of the other key words or terms used throughout the thesis are defined in the Glossary in Appendix 3.

Information is recorded or communicated knowledge concerning some particular fact, subject or event in any communicable form. Unless modified by an adjectives such as "medical" or "scientific and technical", the term "information" in this thesis refers inclusively to behavioural and social sciences information and information needed for the humanities as well as scientific and technical information. The term "information" is differentiated from the term "data" which refers to coded signals received from the external world by an acquisition subsystem (e.g., the eye, the ear, radar). It connotes basic elements of information which can be processed. Processing of data results in information. The processing can be undertaken by mechanical systems (such as computers and displays), or biological systems (e.g., the central nervous system). In either case, the processing changes the state of the receiving agent (e.g., a person is "informed", or a machine has "information"). Sometimes data is considered to be expressible only in numerical form, but information is not so limited. The term "information" is used interchangeably with the word "knowledge" in this thesis.

Information network development is still in its infancy and, as might be expected, its terminology tends to be nebulous and loose. Therefore, this investigator has attempted to formulate a working definition
of the term "national information network" as he uses it in this thesis. A national information network may be defined arbitrarily as a closely coordinated structure which interconnects existing and future libraries and information centres at a national level to collect and process information and to disseminate it through a convenient local outlet and with a minimum of delay to those who need it. From the structural point of view, therefore, a national information network may be regarded as an interconnection of libraries, information centres and other related institutions within a country. We tend to think of networks in terms of the telephone or the radio. However, these networks are primarily communication grids, whose wires and waves carry messages back and forth. Telephone and radio networks are independent of the content or purpose of the messages they carry and serve merely as arteries of communication. Where interdependence for information exists among a group of participants and there is a common function or purpose to be served such a network becomes an information network. An information network usually consists of a formal arrangement whereby data, information and service provided by a variety of types of libraries and information centres are made available to all potential users. Libraries and information centres may be in different jurisdictions but agree to serve one another on the same basis as each serves its own constituents. Telecommunications and computers may be among the tools used for facilitating communication among them.

It is necessary here to introduce a suggested distinction between information networks and information systems. A system is not a network though one may very well contain network elements. While an information network implies an operational relationship between individual services, an information system implies that the various libraries and information centres linked up operationally have, on the one hand, specific objectives in relation to their own readership and that (in the case of national information system) these objectives are seen in turn as integral parts of the total national objectives. There are several kinds of information
networks and systems. First there is the grouping of units of one type within a single administration, for example, the branch libraries and central library of a public library system. This is more properly called a library system in the sense that it is under a single administrative control. A network lacks this single control function. A network consists of independently administered units which have formed operational links either for the purpose of maximising resources in meeting readers' needs, or for improving the efficiency of their internal procedures. Good examples of these types of networks are the British regional library networks linked with the Nation's major research libraries through the British Library.

A network is a vehicle for cooperation, not an end in itself. It is, therefore, necessary to define the concept of cooperation in order to complete the definition of a network. The term "cooperation" though a familiar concept in the library and information field, is used rather loosely at present in the professional literature. Cooperation can be defined as the association of people or agencies in activities with common goals or objectives and with the intent of providing specific benefits for all. The verb "cooperate" implies combining, acting in concert, joining force, working towards a common cause, and sharing successes and failures. On a nation-wide basis we must cooperate to meet all of the goals of information services. Unless there are benefits evident that will be obtained by acting in concert with other libraries and information centres, there is no reason to develop a cooperative scheme. The concept of cost avoidance is one that must be explored as cooperative schemes are developed. The reduction of expenditures should not be regarded as the only justification for forming cooperative schemes. Cost avoidance is, however, an acceptable justification for initiating the consideration of a cooperative effort. Collective action in a cooperative scheme usually brings satisfaction to the parties involved. Acting in concert with one's colleagues in solving problems is usually professionally rewarding and brings a satisfaction and
strength that may justify cooperative schemes. The public demonstration of cooperative programmes is usually a very favourable activity for political interests.

Although the term "coordination" is sometimes used as though it were synonymous with "cooperation" it denotes in fact a different although related activity. Cooperation is based on a willingness to work together to achieve mutual benefits. Coordination is more inclusive, requiring more than desires and willingness. It is conceivable that, by coincidence, mere cooperation could bring about desired results. But we cannot rely upon coincidence. Thus, although cooperation is always helpful, and its absence could prevent all possibility of coordination, its presence will not assure coordination. Coordination must be a conscious managerial effort exercised through the functions of planning, organising, staffing, influencing and controlling.

The term "development" in this thesis is not differentiated from "industrialisation"; it refers to the growth, in a society hitherto mainly agrarian, of modern industry, with all its attendant circumstances and problems, economic and social. The term has come into use mainly during the past thirty years or so, in order to meet certain needs of classification for which the older term seemed unsatisfactory. The term "development" describes in general terms, the growth of a society in which a major role is played by manufacturing industry of the modern type, i.e., characterised by heavy, fixed-capital investment in plant and buildings, by the application of science to industrial techniques, and by mainly large-scale, standardised production. Just as the term "industrial revolution" has come to "cover a range of economic, social and other changes, as constituents of the idea" (52, p. 327), so the process of development may denote characteristic changes in various branches of society, e.g., "the best general test of the development of a nation's life under modern conditions is the rate and character of the growth of its towns" (40, p. 53).

The use of an initially technological criterion of development
does not imply a kind of technological determinism. On the contrary, there are clearly institutional and organisational preconditions and counterparts of large-scale and efficient utilisation of power. Extensive development is quite unlikely in the absence of a highly specialised and coordinated labour force, monetary exchange and rationalised accounting systems, the technology of precise measurement and production control, and so on. Furthermore, "technology itself is properly viewed not as a kind of inanimate force but rather as a body of practical knowledge and skills: it is a social product having social consequences" (85, vol. 7, p. 264).

After World War II the United Nations attempted to establish a grouping of all the countries of the world, the organisation's experts creating a dichotomy which identified countries as "developed" and "underdeveloped". The parameters devised and applied in determining the level of a nation's development are compounded in the socio-economic and cultural status of the nation concerned. This is expressed by three determinants: (a) overall national wealth in terms of gross national product and per capita income, (b) the technical advancement and skill of the country and the equipment that it has for carrying out development, and (c) the level and scope of education and personal development and health facilities. These are assumed to lead to the level of development.

The term "advanced developing countries (ADC)" refers to a group of the developing countries. As described above, the term "developing countries" was established when the United Nations classified all the nations of the world into two categories: the developed and the underdeveloped (later this term "underdeveloped" was dropped in favour of "developing"). Since then it has been common to speak of the developed or the industrialised and the developing countries, few paying attention to the fact that the dichotomy was originally created for the purpose of the organisation's assistance programmes. This contrast appears to be too simple for many other purposes including information studies at an international level. For there is more or less continuous scale of development.
from the least developed to the most developed countries. As Hees-Mogg
(153) suggests, a more useful division might be to "separate the world
into three groups, the developed, the developing and the underdeveloped.
There are some countries, for instance, South Korea, Brazil and Mexico,
which are developing extremely rapidly. There are others, including all
the poorest countries of Africa, Asia and Latin America, where the condi-
tions for development do not exist at present and can hardly be brought into
existence before the end of this century at the earliest" (p. 14).

It is plain that the developing countries is "by no means a
homogeneous, uniform group" (12, p. 12). There is great variation between
the developing countries not only in terms of economic growth but also in
terms of information activities. A recent survey (187) indicates that
"out of 90 countries receiving technical assistance from a United Nations
organisation, half of them have no documentation services at all, moreover,
the other half includes nations where scientific and technical information
resources are of minimal adequacy, consisting rather of libraries with
limited information services" (p. 75).

Recently, some efforts have been made to subdivide the developing
countries into more practical categories. World Bank Annual Report 1977
(213) lists 102 developing countries, out of which Cyprus, Greece, Malta,
Portugal, Spain, Turkey and Yugoslavia are listed under the heading "More
Advanced Mediterranean Countries". Bauer and O'Sullivan (12) have provided
another list of the more advanced developing countries in their recent paper:

... among Third World countries which have enjoyed rapid economic
growth are South Korea, Taiwan, Hong Kong, Malaysia, the Ivory
Coast, Kenya, Brazil, Columbia, Mexico, Venezuela and, of course,
the oil states of the Middle East (p. 12).

These relatively more advanced of the developing countries
constitute the ADC for the purpose of the present study. Perhaps there are
more countries that are entitled to be listed above and more countries that
have nearly reached the level of development of the listed countries. Till
a future study will provide a complete list, we cannot tell all the countries
constituting the suggested category of the ADC, nor can we make absolute claims about the completeness of a list compiled from the sources presently available. That, however, is a matter which may inconvenience only the dogmatist. For the category of the ADC can be understood to comprise the relatively more advanced developing countries listed above and other countries yet unknown but potentially eligible for membership. Out of these known and unknown countries constituting the ADC, the twenty-one listed above will be investigated in this study. These are:

Cyprus, Greece, Malta, Portugal, Spain, Turkey, Yugoslavia, Hong Kong, Korea, Malaysia, Taiwan, The Ivory Coast, Kenya, Brazil, Colombia, Mexico, Venezuela, Iran, Iraq, Kuwait, Saudi Arabia.

The conventional division of the world is dichotomised as shown in Figure 2.1. Figure 2.1 might then be redrawn in Figure 2.2 to show the subdivision of the developing countries into the category of the ADC and that of the rest. In the real world, however, it would be difficult to draw the borderline between the ADC and the rest of the developing countries. The question of making a quantitative assessment of national development still remains to be solved. Perhaps the present study does not need such mathematical precision in telling which countries presently fall, or do not fall, under the category of the ADC, because this study is primarily concerned with a particular category of countries with an identical level of development, not with the constituent countries of a particular category. Levels of development of nations change with the passing of time. Some of the present members of the ADC will leave some day, new members coming in to take their places. Although the members of the ADC change, general information needs and problems related to this particular stage of development will remain essentially unchanged.

2.3 Assumptions

There are five fundamental assumptions which serve as a basis of this study. They are set out below.

(a) Today, library and information institutions are very loosely.
if not, interrelated in the ADC. If maximum communication and coordination could be established among these institutions, the resultant interconnection of resources would constitute a unique national information network of immense value to their economic, social and cultural growth.

(b) All people have the right, according to their individual needs, to realistic and convenient access to their national information resources for their personal enrichment and achievement, and thereby for the progress of society.

(c) Information needs, desires and value of the people in a country would determine the objectives, functions and configurations of a national information network.

(d) Experiences of industrialised countries would be informative to the design of national information networks for the ADC.

(e) A national information network would embrace all media.
2.4 Methodology
2.4.1 Population and Sample

The survey research approach requires careful selection of sample data from a population so as not to bias the study. This is especially critical if a statistical analysis is to be done and inferences are to be made from the results. The survey of information needs and desires to be conducted as part of the present study is designed to cover all the ADC, which has been rather loosely defined as the category of the relatively more advanced developing countries. The population, therefore, comprise all those known and unknown countries constituting the upper part of the developing countries (see Figure 2.2). Since the population includes some countries never mentioned in relation to development level in the literature, sampling is required to present a list of the countries that may be investigated less questionably. Twenty-one countries, explicitly or implicitly designated as more advanced developing countries by Rees-Mogg (153) and Bauer and O'Sullivan (12), and in the recent issues of the World Bank Annual Report (213), are sampled; and receive the questionnaire formulated for the purpose of the survey. These countries are listed in 2.2.

2.4.2 Data Gathering

In the preliminary stages of research, several activities helped develop and modify the methodology of the present study: (a) a recent research project supported by the Ministry of Education of Korea on a model for the scientific and technological information network for Korea (38); (b) a review of the literature of information networking and in related social sciences areas; (c) exploratory interviews with students from many different developing countries who were studying in the Department of Library and Information Studies at Loughborough University of Technology and who were well-acquainted with the library and information services in their respective countries; (d) visits to the major libraries and information facilities in Australia, the Philippines, Hong Kong and Taiwan in 1976.
Data Needed

The data needed in relation to the problem statement and the hypotheses to be tested, fall under the following headings:

(a) Government roles in providing library and information services in the ADC.

(b) Functions of national libraries and national information centres in the ADC.

(c) Library and information services and bibliographical publications currently available in the ADC.

(d) Technological atmosphere in the ADC.

(e) Current planning and important projects for the near future, for the extension of library and information services in the ADC.

(f) Kinds of cooperation among libraries and information institutions in the ADC.

(g) Needs, desires and value of the people utilising information in the ADC.

(h) Main difficulties with respect to the development of library and information services in the ADC.

(i) Composition and terms of reference of the national committee for information services in the ADC.

(j) Kinds of networks of library and information centres evolving in the ADC.

(k) Research and development in information work in the ADC.

(l) Conditions of central collections in the ADC.

(m) Theoretical alternatives for the various aspects of national information networks.

(n) International assistance programmes for the development of information service networks in the ADC.

Data Gathering Methods

Data gathering methods can be categorised under two broad
headers: (a) observation, and (b) experimentation. Observation encompasses such data gathering techniques as (a) the interview, (b) the questionnaire survey, (c) analysis of documents, and (d) observation. Experimentation on the other hand emphasises the techniques of (a) the experiment, and (b) simulation. The methodology utilised for collecting the required data in this study falls under the category of observation, and largely consists of the following three techniques:

(a) Literature review  
(b) Postal questionnaire  
(c) Personal interview

Background information on the individual ADC is gathered from monographic and periodical literature, and country reports presented at the various international conferences are analysed for other relevant data. The literature of information science and its application, and the international assistance programmes available for information network development in the developing countries, especially the literature produced by Unesco, in the United Kingdom and in the United States is carefully studied to assemble the theoretical alternatives needed for the design of a generalised network structure. Finally, an extensive literature review precedes the preparation of the questionnaire, so that a comprehensive list of questions for the data needed can be compiled.

For most of the data needed for the present study, a questionnaire on "Library and Information Services as They Are Available in the Selected Countries" is formulated. This questionnaire is designed to be completed without help, by an expert who is well-informed of the library and information services in his or her country. The questionnaire is intended to look in details at what information services in the ADC are now doing—whom they are serving, in what way, and how well—and establish to what extent they are meeting the nation's information requirements. It is also intended to ascertain the respondents' ideas on possible future developments in information provision in their countries, that is, in the ADC. The
questionnaire was completed over a four month period from February to May 1978. The questionnaire is given in Appendix 1. Similar data on the demands for information and the use of libraries and information centres in the ADC, are gathered by interview with a number of students from the ADC who are studying in the Department of Library and Information Studies at Loughborough University of Technology in order to supplement the data obtained from the questionnaire returns. Most of the interviewees had worked in the library and information field in their respective countries before they came to Loughborough.

2.4.3 Response Rate

Although the questionnaire was designed to be completed by an expert in each of the 21 countries sampled for the present study, it was sent to three experts in each (a) to ensure at least one return out of the three and (b) to obtain more complete and more reliable data in case two or all of the three would return. The questionnaire was posted to a total of 63 national librarians, directors of national information centres and directors of other major libraries or information centres. In the 13 countries where it was difficult to identify the "major libraries or information centres" from the reference sources used (185, 214), the librarians of the British Council libraries established in the countries received the third copy of the questionnaire.

Complete usable responses were received from 31 persons in 15 countries for an overall completion rate of 49.2%; 28 persons (44.4%) did not provide any response; 3 persons (4.8%) provided incomplete data and 1 person (1.6%) refused to participate (see Table 2.1). Although the

<table>
<thead>
<tr>
<th>No. in original posting</th>
<th>No. not responding</th>
<th>No. responding</th>
<th>Response rate (%)</th>
<th>No. providing partial data</th>
<th>No. refusing</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>28</td>
<td>31</td>
<td>49.2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
figures are disappointing, these are rather deceptive. Since the present study actually needs a complete response from each of the 21 countries, and one or more responses were received from 15 countries, the real response rate is 71.4% (see Table 2.2).

Table 2.2 Responses by country
(Number in original posting: 21 countries)

<table>
<thead>
<tr>
<th>No. of responses from a country</th>
<th>No. of countries</th>
<th>Total no. of responses</th>
<th>Response rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 from a country</td>
<td>4/21</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2 from a country</td>
<td>6/21</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3 from a country</td>
<td>5/21</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15/21</td>
<td>31</td>
<td>71.4</td>
</tr>
</tbody>
</table>

2.4.4 Analysis Procedures

The total number of the questionnaire returns—28—was small enough to permit manual tabulation and analysis of them. Difficulties were encountered both in the course of the collection of data and in the analysis of them. Owing to differences in information and library practices among the countries surveyed, the investigator was not able to gather all the information and data which might have been of interest for this study. Therefore, the investigator has also made use, in addition, of other information and data related to the topic. Some problems arose from the terms used by the respondents, but the investigator managed to overcome them by using standardised terminology.

The data supplied in the responses are systematically arranged so as to provide the country reports. Where necessary, these are supplemented with data from other sources, which are given in Appendix 2.

Following the individual country reports, an attempt is made to summarise the data presented in the reports by some cross-section characteristics. These are commented on in relation to the characterisation of the present
situation and the demand for information services in the ADC.

2.4.5 Design of a Generalised Structure

A modeling approach has been adopted to investigate scientifically the area of information networking in the ADC. The basis for selecting this approach is that a model can expose the fundamental nature of a problem in a network environment. A model provides a means of representing a network in a more concrete manner than reality. A model is also a step in developing a theory by forcing the use of a scientific method. In designing a model to investigate the stated problem these steps will be followed:

(a) Judgment step. This is the initial step in designing the model and is dependent upon the experience and knowledge of the researcher. This is often referred to as the inductive level of a model.

(b) Data collection and analysis. This represents the objective measures obtained from the real world, the results of which are used to refine the inductive level of the model.

(c) Establishing the model to fit the data. This represents the deductive level of the model which establishes the relationships between the variables used in constructing the model. Using the model as structured in the inductive level and the data as obtained in the real world level, the deductive model can be formulated.

(d) Developing consequences from the hypotheses. This represents the results of testing the model against the elements in the real world and arriving at conclusions based on the testing procedures.

The present study involves the first, the second and the third phases. Because of the limited resources available to the investigator, the fourth phase is left to be covered by a future study. An attempt is made to design a generalised network structure assumed to be best suited for the particular needs and uses of information, constraints, and other related factors common in the ADC, by choosing between alternative models and configurations assembled through literature searches.
2.5 Delimitations and Limitations

2.5.1 Delimitations

The present study is delimited to the following:

(a) The development of a national information network requires a consideration of two broad aspects: the organisational and structural, and the technological. The present study is delimited to the former, which is greatly needed but have had less attention in the ADC.

(b) A national information network is taken as a national network providing all kinds of information, with the emphasis on scientific and technical information which is most needed for economic and social development in the ADC.

(c) Basically there are two kinds of models: models descriptive of the system itself, which are termed "design models", and models descriptive of variables and relationships relevant to the system performance, which are termed "research models". A generalised structure of national information networks for the ADC to be built in this study will be the former, which will hopefully provide a framework to serve as the foundation for the discussion and resolution of the administrative, financial, designing and operational details surrounding network development in the ADC.

2.5.2 Limitations

The present study has the following three limitations:

(a) As already shown in Table 2.2 no usable responses were received from six countries: Cyprus, Greece, the Ivory Coast, Portugal, Saudi Arabia, and Spain. These six countries are, therefore, excluded from the 21 countries which were originally intended to cover in the present study. The universe of this study now consists of the following fifteen countries:

Brazil, Colombia, Hong Kong, Iran, Iraq, Kenya, Korea, Kuwait, Malaysia, Malta, Mexico, Taiwan, Turkey, Venezuela, Yugoslavia.

This curtailment of the universe would inevitably limit the extent to which
the countries to be investigated are representative of the ADC.

(b) Ideally, a survey of information activities in a group of countries should be made through an effort to collect comprehensive up-to-date, primary data needed for the particular purpose. However, such an attempt is unrealistic for the present study in terms of resources available to the investigator. Data obtained through analysis of the documents produced for various purposes at different times are used in this study to supplement the original data obtained from the returned questionnaire.

(c) For the same reason, validity of the generalised structure of national information networks for the ADC which is to be designed in this study cannot be tested in an application to a real world situation.

2.6 Summary

The research methodology of the present study has been described in this chapter. The basic hypothesis developed is that a generalised structure of national information networks for a certain group of countries with an identical level of development, can be built. The present study specifically attempts to verify the following two logical consequences of the hypothesis: (a) common information needs exist in the ADC, and (b) the common needs lead to an identical network structure for information services in the ADC. The term "national information network" is defined as a closely coordinated structure which interconnects existing and future libraries and information centres at a national level to collect and process information and to disseminate it through a convenient local outlet and with a minimum delay to those who need it. The term "ADC" refers to the category of the relatively more advanced developing countries, namely the countries with the present level of development of the countries listed below:

Cyprus, Greece, Malta, Portugal, Spain, Turkey, Yugoslavia, Hong Kong, Korea, Malaysia, Taiwan, The Ivory Coast, Kenya, Brazil, Colombia, Mexico, Venezuela, Iran, Iraq, Kuwait, Saudi Arabia.

The most fundamental assumption made in the present study is that information needs, desires and value of the people in a country would
determine the objectives, functions and configuration of their national information network. The present study does not seek to prove or nullify a cause and effect relationship deemed to exist between a set of variables. Rather than that, it is concerned with discovering factors responsible for the present status of information and library activities in the ADC, and with developing a generalised structure of an information network which can be used to foster effective information services in the ADC.

The methodology utilised for collecting the required data in this study falls under the category of observation, and largely consists of the three techniques: (a) literature searches, (b) questionnaire, and (c) interviews. Background information on the individual ADC is gathered from monographic and periodical literature, and country reports presented at various regional conferences are analysed for other relevant data. Most of the data needed for the present study are obtained from the returns of a questionnaire on library and information services in the ADC. Similar data are gathered by interview with a number of students from the ADC who are studying in the Department of Library and Information Studies at Loughborough University of Technology.

The data gathered by questionnaire and interview and from other sources are systematically arranged so as to provide country reports. The same data are rearranged to present some cross-section characteristics of the country reports—the common patterns of information needs and uses in the ADC. By choosing between alternative network models and configurations assembled through literature searches, a generalised structure, which would be best suited for the common information needs and uses in the ADC, is designed.
Chapter 3

INFORMATION NEEDS AND SERVICES IN THE ADVANCED DEVELOPING COUNTRIES

3.1 Introduction

The main purpose of the present chapter is to identify (a) common characteristics of the information needs and desires in the ADC and the present situation of the information services to meet them, and (b) the requirements and constraints peculiar to these countries which ought to be considered in the design of a generalised structure for national information networks for the ADC in the following chapter. The former is intended to verify the Hypothesis A, and the latter derives from the assumption that the elaboration of a model for the national information network—which is related to the Hypothesis B—should be based on an analysis of the present level of development of the information services. In order to accomplish the purpose, this chapter presents an individual report on the current status of information activities for each of the fifteen countries chosen for this study, based largely on the questionnaire responses, followed by a detailed analysis of the data contained therein. The procedure used is to arrange in its first half the data acquired in the questionnaire responses and in other sources (see the "List of the Sources of Data Used in Compiling the Country Reports" in Appendix 2), in the form of fifteen country reports to be summarised by cross-section characteristics in its latter half. Because some of the respondents expressed their preference to preserve the confidentiality of their responses, their names are not mentioned in the thesis. The questionnaire is given in Appendix 1.

3.2 Country Reports

The country reports are presented in the following order:

1. Brazil
2. Colombia
3. Hong Kong

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4. Iran
5. Iraq
6. Kenya
7. Korea
8. Kuwait
9. Malaysia
10. Malta
11. Mexico
12. Taiwan
13. Turkey
14. Venezuela
15. Yugoslavia

Each country report is compiled under the following headings:

A. Basic statistical data
   1. Population
   2. Surface area
   3. Density of population
   4. Per capita gross domestic product
   5. Education
   6. Libraries and their holdings by type of library
   7. Book production per year
   8. Journals
   9. Scientific and technical manpower
   10. Research and development (personnel by field of science)
   11. Research and development (personnel by sector of performance)
   12. Selected indicators of scientific and technological development

B. Introductory survey
   1. Recent history
   2. Government
3. Economic development
4. Social welfare
5. Education

C. Government authorities responsible for information services

D. Central information coordinating organisations
   1. Members
   2. Terms of reference

E. National institutions
   1. National libraries
   2. National archives
   3. National information centres

F. Depository collections

G. Important bibliographical publications
   1. General bibliographies and catalogues
   2. Bibliographies of special subjects
   3. Abstracts and indexes
   4. Union catalogues

H. Information centres and their services
   1. General information centres
   2. Specialised information centres
   3. Data centres
   4. Referral centres
   5. Translation centres
   6. Local information units

I. Kinds of library and information services available in the nation

J. Information users

K. Mechanised methods being used

L. Methods of communication in use in interlending

M. Cooperation among library and information institutions

N. Network development
O. Research and development in information work

P. Training for information specialists

Q. Main difficulties

R. Current planning

The "basic statistical data" and the "introductory survey" provided for each country include economic development, education\(^1\) and other relevant information. The major sources used are listed below:


\(^1\) The "no. of students enrolled in 3rd level" in "Education" refers to the number of students of all institutions of education at the third level, i.e., degree-granting and non degree-granting institutions of higher education of all types.
### 3.2.1 Brazil

#### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population</td>
<td>70</td>
<td>52,341</td>
</tr>
<tr>
<td>2. Surface area (km²)</td>
<td>70</td>
<td>8,512,000</td>
</tr>
<tr>
<td>3. Density of population (to 1 km²)</td>
<td>75</td>
<td>13</td>
</tr>
<tr>
<td>4. Per capita gross domestic product (in U.S. dollars)</td>
<td>73</td>
<td>774</td>
</tr>
<tr>
<td>5. Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of students enrolled in 1st level</td>
<td>72</td>
<td>14,082,000</td>
</tr>
<tr>
<td>No. of students enrolled in 2nd level</td>
<td>73</td>
<td>1,476,000</td>
</tr>
<tr>
<td>No. of students enrolled in 3rd level</td>
<td>74</td>
<td>955,000</td>
</tr>
<tr>
<td>Adult illiteracy rate (7)</td>
<td>70</td>
<td>32</td>
</tr>
<tr>
<td>6. Libraries and their holdings by type of library</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of libraries</td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td>No. of volumes (1,000)</td>
<td>71</td>
<td>2,563</td>
</tr>
<tr>
<td>Institution of higher education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of libraries</td>
<td>71</td>
<td>437</td>
</tr>
<tr>
<td>No. of volumes (1,000)</td>
<td>71</td>
<td>6,192</td>
</tr>
<tr>
<td>School</td>
<td></td>
<td></td>
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<tr>
<td>No. of libraries</td>
<td>71</td>
<td>5,407</td>
</tr>
<tr>
<td>No. of volumes (1,000)</td>
<td></td>
<td>...</td>
</tr>
<tr>
<td>Special</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of libraries</td>
<td>71</td>
<td>868</td>
</tr>
<tr>
<td>No. of volumes (1,000)</td>
<td>71</td>
<td>4,758</td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of libraries</td>
<td>71</td>
<td>3,035</td>
</tr>
<tr>
<td>No. of volumes (1,000)</td>
<td>71</td>
<td>9,275</td>
</tr>
<tr>
<td>7. Book production per year (no. of titles)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total no. of titles</td>
<td>73</td>
<td>9,948</td>
</tr>
<tr>
<td>Generalities</td>
<td>73</td>
<td>1,191</td>
</tr>
<tr>
<td>Humanities</td>
<td>73</td>
<td>4,033</td>
</tr>
<tr>
<td>Social sciences</td>
<td>73</td>
<td>2,970</td>
</tr>
<tr>
<td>Pure and applied sciences</td>
<td>73</td>
<td>1,754</td>
</tr>
<tr>
<td>8. Journals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total no. of titles</td>
<td>73</td>
<td>991</td>
</tr>
<tr>
<td>Pure and applied sciences</td>
<td>73</td>
<td>188</td>
</tr>
<tr>
<td>Category</td>
<td>Year</td>
<td>Data</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------</td>
<td>--------------------</td>
</tr>
<tr>
<td>9. Scientific and technical manpower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td>73</td>
<td>1,718,822</td>
</tr>
<tr>
<td>Scientists and engineers: total stock</td>
<td>73</td>
<td>541,328</td>
</tr>
<tr>
<td>Engaged in R. &amp; D.</td>
<td>70</td>
<td>7,725</td>
</tr>
<tr>
<td>Technicians: total stock</td>
<td>70</td>
<td>1,177,494</td>
</tr>
<tr>
<td>Engaged in R. &amp; D.</td>
<td>74</td>
<td>13,200</td>
</tr>
<tr>
<td>10. Research and development (personnel by field of science)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td>74</td>
<td>7,725</td>
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<tr>
<td>Natural sciences</td>
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<td>3,660</td>
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<tr>
<td>Engineering and technology</td>
<td>74</td>
<td>1,088</td>
</tr>
<tr>
<td>Medical sciences</td>
<td>74</td>
<td>818</td>
</tr>
<tr>
<td>Agriculture</td>
<td>74</td>
<td>785</td>
</tr>
<tr>
<td>Social sciences and humanities</td>
<td>74</td>
<td>1,374</td>
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<td>11. Research and development (personnel by sector of performance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All sectors</td>
<td>74</td>
<td>7,725</td>
</tr>
<tr>
<td>Production sector</td>
<td>74</td>
<td>1,051</td>
</tr>
<tr>
<td>Higher education</td>
<td>74</td>
<td>4,627</td>
</tr>
<tr>
<td>General service</td>
<td>74</td>
<td>2,047</td>
</tr>
<tr>
<td>12. Selected indicators of scientific and technological development</td>
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<td></td>
</tr>
<tr>
<td>Scientists and engineers: total stock</td>
<td>74</td>
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<tr>
<td>Scientists and engineers per 10,000 population</td>
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<td>No. of technicians per scientist and engineer</td>
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</tr>
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<td>Scientists and engineers: engaged in R. &amp; D.</td>
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</tr>
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<td>Scientists and engineers per 10,000 population</td>
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<td>1.3</td>
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<td>Technicians per 10,000 population</td>
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<td></td>
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<tr>
<td>No. of technicians per scientist and engineer</td>
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<td>1.7</td>
</tr>
<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>74</td>
<td>0.3</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

General Ernesto Geisel, chosen by an electoral college as President, took office in March 1974. In the congressional election held later in the same year the opposition party, the MDB, made sweeping gains and calls were made for an end to military government. General Geisel has expressed his intention to re-establish stable democratic institutions.

2. Government

Brazil is a federal republic comprising 21 States, four Territories and a Federal District. Legislative power is exercised by the bicameral National Congress. Executive power is exercised by the President. He appoints and leads the Cabinet. Each State has an appointed Governor and an elected legislature.

3. Economic Development

Agricultural production provides a large proportion of Brazil's export earnings, the principal export crops being coffee, sugar and soya beans. Since the early 1960s increased emphasis has been laid for in industrial development, and manufacturing accounted for over 20 per cent of Brazil's G.D.P. in 1974. The second Five-Year Development Plan (1975-79) aimed at an average growth rate of 9.9 per cent, improved social welfare and massive investment in industry, energy, transport and education.

4. Social Welfare

In 1960 the social security system was rationalised and all employees are expected to comply with uniform social security regulations. Social benefits include pensions, sickness and maternity benefits and unemployment insurance.

5. Education

Education is free in official primary schools and compulsory between the ages of 7 and 15. The Federal Government is responsible for higher education, and there are 63 universities and 740 other institutions of higher education.
C. Government Authorities Responsible for Information Services

The Conselho Nacional de Desenvolvimento Cientifico e Tecnologico (CNDCT) is responsible for the nation's information services. The responsibility for library services is shared by the Federal and State governments. For example, the Federal Ministry of Education and Culture is responsible for the National Library and the libraries of institutions of higher education, and the State Departments of Education and Culture for their municipal and school libraries.

D. Central Information Coordinating Organisations

The national information coordinating body in Brazil is the Coordinating Council for the National Information System, a committee of the CNDCT.

1. Members

The Coordinating Council is composed of the representatives of:
(a) Instituto Brasileiro de Informacao em Ciencia e Tecnologia, (b) Ministries of Foreign Affairs, Industry and Commerce, Agriculture, Mines and Energy, and Planning, and (c) the CNDCT.

2. Terms of Reference

The Coordinating Council is charged with the following terms of reference:

(a) To develop and activate a national information network.
(b) To coordinate the activities of the components of the national network.
(c) To propose to the government guidelines of national policies in the area of information services.
(d) To represent Brazil in international organisations dealing with information.

E. National Institutions

1. National Libraries

The Biblioteca Nacional do Rio de Janeiro founded in 1810 is the national library of Brazil. The library is one of the three depositories for Brazilian publications. Its major tasks and functions are as follows:
(a) Central collection of the nation's literature.
(b) Legal depository for Brazilian publications.
(c) Comprehensive coverage of foreign literature.
(d) International exchange service.
(e) Technical advice and assistance to the nation's libraries of all kinds.
(f) Planning the nation's library services.

Unfortunately, the library has apparently been left out of the CNDCT's original plan for the National Information System mentioned above. Efforts are being made to correct this oversight.

2. National Archives

The Arquivo Nacional (Rio de Janeiro) is the Brazilian national archives. It was founded in 1838 and has preserved administrative and historical documents deriving from various organs of the Federal government and private institutions, and made these documents available to government and private researchers.

3. National Information Centres

The Instituto Brasileiro de Informacao em Ciencia e Tecnologia (IBICT) in Rio de Janeiro, originally known as the Instituto Brasileiro de Bibliografia e Documentacao (IBBD), is the Brazilian national information centre. The IBICT was founded in 1954 as a dependent organ to the Conselho Nacional de Pesquisas (now CNDCT), which was directly under the authority of the President of the Republic. Its major function is to gather, organise, print and distribute bibliographies in the physical and social sciences. Other tasks and functions are given below:

(a) Registering of domestic R. and D. results.
(b) Processing of the world's information material.
(c) Reprographic services.
(d) Referral services.
(e) Translation service.
(f) Organisation of advanced training courses for information
specialists.

(g) Current awareness services.

(h) Advice and assistance to other information centres.

(i) Encouragement of exchange between information centres.

(j) Information analysis.

F. Depository Collections

Legal deposit has been extended. At present there are three depository libraries for Brazilian copyright copies: the Biblioteca Nacional do Rio de Janeiro, the Instituto Nacional do Livro, and the IBICT.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

   (a) Bibliografia Brasileira Mensal, published monthly by the Instituto Nacional do Livro.

   (b) List of Brazilian Periodicals in Science and Technology, published by the IBICT.

2. Bibliographies of Special Subjects

   The IBICT publishes a series of national bibliographies of special subjects, e.g., Bibliografia Brasileira de Fisica and Bibliografia Brasileira de Medicina.

3. Abstracts and Indexes


4. Union Catalogues

   (a) The National Union Catalogue, published by the IBICT.

   (b) The Union Catalogue of Periodicals, published by the IBICT.

H. Information Centres and Their Services

1. General Information Centres

   The widest range of information services is provided by the IBICT. Less but comparatively wide range of services is rendered by the
following centres:

(a) Centro de Documentacao e Informacao da Camara dos Deputados (Brasilia). The centre founded in 1971 covers all fields, in particular, social sciences.

(b) Divisao de Documentacao da Reitoria da Universidade de Sao Paulo. The division founded in 1946 covers all fields, particularly, science and technology. Bibliographies in Portuguese and reprographic services are provided on request.

2. Specialised Information Centres

Some of the major specialised information centres in Brazil are listed below:

(a) Centro Nacional de Informacao Cientifica em Microbiologia (Rio de Janeiro).

(b) Instituto Astronomico e Geofisico da Universidade de Sao Paulo (Sao Paulo).

(c) Instituto Butantan, Biblioteca (Sao Paulo).

(d) Instituto Oceanografico da Universidade de Sao Paulo, Divisao de Informacao e Documentacao Cientifica (Sao Paulo).

(e) Centro Brasileiro de Pesquisas Educacionalis, Biblioteca (Rio de Janeiro).

(f) Instituto Brasileiro do Cafe, Biblioteca (Rio de Janeiro).

3. Data Centres

Scientific, engineering, industrial and socio-economic data are extensively collected, processed and provided by the IBICT. In fact, "the major present activities of the IBICT are carried out through its Data Bank ..." (158).

4. Referral Centres

The IBICT provides referral service on a limited scale through its published directories of research institutes, research in progress, scientists in physics and chemistry, and special libraries in Brazil.

5. Translation Centres
There is no information institution in Brazil that provides translation service on a nation-wide scale. However, the IBICT and the Centro Nacional de Informacao Cientifica em Microbiologia provide limited ranges of translation service by giving the user a panel of extramural translators with specialist knowledge and linguistic qualifications. 1,684 titles of Portuguese translations of foreign works were published in 1973.

6. Local Information Units

There are 210 local information departments established in the scientific, industrial and other organisations in the country.

I. Kinds of Library and Information Services Available in the Nation.

The following services and publications are available in Brazil:

(a) National union catalogues.
(b) Reference service.
(c) National and international exchange of documents.
(d) Translation service (on a limited scale).
(e) Reprographic services.
(f) Referral services.
(g) Current awareness services.
(h) Literature searches.
(i) Collections of patents.
(j) Collections of standards.

J. Information Users

According to the questionnaire respondent's view, great demand in Brazil for information services arises out of the research and development institutes, followed by the higher educational institutions, industrial organisations, government departments and agencies, and general public, in that decreasing order.

K. Mechanised Methods Being used

Library or information work has been partially computerised in the IBICT and four other libraries. The Filmorex system is used for biblio-
graphical searches in the Centro Nacional de Informação Científica em Microbiologia and the IBICT.

L. Methods of Communication in Use in Interlending

Communication used in interlending depends on the postal service. Telex is not yet in use in any Brazilian library or information centre.

M. Cooperation among Library and Information Institutions

The National Union Catalogue compiled by the IBICT facilitates interlending by providing information on the stocks of over 500 Brazilian specialised libraries. At present there is one active interlending cooperative in Brazil. The Biblioteca Especializadas Brasileiras published by the IBICT gives a list of its participating libraries.

N. Network Development

To supply the information requested by research workers with the least possible delay, 12 regional centres for bibliographical information have been set up. The regional centres, many associated with the universities, form a national bibliographical network, together with the IBICT. The framework for information networks in Brazil is formulated through laws and decrees. Most recently, a federal decree has been submitted for Presidential signature on a national information network (SNICT). The SNICT as formulated is not a single system—it is a network which consists of numerous independent specialised information systems. The philosophy behind this is coordination, not a centralisation.

O. Research and Development in Information Work

There is no institution in Brazil responsible for nation-wide coordination of pure and applied research in information science. Research related to educational programmes is conducted at the IBICT and library schools.

P. Training for Information Specialists

Besides the courses organised by the IBICT there are no separate courses in information science in Brazil. The subject is, however,
taught in library schools. There are 14 library schools in the country: 12 schools in universities, two independent. They provide training in library and information work. Information science is one among the disciplines that all library schools are obliged to teach since 1962.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Brazil are shortage of qualified information specialists and lack of user education.

R. Current Planning

Current planning and important projects for the near future in information services are: implementation of the plan for the SNICT and expansion of the present function of the Instituto Nacional do Livro.
### 3.2.2 Colombia

#### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population (1,000)</td>
<td>73</td>
<td>22,500</td>
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<tr>
<td>2. Surface area (km²)</td>
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<tr>
<td>3. Density of population (to 1 km²)</td>
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<td>20</td>
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<tr>
<td>4. Per capita gross domestic product (in U.S. dollars)</td>
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<td>577</td>
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<tr>
<td>5. Education</td>
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<tr>
<td>No. of students enrolled in 1st level</td>
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<td>3,792,000</td>
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<tr>
<td>No. of students enrolled in 2nd level</td>
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<td>No. of students enrolled in 3rd level</td>
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<td>Adult illiteracy rate (%)</td>
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<td>National</td>
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<td>Institution of higher education</td>
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<td>No. of volumes (1,000)</td>
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<td>No. of volumes (1,000)</td>
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<td>7. Book production per year (no. of titles)</td>
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<td>Social sciences</td>
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<tr>
<td>Pure and applied sciences</td>
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<td>112</td>
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<td>8. Journals</td>
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<tr>
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<td>Pure and applied sciences</td>
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<td>Category</td>
<td>Year</td>
<td>Data</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>9. Scientific and technical manpower</td>
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<td></td>
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<tr>
<td>Total number</td>
<td>71</td>
<td>441,433</td>
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<tr>
<td>Scientists and engineers</td>
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<td>Total stock</td>
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<tr>
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<td>1,140</td>
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<tr>
<td>Technicians</td>
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<td>Total stock</td>
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<td>10. Research and development (personnel by field of science)</td>
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<tr>
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<td>Engineering and technology</td>
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<td>Medical sciences</td>
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<tr>
<td>Agriculture</td>
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<td>348</td>
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<tr>
<td>Social sciences and humanities</td>
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<td>323</td>
</tr>
<tr>
<td>11. Research and development (personnel by sector of performance)</td>
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<td></td>
</tr>
<tr>
<td>All sectors</td>
<td>71</td>
<td>1,140</td>
</tr>
<tr>
<td>Production sector</td>
<td>71</td>
<td>239</td>
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<tr>
<td>Higher education</td>
<td>71</td>
<td>285</td>
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<td>General service</td>
<td>71</td>
<td>616</td>
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<td>12. Selected indicators of scientific and technological development</td>
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<td></td>
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<tr>
<td>Scientists and engineers: total stock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists and engineers per 10,000 population</td>
<td>71</td>
<td>67.7</td>
</tr>
<tr>
<td>Technicians per 10,000 population</td>
<td>71</td>
<td>131.0</td>
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<tr>
<td>No. of technicians per scientist and engineer</td>
<td>71</td>
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<td>Scientists and engineers: engaged in R. &amp; D.</td>
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<tr>
<td>Scientists and engineers per 10,000 population</td>
<td>71</td>
<td>0.5</td>
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<td>Technicians per 10,000 population</td>
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<td>No. of technicians per scientist and engineer</td>
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<td>0.4</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>71</td>
<td>0.1</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

A state of siege was announced in June 1975. Throughout 1976 there was serious civil unrest and intensified guerrilla activity. The state of siege was lifted in June 1976 but reimposed in October of the same year.

2. Government

Executive power is exercised by the President (assisted by a Cabinet) who is elected for a four-year term by universal adult suffrage. Legislation is carried out by the Congress, consisting of the Senate and the House of Representatives.

3. Economic Development

The economy depends principally on coffee, of which Colombia is the world’s second largest producer and accounted for 45 per cent of export earnings in 1976. Industrial growth slowed in the mid-1970s and the world recession affected textile exports which are the country’s second major currency earner.

4. Social Welfare

There is compulsory social security paid for by the Government, employers and employees, and administered by the Institute of Social Security. It provides benefits for disability, old age, death, sickness, maternity and unemployment.

5. Education

Elementary education is free and compulsory for five years. There are 21 public and 17 private universities.

C. Government Authorities Responsible for Information Services

The Fondo Colombiano de Investigaciones Científicas y Proyectos Especiales "Francisco Jose de Caldas" (COLCIENCIAS) is responsible for the nation’s information services. The Ministry of Education and the Instituto Colombiano de Cultura (COLCULTURA) share the major part of the responsibility for the library services. The former is responsible for the national
library and the school and university libraries, and the latter for the public library service.

D. Central Information Coordinating Organisations

It is a function of the COLCIENCIAS to ensure the adequate dissemination and use of scientific information. In 1970 the COLCIENCIAS launched a programme for a national information service network which it has since coordinated and developed. In 1973 a government decree stipulated that the national information service network was a national programme the objective of which was to make available to the nation the resources in information, bibliographies and documents existing in Colombia.

1. Members

The COLCIENCIAS has a Board of Directors composed of representatives of: (a) research organisations, (b) libraries, (c) information centres, and (d) institutions of higher education.

2. Terms of Reference

The COLCIENCIAS is authorised as follows:

(a) To establish a national network of libraries and information centres.

(b) To make recommendations on information policy to the government so as to provide it with a basis for information policies.

(c) To initiate and coordinate national planning and development of information programmes.

(d) To participate in, and promote, international cooperation on information matters.

E. National Institutions

1. National Libraries

The Biblioteca Nacional de Colombia (Bogota) was founded in 1777. The library is the legal depository for Colombian publications and for those of the international organisations. Its major tasks and functions are summarised below:
(a) Central collection of the nation's literature.
(b) Legal depository for Colombian publications.
(c) Depository for publications from international organisations.
(d) National bibliographical information centre (partially).
(e) Centre for the nation's international exchange service.

2. National Archives
The Archivo Nacional de Colombia (Bogota) was founded in 1868 and publishes reviews, indexes and series of historical documents.

3. National Information Centres
Colombia has no large-scale information centre that is designed to provide a full range of information services on a national scale. The services of such a centre are covered through the work of the nation's several specialised information services including the Documentation and Information Centre of the Industrial University of Santander (Bucaramanga) and the Institute for Technological Research (Bogota).

F. Depository Collections
There are three depository libraries for the books published in Colombia: the Biblioteca Nacional de Colombia, the Biblioteca Central de la Universidad Nacional de Colombia, and the Instituto Caro y Cuervo (Bogota). The last mentioned is an institute for Hispanic philology and literature.

G. Important Bibliographical Publications
1. General Bibliographies and Catalogues
   (a) Anuario Bibliografico Colombiano, published by the Instituto Caro y Cuervo.
   (b) Bibliografia Oficial Colombiana, published by the Inter-American School of Librarianship of the University of Antioquia

2. Bibliographies of Special Subjects
   (a) Boletin Bibliografico e Informativo, published quarterly by the National Institute of Geology and Mining Survey.
   (b) Bibliografia de la Educacion en Colombia, published in 1977
by the Instituto Caro y Cuervo.

3. Abstracts and Indexes

Indice Colombiano de Educacion 1905-1973, published in 1974 by the Inter-American School of Librarianship of the University of Antioquia.

4. Union Catalogues

National Inventory of Information Resources and Services of Public Libraries, published in 1977 by the COLCULTURA.

H. Information Centres and Their Services

1. General Information Centres

There are not many organisations in Colombia that are self-described as "information centres" although many special libraries and information services practically perform the functions of an information centre.

2. Specialised Information Centres

There are four important specialised information centres of national character. These are:

(a) Office of Information, which organises a data bank and a network for agricultural statistical information.

(b) Colombian Chamber of Construction, which provides information services in the fields of engineering, architecture and construction.

(c) Institute for Technological Research, which provides nation-wide information services in food industry, metallurgical and metal-mechanical industries, and agricultural and chemical process industries.

(d) National Institute of Geology and Mining Survey, which provides nation-wide information services in hydrogeology, photogeology, paleontology, geochemistry and petrology.

3. Data Centres

At present there is no institution concentrating on the
collection and processing of data.

4. Referral Centres

Limited referral services are provided by some specialised information services through their published directories such as these:

(a) Directorio de la Industria de la Construccion en Antioquia, published by the Colombian Chamber of Construction.

(b) Directorio del Sector Agropecuario, published by the Office of Information.

5. Translation Centres

Translation service is provided on a limited scale by the Documentation and Information Centre of the Industrial University of Santander, and the Institute for Technological Research. 15 titles of Spanish translations of foreign works were published in Colombia in 1973.

6. Local Information Units

The number of the local information departments is unknown.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services and publications are available:

(a) A national union catalogue.

(b) Reference service.

(c) International exchange of material.

(d) Translation service (on a limited scale).

(e) Literature searches.

(f) Referral services.

(g) Reprographic services.

(h) Current awareness services.

J. Information Users

According to the questionnaire respondents' view, great demand in Colombia for information services arises out of the research and development institutes, higher educational institutions, industrial organisations, and government departments and agencies, in that decreasing order.
K. Mechanised Methods Being Used

Library work has been partially computerised in the libraries of the University of the Andes (Bogota), the Francisco University of Paula Santander (Cucuta), and the Industrial University of Santander (Bucaramanga).

L. Methods of Communication in Use in Interlending

The postal service is almost exclusively used in interlending.

M. Cooperation among Library and Information Institutions

Cooperation among institutions has not been organised but operates informally.

N. Network Development

There is as yet no information network evolving in Colombia.

O. Research and Development in Information Work

There is no institute devoted to research and development in information work. Research related to educational programmes is conducted at schools of information science and of librarianship.

P. Training for Information Specialists

The Universidad Social Catolica de la Salle (Bogota) offers a full range of degree courses in information science. Library schools are established in three higher educational institutions.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Colombia are:

(a) Lack of a national information policy.
(b) Insufficient funds.
(c) Lack of coordination and cooperation.
(d) Lack of a national information centre.

R. Current Planning

Current planning and important projects for the near future in information services are: (a) establishing of a national information centre, and (b) compilation of a union list of periodicals held by Colombian libraries and information centres.
### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
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<td>8. Journals Total no. of titles</td>
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<td><strong>9. Scientific and technical manpower</strong></td>
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<td>83</td>
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<td>Scientists and engineers: total stock</td>
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<td>Technicians per 10,000 population</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
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<td>...</td>
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</tbody>
</table>
B. Introductory Survey

1. Recent History

Hong Kong is a British dependent territory which lies off the south coast of China and consists of the island of Hong Kong, the Kowloon Peninsula and the New Territories. Hong Kong was temporarily occupied by Japan during the Second World War, but the British Government was reestablished in 1945.

2. Government

The colony is administered by the Governor, the Executive Council of five ex officio members and eight others, and the Legislative Council of four ex officio Executive Council members, 18 other official members and 22 unofficial members.

3. Economic Development

Hong Kong is a free trade area and one of the principal entrepot ports of the world. Manufactured goods, particularly textiles and electrical goods, provide three-quarters of total export earnings. Commerce plays an important part in the economy of Hong Kong.

4. Social Welfare

The Social Welfare Department initiated a scheme of five-year development programmes in 1973. It is not a comprehensive system, for instance, there is no unemployment benefit.

5. Education

Since 1965, with the doubling of free places in primary schools, every child is ensured a primary education. There are three government-run teacher-training colleges. Two universities have a combined enrollment of over 7,000 students.

C. Government Authorities Responsible for Information Services

There is no one government department with total responsibility for the library and information services, although the Department of Education and the Urban Council have major interests.

D. Central Information Coordinating Organisations
No central coordinating element for information services exists as yet in Hong Kong.

E. National Institutions

The directory reveals that Hong Kong lacks two of the important elements in the structure of an information service—a national library and a national information centre. This is not surprising, for the population of Hong Kong is relatively small and Hong Kong is not a nation. It is inevitable, therefore, that the Urban Council Public Libraries would have to take over some of the responsibilities of a national library and of a national information centre.

F. Depository Collections

The British Library and the Urban Council Public Libraries are the two major legal deposit libraries. Others are the University of Hong Kong Library and the Chinese University of Hong Kong Library. One copy of all books published in Hong Kong is forwarded to the British Library and to the Urban Council Public Libraries, and one copy of books in English goes to the University of Hong Kong Library and one copy of books in Chinese to the Chinese University of Hong Kong Library.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues
   (a) Catalogue of Books Printed in Hong Kong, published quarterly in the Hong Kong Government Gazette as its Special Supplement No. 4.
   (b) Hong Kong List of Government Publications, published by the Government Press.

2. Bibliographies of Special Subjects
   (a) Hong Kong: a Social Sciences Bibliography, published by the Centre of Asian Studies, University of Hong Kong.
   (b) Hong Kong Contributions to Published Literature on Medical and Related Subjects, published by the Federation of Medical Societies of Hong Kong.
3. Abstracts and Indexes

Index to Collections of Learned Writings on Chinese Studies by Modern Scholars, compiled by Y.K. Hung and L.S. Tim.

4. Union Catalogues

Hong Kong Catalogue: Works Relating to Hong Kong in Hong Kong Libraries, published by the University of Hong Kong.

H. Information Centres and Their Services

1. General Information Centres

There is at present no general information centre in Hong Kong. In the absence of such centralised information facilities, some major organisations in Hong Kong responsible for promoting local science, industry and trade, and the institutions of higher education attempt to fill the vacuum as far as their limited resources permit. In order to assist industry in raising productivity, the Hong Kong Productivity Centre collects and disseminates information on modern industrial methods and processes. The Centre's Technical Reference Library is specifically designed to reinforce and supplement other technical information services available in Hong Kong. As mentioned above, the Urban Council Public Libraries have taken an important role in the information services to the scientific, industrial and trading communities in Hong Kong.

2. Specialised Information Centres

The Asian Packaging Information Centre established in 1976 is the only specialised information centre in Hong Kong.

3. Data Centres

A Heavy Machinery and Light Equipment Data Bank is maintained by the Hong Kong Productivity Centre. This data bank contains catalogues and technical specifications of both local and imported machinery and equipment.

4. Referral Centres

Referral services are limited in Hong Kong. The only service of such kind is provided by the Centre of Asian Studies of the University of
Hong Kong through its published *Directory of Current Hong Kong Research on Asian Topics* (131).

5. Translation Centres

Translation service of limited range is provided by the Federation of Hong Kong Industries and the Hong Kong Productivity Centre. These two organisations prepare translations on their own initiatives and on request from English to Chinese and vice versa.

6. Local Information Units

There are 21 local information departments established in the scientific, industrial and other organisations in Hong Kong.

I. Kinds of Library and Information Services Available in the Nation.

At present the following kinds of library and information services are available in Hong Kong:

(a) Union Catalogues.
(b) Reference service.
(c) National and international exchange of documents.
(d) Reprographic services.
(e) Collections of standards.
(f) Industrial data.

J. Information Users

According to the respondents' opinion, great demand in Hong Kong for information services arises out of the industrial organisations, followed by trading houses, research and development institutes, higher educational institutions, government departments and agencies, and general public, in that decreasing order.

K. Mechanised Methods Being Used

In two academic libraries mechanised methods are partially applied to library work. One is the University of Hong Kong Library and the other the Hong Kong Polytechnic Library.

L. Methods of Communication in Use in Interlending
The postal service.

M. Cooperation among Library and Information Institutions

While individual library and information services are improving rapidly in Hong Kong, there is minimal cooperation except between the three main academic libraries (as one group) and the Urban Council Public Libraries and other government libraries (as another group). The librarians of the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong Polytechnic formed a Joint Committee of Chief Librarians of Institutions of Higher Education in 1975 to make their cooperative plans and action programmes.

N. Network Development

There is as yet no information network evolving in Hong Kong.

O. Research and Development in Information Work

Research and development in information work is limited.

P. Training for Information Specialists

There is no institution for training of information specialists. Most information workers are trained in the United Kingdom and in the United States.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Hong Kong are: lack of information policy, insufficient funds, and shortage of qualified information workers.

R. Current Planning

Current planning and important projects for the near future in information services are: (a) establishing of a central information service, (b) compilation of a comprehensive union catalogue, (c) computerisation of library work in two more libraries, and (d) expansion of public library service.
### Iran

#### A. Basic Statistical Data

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</tbody>
</table>
B. Introductory Survey

1. Recent History

The Empire of Iran, called Persia until 1935, adopted its first constitution in 1906. Since 1965 Iran has enjoyed continued political stability and considerable economic growth. There was serious civil unrest throughout 1978, which culminated in the establishment of the Islamic Republic of Iran in 1979.

2. Government

Iran is divided into 21 provinces, administered by Governors-General nominated by the Minister of the Interior.

3. Economic Development

Iran is one of the world's leading oil producers and the massive oil revenues have been instrumental in developing the rest of the economy. Although the industry now predominates over agriculture in the formation of the gross national product, the majority of the Iranian people are engaged in agriculture.

4. Social Welfare

The education, health and social welfare of the poorer classes have recently been improved. National service draftees with medical experience have been formed into a Health Corps, bringing medical assistance to outlying areas of the country.

5. Education

Primary education is free and compulsory for both sexes, but this has not been fully implemented in rural areas. There are ten universities.

C. Government Authorities Responsible for Information Services

The Ministry of Science and Higher Education is responsible for the information services in Iran. There is no single government authority with total responsibility for the library services. Public libraries are under the authority of the Ministry of Culture and Fine Arts, while others are
subordinated to the Prime Minister, and the Ministries of Education, of Science and Higher Education, and of the Interior.

D. Central Information Coordinating Organisations

The constitution of the National Committee for Information Services was approved by the Iranian Government in 1973.

1. Members

The Ministries and governmental and nongovernmental institutions represented in the National Committee are: (a) Association of Scientific Societies, (b) Iranian Documentation Centre, (c) Iranian Library Association, (d) Iranian National Archives Organisation, (e) Ministries of Culture and Fine Arts, of Education, of Foreign Affairs, of Information, of Post, Telegraph and Telephone, and of Science and Higher Education, (f) Iranian National Commission for Unesco, (g) National Iranian Oil Company, (h) National Iranian Radio and Television, and (i) Plan Organisation.

2. Terms of Reference

The National Committee is authorised as follows:

(a) To make necessary surveys in order to identify needs of Iranian research and industrial institutions to scientific and technical information.

(b) To cooperate with interested institutions in making a national policy on scientific and technical information.

(c) To coordinate the work of the existing scientific and technical information services in Iran in order to facilitate exchange of information between themselves and with foreign institutions.

E. National Institutions

1. National Libraries

The National Library (Tehran) founded in 1935 aims at collecting all books published in Iran, but has difficulty in ensuring complete coverage, as books published in the provinces were not deposited directly
in it. Its tasks and functions include:

(a) Central collection of the nation's literature.
(b) Receiving books under legal deposit.
(c) National bibliographical information centre.
(d) International exchange service.
(e) Bibliographical advice and assistance to the nation's libraries of all kinds (on a limited basis).

2. National Archives

The National Archives Centre (Tehran) was set up in 1970. Each Ministry or governmental department has its own archives centre and is obliged by special regulations to send its documents to the National Archives Centre.

3. National Information Centres

The Iranian Documentation Centre (IRANDOC) in Tehran is the national information centre of Iran. It was established in 1969 as part of the Institute for Research and Planning in Science and Education of the Ministry of Science and Higher Education. While functionally separate, the IRANDOC cooperates very closely with the Tehran Book Processing Centre (TEBROC), which is also part of the Institute for Research and Planning in Science and Education, in all aspects of library and information work. The IRANDOC is a modern information centre covering the subject areas of social sciences, science and technology. The basic functions of the IRANDOC are as follows:

(a) Registering domestic R. and D. results.
(b) Publication of abstracts and indexes.
(c) Reprographic services.
(d) Referral services.
(e) Translation service.
(f) Literature searches.
(g) Current awareness services.
(h) State-of-the-art studies.
(i) Encouraging cooperation and coordination among Iran's research and special libraries and information centres.

F. Depository Collections

There are three depository libraries: the National Library (Tehran), the Fars National Library (Shiraz) and the Pahlavi Library (Tehran).

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues
   (a) National Bibliography, Iranian Publications, published by the National Library.
   (b) Directory of Iranian Periodicals, published by the IRANDOC.

2. Bibliographies of Special Subjects
   (a) Land Reform and Rural Economy in Iran, published by the IRANDOC.
   (b) Bibliography of Persian Law Books, published by the IRANDOC.

3. Abstracts and Indexes
   (a) Irandoc Science and Social Science Abstracting Bulletin, published by the IRANDOC.
   (b) Contents Pages, published by the IRANDOC.

4. Union Catalogues
   Iranian National Union List of Serials, published by the IRANDOC.

H. Information Centres and Their Services

1. General Information Centres
   The IRANDOC is the only general information centre in Iran that provides nation-wide information services in all fields.

2. Specialised Information Centres
   Some major specialised information centres are listed below:
   (a) Central Library and Documentation Centre of the Tehran University.
   (b) Documentation and Technical Records Centre of the Plan and
Budget Organisation.

(c) Library and Documentation Centre of the Ministry of Economics.

(d) Technical Documentation Centre of the Institute of Standards and Industrial Research of Iran.

(e) Technical Information Centre of the National Iranian Oil Company.

(e) Technical Documentation Department of the National Petrochemical Company.

3. Data Centres

At present there is no institution self-described as "data centre" although the IRANDOC and the Archives of the Statistical Centre of Iran collect and process extensive data.

4. Referral Centres

The IRANDOC provides referral services on a limited scale through its published directories: The Directory of Iranian Libraries, and The Directory of Iranian Periodicals.

5. Translation Centres

The IRANDOC publication Department provides an ad hoc translating service. The Technical Documentation Department of the National Petrochemical Company prepares translations requested by the experts of the petrochemical companies in Iran. 200 titles of translations of foreign works were published in 1973.

6. Local Information Units

Data for the local information units are not available.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services and publications are available:

(a) National union catalogues.

(b) Reference service.

(c) International exchange of material.
(d) Translation service.
(e) Reprographic services.
(f) Collections of standards.
(g) Referral services.
(h) Current awareness services.
(i) Literature searches.
(j) State-of-the-art reviews.

J. Information Users

Great demand in Iran for information services arises out of the research and development institutes, industrial organisations, higher educational institutions, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used

There is as yet no application of computerised methods to library and information work in Iran.

L. Methods of Communication in Use in Interlending

The postal service.

M. Cooperation among Library and Information Institutions

An interlibrary lending cooperative has been initiated and administered by the IRANDOC, in which 60 libraries now participate. An example of efficient interlibrary cooperation on a national scale is the services provided by the TEBRCC, a cooperative book processing centre. Contractual relations are established with institutions which need its services. Books are delivered to the library ready to circulate with catalogue and shelflist cards ready to file.

N. Network Development

No information network as yet exists in Iran. It is expected, however, that the Cultural, Scientific and Resource Centre will open its doors to the public in 1980. The Centre will be a vast complex of modern
library and information services for the whole country. The Centre is expected to develop and control Iran's future national information network.

O. Research and Development in Information Work

The TEBROC runs research on the expansion of the Dewey and LC classifications to fit Iranian materials, and makes and revises a list of Persian subject headings. Research related to educational programmes is conducted in the library schools.

P. Training for Information Specialists

There are no separate courses for information specialists in Iran. Information subjects are only taught in library schools. There are three institutions of higher education offering courses in librarianship: the University of Tehran, the Tabriz University, and the Iranian Junior College.

Q. Main Difficulties

The main difficulties with respect to the development of information services are: shortage of qualified information specialists and lack of user education.

R. Current Planning

Current planning and important projects for the near future in information services are summarised below:

(a) Establishing of the Cultural, Scientific and Resource Centre of Iran.

(b) Compilation of a national union catalogue of books.

(c) Introducing of computerised methods in library and information work.
3.2.5 Iraq

A. Basic Statistical Data

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<td>12. Selected indicators of scientific and technological development</td>
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<td>Scientists and engineers: total stock</td>
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<td>No. of technicians per scientist and engineer</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
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</table>
B. Introductory Survey

1. Recent History

A coup d'etat by the army in 1958 resulted in the assassination of King Faisal and the establishment of a republic. Iraq's withdrawal from the Baghdad Pact soon followed. In July 1973 a National Front was formed on the basis of a common programme endorsed by the Baath Party and the Iraqi Communist Party.

2. Government

Power rests with the President and a Revolutionary Command Council, which can contain up to 12 members, while the day-to-day running of the country is carried out by a Council of Ministers. The country is divided into 18 governorates.

3. Economic Development

Oil is the most important sector of the economy. Iraq is using some of its oil revenues in a programme of industrialisation, but is experiencing some difficulties with bottlenecks at the ports and shortage of skilled manpower. Over three quarters of the population still continue to depend on agriculture for their living.

4. Social Welfare

A limited Social Security Scheme was introduced in 1957 and expanded in 1976. Benefits are given for old age, sickness, unemployment, maternity, marriage and death. Health services are free.

5. Education

Education is free and primary education lasting six years is compulsory in an effort to reduce the nation's high illiteracy rate. There are six universities. Many Iraqis study abroad.

C. Government Authorities Responsible for Information Services

There is no single government authority with total central responsibility for the nation's library and information services, although four Ministries have major interests. The Ministry of Information is responsible
for the National Library, the Ministry of Education for school libraries, the Ministry of Higher Education for libraries of the institutions of higher education, and the Ministry of the Interior for municipal libraries. The other Ministries control their own libraries and information services.

D. Central Information Coordinating Organisations

The National Committee for Information Services was established in 1976 within the Foundation of Scientific Research (Baghdad) by the Revolutionary Command Council to develop and activate a national information network.

1. Members

The Committee consists of members representing: (a) the Ministries of Cultural Affairs and of the Interior, (b) research libraries, (c) industry, and (d) university teaching staff.

2. Terms of Reference

The Committee is charged with the following terms of reference:

(a) To develop a national information network.

(b) To propose long-range plans for the development of information services in Iraq.

(c) To function as the national focus for international cooperation.

E. National Institutions

1. National Libraries

The National Library (Baghdad) was founded in 1920, but an enabling act was promulgated in 1961. It is a legal depository for Iraqi publications and publishes The Iraqi National Bibliography. Its major tasks and functions are as follows:

(a) Central collection of the nation's literature.

(b) Receiving books under legal deposit.

(c) Bibliographical advice and assistance to the nation's libraries of all kinds.
2. National Archives

The National Centre of Archives (Baghdad) was founded in 1963 to conserve important government documents.

3. National Information Centres

The Iraqi Scientific Documentation Centre (Baghdad) was founded in 1972 within the Foundation of Scientific Research to provide a full range of information services, with emphasis on the fields of science and industry. The Iraqi Scientific Documentation Centre (ISDC) has published The Iraqi Scientific Guide to Papers, Reports and Studies since 1973.

The ISDC's major functions are as follows:

(a) Registering domestic R. and D. results.
(b) Processing of the world's information.
(c) Publication of indexes.
(d) Reprographic services.

F. Depository Collections

One copy of all materials published in Iraq is deposited in the National Library and in the Central Library of the University of Baghdad, and one copy of all scientific works published in the nation is deposited in the ISDC.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Iraqi National Bibliography, published by the National Library.
(b) Bibliography of Books Translated from Foreign Languages to Arabic Published in Iraq, published by the Central Library of the University of Baghdad.

2. Bibliographies of Special Subjects

(a) Bibliography of Publications Dealing with Industrial Development in Iraq Available in the Central Library of the University of Baghdad, published by the Central Library.
(b) List of Social, Economic and Educational Books on Arab World Available in the Central Library of the University of Baghdad, published by the Central Library.

3. Abstracts and Indexes

Iraqi Scientific Guide to Papers, Reports and Studies, published by the ISDC.

4. Union Catalogues

No significant union catalogue exists.

H. Information Centres and Their Services

1. General Information Centres

The ISDC provides a full range of nation-wide information services, with emphasis on the fields of science and technology. The Central Library of the University of Baghdad has also taken an important role, through its National Bibliographical Information Centre and Exchange Department, in providing nation-wide information services.

2. Specialised Information Centres

The Social Science Information Centre founded in 1977 provides nation-wide information services in economic and political science. The libraries of the following research institutes affiliated to the Foundation of Scientific Research form the nucleus of the nation's specialised information resource: the Date-Palm Research Centre, the Building Research Centre, the Biological Research Centre, the Agricultural Research Centre, the Petroleum Research Institute, and the Institute of Applied Research on Natural Resources.

3. Data Centres

The Bureau of Statistics of the Ministry of Planning collects, processes and provides socio-economic data. There is no other data centre that operates on a national scale.

4. Referral Centres

Limited referral services are provided by the Central Library of
the University of Baghdad through its directories and catalogues.

5. Translation Centres

There is no translation service at present. 23 titles of Arabic translations of foreign works were published in Iraq in 1973.

6. Local Information Units

There are 17 local information departments established in the scientific, industrial and other organisations in Iraq.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services are available in Iraq:

(a) Reference service.
(b) International exchange of documents.
(c) Reprographic services.
(d) Socio-economic data.
(e) Referral services (on a limited basis).

J. Information Users

Demand in Iraq for information services arises out of the higher educational institutions, research and development institutes, industrial organisations, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used

Bibliographical handling has been partially computerised in the following libraries:

(a) The National Library.
(b) The Central Library of the University of Baghdad.
(c) The Central Library of the University of Al-Mustansiriya.
(d) The Central Library of the University of Basrah.
(e) The Central Library of the University of Mosul.

L. Methods of Communication in Use in Interlending

Communication used in interlending exclusively depends on the postal service.
M. Cooperation among Library and Information Institutions

While individual library and information services are improving rapidly, there is only limited cooperation among libraries and information centres. Iraq lacks a union catalogue which is a rudimentary requirement of any library cooperative.

N. Network Development

There is as yet no information network evolving in this country. However, Iraq now has the National Committee for Information Services the mandate of which includes development of a national information network.

O. Research and Development in Information Work

Research in information work is limited in Iraq.

P. Training for Information Specialists

At present there are no training courses for information specialists. There are, however, courses for librarians offered by the University of Baghdad and the University of Al-Mustansiriya. The former initiated a one-year graduate programme in 1972 as a substitute for a ten-month in-service graduate programme given by its Central Library, and the latter introduced a two-year undergraduate programme, after which students are qualified for a diploma.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Iraq are: (a) lack of a national information policy, (b) shortage of qualified information personnel, and (c) lack of coordination.

R. Current Planning

Current planning and important projects for the near future in information services are: (a) establishing of a centralised technical services unit for the nation's public libraries, as a division of the Nations Library, (b) compilation of a national union catalogue, and (c) compilation of a union list of the periodical holdings of the major libraries in Iraq.
3.2.6 Kenya

A. Basic Statistical Data

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<td>Scientists and engineers per 10,000 population</td>
<td>72</td>
<td>0.5</td>
</tr>
<tr>
<td>Technicians per 10,000 population</td>
<td>72</td>
<td>0.9</td>
</tr>
<tr>
<td>No. of technicians per scientist and engineer</td>
<td>72</td>
<td>1.8</td>
</tr>
<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td></td>
<td>72</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

A former British colony and protectorate, Kenya was given internal self-government in June 1963, became independent in December 1963 and a republic one year later.

2. Government

Legislative power is vested in the unicameral National Assembly. Executive power is held by the President, directly elected for four years. He is assisted by an appointed Vice-President and Cabinet. Kenya has been a one-party State since 1969.

3. Economic Development

Kenya’s prosperity rests largely on the production and processing of agricultural and pastoral products and over two-thirds of Kenya’s population is dependent on agriculture. Manufactures and food processing accounted for about 12 per cent of gross domestic product in 1973, and industry continues to expand.

4. Social Welfare

There are State pension and welfare schemes and a National Social Security Fund has been set up. The Government runs hospitals and medical services; no fees are charged to out-patients.

5. Education

In 1973 school fees were abolished for the first four years of education. The National University in Nairobi has 5,000 students. Over 5,000 students a year study overseas.

C. Government Authorities Responsible for Information Services

There is no government authority responsible for information services. The Kenya National Library Service Board is responsible only for the nation’s library services.

D. Central Information Coordinating Organisations

It is a function of the National Council for Science and Technology
established in 1975 to promote and coordinate information activities in the nation. The powers to coordinate library services have been vested in the Kenya National Library Service Board created in 1967.

1. Members

The Kenya National Library Service Board is composed of representatives of: (a) the seven provinces, (b) Nairobi City Council, (c) University of Nairobi, and (d) five Government Ministries.

2. Terms of Reference

The Board is authorised to "start, expand and develop library services" in Kenya.

B. National Institutions

1. National Libraries

Kenya does not have a national library at present. The services of a national library are, however, partially covered through combination of those of the Macmillan Memorial Library (Nairobi), the University of Nairobi Library, and the Kenya National Library Service (Nairobi).

2. National Archives

The Kenya National Archives (Nairobi) collects and conserves important archives, mainly those connected with the history of Kenya and East Africa.

3. National Information Centres

At present there is no designated national information centre in Kenya. However, the East African Academy Research Information Centre (Nairobi) is a State institution for information services that acts as a national information centre in the field of social sciences and economic development. Its objectives are to collect and disseminate information in the social sciences with special reference to East Africa.

F. Depository Collections

The University of Nairobi Library is a national legal depository
for materials published in Kenya.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues
   (b) Books Printed in Kenya 1962-1975, to be published soon by the University of Nairobi Library.

2. Bibliographies of Special Subjects
   No separate bibliography of this kind has been compiled.

3. Abstracts and Indexes
   Kenya has no separate volume of these kinds.

4. Union Catalogues
   Union List of Periodicals for East Africa, published by the University of Nairobi Library.

H. Information Centres and Their Services

1. General Information Centres
   There is no information centre in Kenya that provides services in all fields. The State institution that provides the widest coverage of information services is the East African Academy Research Information Centre mentioned in E.

2. Specialised Information Centres
   Specialised information is provided by the following information facilities:
   (a) Coffee Research Foundation Library (Ruiru).
   (b) National Agricultural Documentation Centre (Nairobi).
   (c) East African Agriculture and Forestry Research Organisation Library (Nairobi).
   (d) National Public Health Laboratory Service (Nairobi).
   (e) Veterinary Research Laboratory (Kabete).

3. Data Centres
At present there is no data centre in Kenya. However, the International Laboratory for Research on Animal Disease collects extensive data relative to various animal diseases.

4. Referral Centres
Referral services are limited in Kenya.

5. Translation Centres
Translation service is limited. 15 titles of translations of foreign works were published in Kenya in 1973.

6. Local Information Units
The number of local information departments is unknown.

I. Kinds of Library and Information Services Available in the Nation.
At present the following services are available in Kenya:
(a) Reference service.
(b) International exchange of material.
(c) Reprographic services.
(d) Scientific and socio-economic data (on a limited scale).
(e) Interlending service (informally).

J. Information Users
According to the questionnaire respondents' view, the demand in Kenya for information services arises out of the research and development institutes, higher educational institutions, industrial organisations, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used
No application of mechanised methods to information handling has been made in Kenya.

L. Methods of Communication in Use in Interlending
The postal service.

M. Cooperation among Library and Information Institutions
Cooperation among libraries and information centres is not organised
but operates informally.

N. Network Development

There is as yet no information network evolving in Kenya. It does, however, have a library network. Kenya runs a nation-wide public library service, through the Kenya National Library Service which is essentially a public library service network with branches throughout the country.

O. Research and Development in Information Work

Research and development activities are very limited in Kenya.

P. Training for Information Specialists

There are no institutions for training in information services. At present Kenya does not have its own library school, either, but intensive use is made of the East African School of Librarianship at Kampala, Uganda.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Kenya are summarised below:

   (a) Lack of a national information policy.
   (b) Lack of a central information service.
   (c) Shortage of qualified information specialists.
   (d) Insufficient funds.

R. Current Planning

Current planning and important projects for the near future in information services include establishing of a national information centre, a national library, and a postgraduate school of librarianship attached to the University of Nairobi.
### 3.2.7 Korea

#### A. Basic Statistical Data

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### Category: Research and development (personnel by field of science)

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<td>Scientists and engineers: engaged in R. &amp; D.</td>
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<td>Scientists and engineers per 10,000 population</td>
<td>73</td>
<td>1.8</td>
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<td>Technicians per 10,000 population</td>
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<tr>
<td>No. of technicians per scientist and engineer</td>
<td>73</td>
<td>0.6</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Expenditure for R. &amp; D. as percentage of GNP (%)</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>72</td>
<td>0.3</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

Tension and rivalry between South and North culminated in the Korean War in 1950. The present armistice agreement was made in July 1953. During the war, the nation's pre-war library collections were reduced to a quarter and many priceless classical works were lost to fire.

2. Government

Executive power is held by the President, indirectly elected by the National Conference for Unification. The President governs with the assistance of an appointed State Council led by a Prime Minister. Legislative power is vested in the unicameral National Assembly.

3. Economic Development

Agriculture is the principal source of employment, with about 46 per cent of the working population engaged in agriculture and fishing in 1976. Industry is playing an increasingly large role in the economy and in 1975 the manufacturing sector accounted for 28 per cent of Korea's G.N.P.

4. Social Welfare

The Government provides social relief services for the handicapped, wounded veterans and war widows. Special grants are also given to the aged, disaster victims and orphans.

5. Education

Primary education between the ages of 6 and 12 is free and compulsory. There are 95 colleges and universities. Total college and university student enrolment in 1976 was nearly 300,000.

C. Government Authorities Responsible for Information Services

There is no one government authority with total central responsibility for the nation's library and information services, although the Ministry of Education and the Ministry of Science and Technology have major interests. The former is responsible for the library services and the
latter for the scientific and technical information services.

D. Central Information Coordinating Organisations

The national information coordinating body in Korea is the National Council for Scientific and Technical Information created in 1972 to determine the general information policy of the country and to supervise its execution.

1. Members

The Council consists of the members representing: (a) the Ministries of Cultural Affairs and Information, Defense, Education, Industry and Commerce, and Science and Technology, (b) scientific and research establishments, (c) research libraries, (d) information centres, (e) industry, and (f) institutions of higher education.

2. Terms of Reference

The Council's terms of reference are:

(a) To develop national policy on the supply of information.

(b) To coordinate the activities of the components of the national information network.

(c) To promote the establishment (in appropriate Government or independent organisations) of new information services.

(d) To participate in, and promote, international cooperation on information matters.

E. National Institutions

1. National Libraries

There are two national libraries in Korea: the National Central Library (Seoul) founded in 1925, and the National Assembly Library (Seoul) founded in 1952. Their combined national functions are summarised below:

(a) Central collection of the nation's literature.

(b) National union catalogues.

(c) Receiving books under legal deposit.

(d) National bibliographical information centre.
(e) Initiation of research on librarianship.
(f) International exchange service.
(g) Centre for professional training in librarianship.
(h) Bibliographical advice and assistance to the nation's libraries of all kinds.
(i) Planning centre for the nation's library services.

2. National Archives

The national archives centre is the Jeongbu Kirog Bojonso in Seoul, which is under the direction of the Minister of General Affairs.

3. National Information Centres

The national information centre is the Korea Scientific and Technological Information Center (KORSTIC) in Seoul. It acts as a central organisation for scientific, technical, patent and medical information services; and as a trade catalogue centre for the industrial organisations in Korea. Its functions include:

(a) Registering of domestic R. and D. results.
(b) Processing of the world's information material.
(c) Publication of abstracts and indexes.
(d) Reprographic services.
(e) Referral services.
(f) Translation service.
(g) Publication of collections of digests of articles of topical interest.
(h) Literature searches.
(i) Trade catalogues.
(j) Industrial liaison services.
(k) Current awareness services.

F. Depository Collections

Korea has two depository libraries for copyright copies: the National Central Library and the National Assembly Library.
G. Important Bibliographical Publications

1. General Bibliographies and Catalogues
   (a) Korean National Bibliography, published by the National Central Library.
   (b) Catalogue of Government Publications, published by the National Assembly Library.

2. Bibliographies of Special Subjects
   (a) Bibliography of Korean Studies, published by the Asiatic Research Center of the Korea University.
   (b) Bibliography of Scientific Publications of Korea, published annually by the KORSTIC.

3. Abstracts and Indexes
   (a) Korean Scientific Abstracts, published bimonthly by the KORSTIC.
   (b) Korean Periodicals Index, published quarterly by the National Assembly Library.

4. Union Catalogues
   (a) Union catalogue of the Foreign Books in the Korean Libraries, published by the National Central Library.
   (b) Union Catalogue of the Foreign Periodicals Held by the Major Libraries and Information Centres in Korea, published by the KORSTIC.

H. Information Centres and Their Services

1. General Information Centres
   The KORSTIC provides the most comprehensive information services in Korea. Another important institution of such kind is the Technical Library of the Korea Institute of Science and Technology (Seoul), which provides nation-wide information services in science and technology, though its primary assignment of service is to the Institute.

2. Specialised Information Centres
The Electronics Development Analysis Centre (Seoul) was established in 1969 to collect and disseminate technical information useful to Korean electronics manufacturers. The Centre's services include: (a) compilation of bibliographies, (b) literature searches, (c) translation service, (d) state-of-the-art studies, (e) reprographic services, and (f) reference service.

Other specialised information centres of national importance are:

(a) Trade Information Centre of the Bureau of Trade Promotion (Seoul).

(b) Information Processing Department of the Research Institute for Education (Seoul).

(c) Library of the Korea International Economics Institute (Seoul).

(d) Agricultural Information Centre of the Korean National Commission for FAO (Seoul).

3. Data Centres

At present there are two data centres in Korea: the Trade Data Bank of the Bureau of Trade Promotion (Seoul) and the Industrial Data Processing Unit of the National Industrial Research Institute (Seoul).

4. Referral Centres

Referral services are rendered by the KORSTIC, which publishes The On-going Research Projects in Korea and maintains the reference files of subject specialists, research institutes, equipments and information materials.

5. Translation Centres

Translations of research materials are prepared by the KORSTIC on request from English, German, French and Japanese into Korean. The Electronics Development Analysis Centre prepares translations on its own initiative from other languages into Korean. Most of the translation requests in Korea are met through the KORSTIC's Directory of Translators. 267 titles of Korean translations of foreign works were published in 1973.
6. Local Information Units

At present there are 391 local information departments that receive the KORSTIC services regularly.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services are available in Korea:

(a) National union catalogues.
(b) Reference service.
(c) National and international exchange of material.
(d) Translation service (on a limited scale).
(e) Register of translators.
(f) Reprographic services.
(g) Literature searches.
(h) Collections of standards and patents.
(i) Scientific, industrial and socio-economic data.
(j) Trade catalogues.
(k) Referral services.
(l) Current awareness services.
(m) Industrial extension service.
(n) Literature analysis.

J. Information Users

Great demand in Korea for information services arises out of the industrial organisations, followed by the research and development institutes, higher educational institutions, mass communications, government departments and agencies, and general public, in that decreasing order.

K. Mechanised Methods Being Used

Since 1975 the KORSTIC has been using a computer in processing data in the tapes of CAC, INSPEC, ISIPEC, and others, and in preparing its two union catalogues. In two libraries, bibliographical handling has been partially computerised: the Technical Library of the Korea Institute of Science and Technology, and the Library of the Korea International Economics
Institute. Projects are presently going on in the National Assembly Library and in the Seoul National University Library to computerise their operation.

I. Methods of Communication in Use in Interlending

The postal service is most commonly used in interlending in Korea. Telex is used in the KORSTIC and the two national libraries.

K. Cooperation among Library and Information Institutions

At present there are six library cooperatives in Korea, three of which operate at national level and the rest at regional level. These cooperatives involve interlending, photocopying, cooperative purchase, and exchange of publications, information and advice. The cooperatives operating at national level are those of the National Central Library and the major research libraries, the KORSTIC and the major research libraries, and the nine national university libraries. The cooperatives operating at regional level are those of the research libraries in the Seoul Science Park, the university libraries in Sinchon area in Seoul, and the college and university libraries in Daegu area in North Kyeongsang Province. They are still too embryonic to meet the growing requirements. Informal, direct cooperation between special libraries is extensive, much of it through the KORSTIC and the National Central Library.

N. Network Development

At present no information network exists in Korea. However, "A Plan for a Scientific and Industrial Information Transfer System" (101) has been drawn up by the Agency for Administrative Development. This government plan was released in January 1978. Thus Korea has a concrete plan for a national information network to be implemented when conditions will make it possible.

O. Research and Development in Information Work

There is no institution devoted to research and development in information science. However, there are 14 library schools in Korea where research related to their educational programmes is conducted.
P. Training for Information Specialists

There are 14 library schools associated with colleges and universities. Sung Kyun Kwan University School of Library Service (Seoul) offers a course for information specialists. Short refresher courses for practicing information specialists are offered by the KORSTIC and similar courses for librarians are offered by the National Central Library.

Q. Main Difficulties

The main difficulties with respect to the development of information services are: insufficient funds, shortage of qualified information specialists, rudimentary coordination and cooperation in providing information services, and lack of user education.

R. Current Planning

Current planning and important projects for the near future in information services are: establishing a national science library in Daedeok Science Park in South Chungcheong Province, implementation of the plan for a national information network drawn up by the Agency for Administrative Development, establishing a postgraduate course in information science, establishing a scientific data centre, expansion of the KORSTIC's computer-based SDI service, and improvement of the present computer-processing system for material in the Korean characters.
## A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
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<td>Social sciences</td>
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<td>15</td>
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<td>----------------------------------------------</td>
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<td>9. Scientific and technical manpower</td>
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<td>15</td>
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<td>10. Research and development</td>
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</tr>
<tr>
<td>(personnel by field of science)</td>
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<tr>
<td>Total number</td>
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<td>73</td>
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<td>Engineering and technology</td>
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<td>Agriculture</td>
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<td>11. Research and development</td>
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<td>(personnel by sector of performance)</td>
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<td>12. Selected indicators of scientific and</td>
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<td></td>
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<td>Engaged in R. &amp; D.:</td>
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<tr>
<td>10,000 population</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP</td>
<td></td>
<td>⋯</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

Until 1961, Kuwait accepted British protection and foreign policy was controlled by the British Government. Kuwait became independent in 1961 and joined the United Nations in 1963. In 1971 a more representative national assembly was elected. The National Assembly was dissolved in 1976.

2. Government

Executive power is vested in the Amir, the Head of State chosen by and from members of the ruling family, and is exercised through a Council of Ministers. Legislative power is vested in the unicameral National Assembly, which was dissolved in August 1976.

3. Economic Development

The economy is based on rich deposits of petroleum, most of it exploited by the Kuwait Oil Company, which is government-owned and accounts for almost 90 per cent of Kuwait's oil production. Oil refining and the production of natural gas are increasingly important industries.

4. Social Welfare

A Labour Law safeguards employment and there are benefits for sickness, and industrial accidents and diseases. Medical treatment is free. Large government subsidies keep down the cost of food.

5. Education

Education is free. There are a technical college and a university. Over 2,000 Kuwait students are now receiving education abroad.

C. Government Authorities Responsible for Information Services.

The Ministry of Education, and the Ministry of Cultural Affairs and Information share the responsibility for the library and information services in Kuwait.

D. Central Information Coordinating Organisations

The Kuwait Institute for Scientific Research created a Committee for Information Policy in 1976 to formulate a national policy for the
organisation of scientific and technical information as well as the coordination and promotion of information activities.

1. Members

The Committee has 8 members who represent: (a) Government Ministries and other bodies concerned with information services, (b) R. and D. institutes, (c) institutions of higher education, (d) research libraries, and (e) information centres.

2. Terms of Reference

The Committee's terms of reference are:

(a) Development of a national information network.

(b) Functioning as the national focus for international cooperation.

(c) Development of national information policies.

(d) Long term planning for information services in Kuwait.

(e) Promotion of education for information specialists and users.

E. National Institutions

1. National Libraries

Neither the Kuwait University Library (Kuwait City) nor the Kuwait Central Library (Kuwait City) is an officially designated national library. Nevertheless, some of their functions are carried out on the national level. Their combined national functions are summarised below:

(a) Central collection of the nation's literature.

(b) International exchange service.

(c) Centre for the distribution of duplicate material.

(d) Publication of indexes.

(e) Centre for bibliographical advice and assistance to the nation's libraries.

2. National Archives

There is no public record office in Kuwait. Most of the nation's archives are conserved in the Kuwait University Library.
3. National Information Centres

The National Scientific and Technical Information Centre (Kuwait City) was set up in 1976 to provide nation-wide, comprehensive information services with emphasis on those in the areas of science and industry. Its functions are as follows:

(a) Processing of the world's information material.
(b) Registering domestic R. and D. results.
(c) Reprographic services.
(d) Promotion of cooperation among scientific and technical libraries and information centres.
(e) Research in information work on a limited scale.

F. Depository Collections

A copyright bill has been drafted and recently introduced by the government. If the bill be passed, the Kuwait University Library will be the legal depository of the publications produced in Kuwait.

G. Important Bibliographical Publications.

1. General Bibliographies and Catalogues

National Computerised Book Catalogue, published by the National Scientific and Technical Information Centre.

2. Bibliographies of Special Subjects

Bibliography on Kuwait, published by the Kuwait University Library.

3. Abstracts and Indexes

Kuwait Index to Periodicals, published by the National Scientific and Technical Information Centre.

4. Union Catalogues

Union List of the Scientific and Technical Periodicals in Kuwait, published by the National Scientific and Technical Information Centre.

H. Information Centres and Their Services
1. General Information Centres

The National Scientific and Technical Information Centre mentioned in E is the only information institution in Kuwait that can be considered general.

2. Specialised Information Centres

The Information Unit of the Kuwait Institute of Scientific Research founded in 1973 provides nation-wide services exclusively in the fields of science and technology.

3. Data Centres

There is no data centre designed for public service. However, the Office of Statistics collects, processes, and on a limited scale provides socio-economic data.

4. Referral Centres

At present there is no referral centre.

5. Translation Centres

No translation service is available.

6. Local Information Units

There are six local information departments established in the scientific, industrial and other organisations.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services are available in Kuwait:

(a) Reference service.
(b) National and international exchange of documents (partially).
(c) Reprographic services.
(d) Socio-economic data.
(e) National union catalogues.

J. Information Users

Demand for information services arises largely out of the research and development institutes, higher educational institutions, industrial organisations, government departments and agencies, and mass communications.
in that decreasing order.

K. Mechanised Methods Being Used

Part of information work of the Kuwait Institute of Scientific Research Information Unit and of the National Scientific and Technical Information Centre has been computerised.

L. Methods of Communication in Use in Interlending

Sending by post.

M. Cooperation among Library and Information Institutions

Cooperation among information institutions in Kuwait is not organised but operates informally.

N. Network Development

There is as yet no information network evolving in Kuwait.

O. Research and Development in Information Work

The Kuwait University Library carries out research on the application of modern bibliographical techniques to Arabic publications, especially in cataloguing, classification and information retrieval.

P. Training for Information Specialists

There is no training course for information specialists. There are, however, two training courses for librarians offered by the Kuwait University, a postgraduate programme, and a programme for library assistants and clerks.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Kuwait are: (a) lack of a national information policy, (b) lack of qualified information specialists, and (c) lack of cooperation.

R. Current Planning

Current planning and important projects for the near future in information services are: (a) establishing of a national central library, and (b) establishing of a training programme in the National Scientific and Technical Information Centre.
### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
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<td>No. of students enrolled in 3rd level</td>
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<td>Engineering and technology</td>
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<td>642</td>
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<td>Medical sciences</td>
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<td>268</td>
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<td>Agriculture</td>
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<td>Social sciences and humanities</td>
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<td><strong>11. Research and development (personnel by sector of performance)</strong></td>
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<td>All sectors</td>
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<td>1,700</td>
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<td>Production sector</td>
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<td>Scientists and engineers: total stock</td>
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</tr>
<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td></td>
<td>...</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

Malaysia was established in 1963, through the union of the independent Federation of Malaya, the internally self-governing state of Singapore, and the former British colonies of Sarawak and Sabah. Singapore left the federation in 1965.

2. Government

Malaysia is a federation of 13 states. The Supreme Head of Malaysia is a monarch, elected for a five-year term from the hereditary rulers of nine of the states. The monarch acts on the advice of Parliament and a Cabinet.

3. Economic Development

The rubber industry provided about 20 per cent of the total export earnings in 1975, and is the chief employer of labour in Malaysia. The manufacturing sector maintained its position as the fastest growing sector of the economy in 1975, accounting for nearly 15 per cent of G.D.P.

4. Social Welfare

Social welfare comes under the two Malaysian Ministries of Health and of Welfare Services. Employers and employees contribute to the Employee’s Provident Fund for retirement benefits.

5. Education

Education between the ages of 6 and 15 is free and compulsory in Peninsular Malaysia. Sabah and Sarawak enjoy some local autonomy over education. There are five universities in Malaysia.

C. Government Authorities Responsible for Information Services

There is no government department with central responsibility for the nation’s library and information services. At present the information services in Malaysia are limited. The responsibility for the library services is shared by the Federal and State governments.

D. Central Information Coordinating Organisations
The only organisation of such kind is the National Library of Malaysia which, through its Division of Extension Services, coordinates the total library and information resources of the nation.

1. Members

The National Library has an Advisory Board the members of which are appointed by the Cabinet. The members of the Board include: (a) Chief Secretary of the Government (Chairman), (b) representatives of the Ministries of Finance, External Affairs, Education, Post and Telecommunications, and Information and Broadcasting, (c) representative of the Public Services Department, (d) representative of the Dewan Bahasa dan Pustaka, (e) Librarian of the University of Malaya, and (f) Director General of the National Archives and Library (Secretary).

2. Terms of Reference

Under the provisions of the National Library Act, 1972, it is responsible for:

(a) Making available information resources and services.
(b) Coordinating the library resources of the nation.
(c) Promoting a nation-wide network of public libraries.
(d) Providing reference, information and bibliographical services.
(e) Operating the Preservation of Books Act, 1976.
(f) Legal depository for Malaysian, Unesco and ASEAN publications.

E. National Institutions

1. National Libraries

In the organisation of the National Library of Malaysia (Kuala Lumpur), the library and the National Archives of Malaysia constitute one department, namely the National Archives and Library of Malaysia. A Director-General is the overall head of the two entities, and the head of the library section is a deputy director. The National Library was established in 1971, and an Act was promulgated in 1972 to give it legal
The tasks and functions of the Library include:

(a) Central collection of the nation's literature.
(b) Legal depository for Malaysian publications.
(c) Centre of the nation's international exchange service.
(d) Technical advice and assistance to the nation's libraries.
(e) Planning for the nation's library and information services.
(f) Promoting interlibrary cooperation.

2. National Archives

The National Archives of Malaysia (Kuala Lumpur) was founded in 1957, forms part of the National Archives and Library of Malaysia, and houses public records, private and business records and the Prime Minister's archives.

3. National Information Centres

At present there is no national information centre in Malaysia. Consideration is now being given to the setting up of a general information centre (110).

F. Depository Collections

Since 1966, the National Library of Malaysia has been the legal depository for Malaysian publications as well as for Unesco and ASEAN ones.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Malaysian National Bibliography, published quarterly by the National Library.

2. Bibliographies of Special Subjects

Bibliography (of a scientific or technical subject), published irregularly by the Standards and Industrial Research Institute of Malaysia.

3. Abstracts and Indexes
Malaysian Periodicals Index, published annually by the National Library.

H. Information Centres and Their Services

There is no general information centre or specialised information centre in Malaysia. However, the Institute for Medical Research (Kuala Lumpur), the Malaysian Agricultural Research and Development Institute (Selangor), the Rubber Research Institute of Malaysia (Kuala Lumpur), the Standards and Industrial Research Institute of Malaysia (Kuala Lumpur), and the Tropical Fish Culture Research Institute (Malacca) perform some central information activities. There is no data centres in Malaysia. Referral services are limited. Translations (into English) are provided on request, by the Rubber Research Institute of Malaysia but only to its own research staff. 46 titles of translations were published in the nation in 1973.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services are available in Malaysia:

(a) Reference service.
(b) International exchange of documents.
(c) Translation service (on a limited scale).
(d) Reprographic services.
(e) Collections of standards.

J. Information Users

According to the questionnaire respondents' view, the demand in Malaysia for information services arises out of the higher educational institutions, industrial enterprises, research and development institutes, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used
Nothing has been done in the field of mechanised methods in library work.

I. Methods of Communication in Use in Interlending

The postal service.

M. Cooperation among Library and Information Institutions

Cooperation among libraries is not organised but operates informally.

N. Network Development

There is as yet no information network evolving in Malaysia.

O. Research and Development in Information Work

Research in information services is limited.

P. Training for Information Specialists

There is no training courses for information specialists. Malaysia has, however, a library school established at the Mara Institute of Technology in Selangor.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Malaysia are:

(a) Lack of a national information policy.
(b) Insufficient funds.
(c) Lack of qualified information workers.
(d) Lack of user education.
(e) Lack of a central information service.

R. Current Planning

Important projects for the near future in information services are as follows:

(a) Establishing a central information service.
(b) Compilation of a national union catalogue of books and a union list of periodicals.
### 3.2.10 Malta

**A. Basic Statistical Data**

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
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</thead>
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<td>1. Population (1,000)</td>
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<td>2. Surface area (km²)</td>
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<td>3. Density of population (to 1 km²)</td>
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<td>4. Per capita gross domestic product (in U.S. dollars)</td>
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<td>5. Education</td>
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</tr>
<tr>
<td>No. of students enrolled in 2nd level</td>
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<td>No. of students enrolled in 3rd level</td>
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<td>Adult illiteracy rate (%)</td>
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<tr>
<td>6. Libraries and their holdings by type of library</td>
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<tr>
<td>National</td>
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<td>General service</td>
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<td>12. Selected indicators of scientific and technological development</td>
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<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>73</td>
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</table>
B. Introductory Survey

1. Recent History

Malta was formerly a British colony, and became a republic in 1974. The policies of the present government are independence and non-alignment in foreign affairs and socialist reform at home.

2. Legislative power is held by the unicameral House of Representatives. The President is a constitutional Head of State, elected by the House, and the executive power is exercised by the Cabinet, which is responsible to the House.

3. Economic Development

Malta's major sources of income are light industry, tourism, the dockyard and agriculture. Shipbuilding and ship-repairing are of prime importance since Malta is ideally situated in the centre of the Mediterranean. For the recent years Malta continued to make progress towards achieving economic independence by 1980.

4. Social Welfare

Social security is provided under the National Insurance Act, 1956, the National Assistance Act, 1956, and the Old Age Pension Act, 1948.

5. Education

Education is compulsory between 6 and 16, and is free in government schools and in the University of Malta.

C. Government Authorities Responsible for Information Services

The Ministry of Education is responsible for the library services. There is no government authority responsible for the information services.

D. Central Information Coordinating Organisations

No national coordinating element for information services exists as yet in Malta.

E. National Institutions

1. National Libraries

The Malta Library (Valletta) originally founded in 1552 is
designated as the national library. The library is one of the two legal depositories for materials published in Malta. The library controls the Public Library in Gozo and 46 District Libraries in Malta and Gozo. Its other major functions and services are as follows:

(a) Central collection of the nation's literature.
(b) Legal depository for Maltese publications.
(c) International exchange service.
(d) Technical advice and assistance to the nation's libraries.
(e) Planning for the nation's library services.
(f) Promotion of interlibrary cooperation.

2. National Archives

There is no public record office in Malta. The Archives of the Order of St. John of Jerusalem from 1107 to 1798 are conserved in the Malta Library. These archives, from 1530, the year of the inception of the Order's rule in Malta, onwards, may be considered as Malta's national archives.

3. National Information Centres

There is at present no national information centre in Malta.

F. Depository Collections

There are two legal depositories for materials published in Malta: the Malta Library and the Gozo Public Library.

G. Important Bibliographical Publications

The Malta Library publishes The Catalogue of Maltese Publications, which is a national bibliography classified by subject. This bibliography includes books, pamphlets, official publications and university dissertations produced in the Maltese Islands. With the cooperation of the Press Registrar, the Malta Library compiles a list of the newspapers and other periodical publications registered under the Press Act.

H. Information Centres and Their Services

Now that no information centre exists in Malta, information activities...
are performed by libraries. Scientific, technical and other information is provided by the libraries of the major research organisations, institutions of higher education and government departments. Malta has a specialised information service that operates on a small but at an international level. It is the International Ocean Institute (IOI) which was established in 1972 to promote research on the peaceful use of ocean space and its resources, including the regulation of such uses. The IOI is a self-governing institute located on the campus of the University of Malta and its Director is the Rector of the University. Bibliographies are compiled and literature searches carried out on the Institute's own initiative.

I. Kinds of Library and Information Services Available in the Nation.
   At present the following services are available in Malta:
   
   (a) Reference service.
   (b) International exchange of documents.
   (c) Reprographic services.
   (d) Legal deposit.
   (e) Literature searches.

J. Information Users
   Demand in Malta for information services arises out of the research and development institutes, followed by the higher educational institutions, government departments and agencies, and industrial organisations, in that decreasing order.

K. Mechanised Methods Being Used
   No mechanised methods are applied to library and information work in Malta.

L. Methods of Communication in Use in Interlending
   The postal service.

K. Cooperation among Library and Information Institutions
Cooperation in the form of interlibrary lending and cooperative acquisition exists between the public libraries (including the Malta Library) and the University of Malta library.

N. Network Development

There is as yet no information network formed in Malta.

O. Research and Development in Information Work

Research and development in librarianship and in information science are limited.

P. Training for Information Specialists

There is a diploma course for library assistants established at the Malta College of Arts, Science and Technology. Many professional librarians and information workers are trained in the United Kingdom.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Malta are as follows:

(a) Lack of a national information policy.
(b) Insufficient funds.
(c) Shortage of qualified information specialists.
(d) Lack of user education.
(e) Lack of coordination and cooperation.
(f) Lack of a national information centre.

R. Current Planning

Current planning and important projects for the near future in information services are as follows:

(a) Establishing of a national information centre.
(b) Compilation of a comprehensive national union catalogue.
(c) Establishing of a degree course in librarianship and one in information services.
### Category | Year | Data
--- | --- | ---
1. Population (1,000) | 74 | 58,118
2. Surface area (km²) | 75 | 1,973,000
3. Density of population (to 1 km²) | 75 | 30
4. Per capita gross domestic product (in U.S. dollars) | 74 | 1,119
5. Education
   - No. of students enrolled in 1st level | 75 | 11,571,000
   - No. of students enrolled in 2nd level | 75 | 2,617,000
   - No. of students enrolled in 3rd level | 74 | 453,000
   - Adult illiteracy rate (%) | 70 | 16
6. Libraries and their holdings by type of library
   - National
     - No. of libraries | 73 | 2
     - No. of volumes (1,000) | 73 | 963
   - Institution of higher education
     - No. of libraries | 73 | 190
     - No. of volumes (1,000) | 73 | 1,408
   - School
     - No. of libraries | 73 | 937
     - No. of volumes (1,000) | 73 | 7,103
   - Special
     - No. of libraries | 73 | 121
     - No. of volumes (1,000) | 73 | 879
   - Public
     - No. of libraries | 73 | 942
     - No. of volumes (1,000) | 73 | 2,752
7. Book production per year (no. of titles)
   - Total number of titles | 74 | 5,733
   - Generalities | 74 | 18
   - Humanities | 74 | 1,707
   - Social sciences | 74 | 1,037
   - Pure and applied sciences | 74 | 2,971
8. Journals
   - Total no. of titles | 74 | 2,467
   - Pure and applied sciences | ...
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<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>71</td>
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</table>
B. Introductory Survey

1. Recent History

Since 1929 the country has been governed by the Partido Revolucionario Institucional in an effective one-party system, while maintaining a democratic form of election. On taking office in 1976, President Lopez Portillo indicated a return to more business-oriented policies and a swing to the right.

2. Government

Mexico is a federal republic comprising 31 States and a Federal District. Legislative power is vested in the bicameral National Congress. Executive power is held by the President, directly elected for six years.

3. Economic Development

Agriculture accounts for almost a quarter of the national income. As a result of the discovery of extensive oil reserves, petroleum production reached one million barrels per day at the end of 1976. There has been considerable expansion of industry: 80 per cent of consumer goods are now made in Mexico and manufactured goods account for 42 per cent of exports.

4. Social Welfare

Social welfare is administered by the Mexican Social Security Institute and financed by contribution from employers, employees and the Government.

5. Education

State education is free. Much is being done in the field of adult education and the illiteracy rate dropped from 52 per cent in 1946 to 24 per cent in 1971. There are 44 universities.

C. Government Authorities Responsible for Information Services

The Ministry of National Education is responsible for the nation's library services and the National Council for Science and Technology (CONACYT) for the information services.
D. Central Information Coordinating Organisation

Through its Centre of Information and Documentation Services, the CONACYT coordinates the information service activities in Mexico.

1. Members

The CONACYT has a steering committee for information policy which is composed of representatives of: (a) Government Ministries and other bodies concerned with information provision, (b) central scientific organisations, (c) information centres, and (d) research libraries.

2. Terms of Reference

The committee is authorised as follows:

(a) To formulate national information policies.

(b) To establish an efficient national information network.

(c) To coordinate the information activities in the nation through the Centre of Information and Documentation Services.

E. National Institutions

1. National Libraries

There are two national libraries in Mexico: the Biblioteca Nacional de Mexico (Mexico City) and the Hemeroteca Nacional de Mexico (Mexico City). The former was founded in 1833 and now belongs to the National University of Mexico (UNAM). The latter founded in 1912 is a national library of periodicals which contains newspapers, periodicals and the Mexican Gazette of the eighteenth century. The combined national functions of the two libraries are:

(a) Central collection of the nation's literature.

(b) Receiving books under legal deposit.

(c) National bibliographical centre.

(d) International exchange service

(e) Bibliographical advice and assistance to the nation's libraries of all kinds.
2. National Archives

The Archivo General de la Nación (Mexico City) founded in 1823 conserves documents relating to the vice-regal administration of New Spain, the Inquisition, the years of independence 1821-40, the nineteenth century, the Mexican Revolution 1910, and the years up to 1940.

3. National Information Centres

The Centre of Information and Documentation Services (CSID), which is the national information centre of Mexico, was set up within the CONACYT and started operation in 1971. Its main objective is the establishment and operation of a national information network for the country. Its services are summarised below:

(a) Registering domestic R. and D. results.

(b) Processing of the world's information material.

(c) Publication of abstracts, bibliographies and indexes.

(d) Reprographic services.

(e) Translation service.

(f) Literature searches.

(g) Enquiry service.

(h) Compilation of union catalogues of periodicals.

F. Depository Collections

The two national libraries are the legal depositories for Mexican publications. One copy of all books published in the country is forwarded to the Biblioteca Nacional de Mexico and one copy of all periodical publications printed in the country to the Hemeroteca Nacional de Mexico.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Bibliografía Mexicana, published by the Biblioteca Nacional de Mexico

(b) Las Publicaciones Oficiales de Mexico: Guia de Publicaciones Periodicas y Seriadas 1937-1970, published by the UNAM.
2. Bibliographies of Special Subjects
   (b) Guia de Documentos para la Historia de Mexico, published by the UNAM.

3. Abstracts and Indexes

4. Union Catalogues
   Catalogo Collectivo de Publicaciones Periodicas Existentes en Bibliotecas de la Republica Mexicana, published by the Instituto Nacional de Investigaciones Agricolas.

H. Information Centres and Their Services

1. General Information Centres
   The Centro de Investigacion y de Estudios Avanzados del Instituto Politecnico Nacional, Departamento de Bibliotecas y Servicios Bibliograficos, originally known as the Centro de Documentacion Cientifica y Tecnica de Mexico, covers the fields of medicine, chemistry, agriculture, engineering, biology, physics, mathematics, soil sciences, food industries, astronomy, astrophysics, architecture and urban planning.

2. Specialised Information Centres
   The Library of the Division of Research and Higher Studies of the Faculty of Engineering of the UNAM provides a wide range of information services in the fields of operations research, planning, structures, dynamics, sanitary engineering, electronics, control, and soil mechanics. Some other specialised information services of national character are listed below:
   (a) Biblioteca del Instituto de Fisica (Mexico City).
   (b) Biblioteca del Comision Nacional de Energia Nuclear (Mexico City)
(c) Biblioteca de la Secretaria de Salubridad y Asistencia y de la Escuela de Salud Publica (Mexico City).

3. Data Centers

At present Mexico has no data centres that operate at national level.

4. Referral Centres

Referral services are limited in Mexico.

5. Translation Centres

There is no translation service on a national scale. The CSID and the Library of the Division of Research and Higher Studies of the Faculty of Engineering of the UNAM prepare translations on request, but only for the research workers of their parent organisations. 218 titles of Spanish translations of foreign works were published in the nation in 1973.

6. Local Information Units

Data for the local information units in Mexico are not available.

I. Kinds of Library and Information Services Available in the Nation

At present the following services and publications are available:

(a) National union catalogues.
(b) Reference service.
(c) International exchange of documents.
(d) Literature searches.
(e) Reprographic services.
(f) Current awareness services.

J. Information Users

Demand in Mexico for information services arises out of the research and development institutes, higher educational institutions, industry, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used

Library work has been partially computerised in the Biblioteca Central de la UNAM.

L. Methods of Communication in Use in Interlending
The postal service is almost exclusively used.

M. Cooperation among Library and Information Institutions

Cooperation among information institutions is not organised but operate informally.

N. Network Development

No information network has as yet evolved in Mexico.

O. Research and Development in Information Work

Research activities in information handling are limited. Research related to educational programmes is conducted at the two library schools.

P. Training for Information Specialists

There is no training courses for information specialists. There are, however, two library schools in Mexico City: Colegio de Bibliotecología y Archivología, Facultad de Filosofía y Letras, UNAM; and Escuela Nacional de Bibliotecarios y Archivistas.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Mexico are:

(a) Lack of a national information policy.
(b) Shortage of qualified information specialists.
(c) Lack of coordination and cooperation.
(d) Lack of a comprehensive national union catalogue.

R. Current Planning

Current planning in information services includes introducing of computer-based SDI and RS services in the CSID.
### A. Basic Statistical Data

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<td>No. of students enrolled in 3rd level</td>
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<td>Pure and applied sciences</td>
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<td>169</td>
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<td>----------------------------------------------</td>
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<td><strong>9. Scientific and technical manpower</strong></td>
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<tr>
<td>(personnel by field of science)</td>
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<td></td>
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<td>Total number</td>
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<td>Engineering and technology</td>
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<td>915</td>
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<td>Medical sciences</td>
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<td>70</td>
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<td>Social sciences and humanities</td>
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<td>205</td>
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<tr>
<td>(personnel by sector of performance)</td>
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<td></td>
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<td>Production sector</td>
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<td>Higher education</td>
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<td>915</td>
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<td><strong>12. Selected indicators of scientific and</strong></td>
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<td>technological development</td>
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<td></td>
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<td>Scientists and engineers: total stock</td>
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<td>Scientists and engineers: engaged in R. &amp; D.</td>
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<tr>
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<td>No. of technicians per scientist and engineer</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GRP (%)</td>
<td>70</td>
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</tbody>
</table>
P. Introductory Survey

1. Recent History

Since the communist revolution of 1949, Taiwan has been the site of the Nationalist government. Detente with mainland China still seems remote and economic and political stability continues to be the main priority.

2. Government

The Head of State is the President, who is elected by the National Assembly. There are five yuans (governing bodies), the highest legislative organ being the Legislative Yuan, to which the Executive Yuan is responsible. There are also Control, Judicial and Examination Yuans.

3. Economic Development

The economy is progressing towards self-sufficiency, and Taiwan has become one of the leading exporters in Asia. Trade is chiefly with the U.S.A., Japan and Southeast Asia, the most important exports being clothing, television sets and cotton fabrics. G.N.P. per capita is now amongst the highest in Asia.

4. Social Welfare

The Labour Security Programme covers over 1.4 million workers and provides benefits for injury, disability, birth, death and old age.

5. Education

Primary education is free and compulsory between the ages of 6 and 12. There are 11 universities and 16 independent colleges.

C. Government Authorities Responsible for Information Services

The Ministry of Education is responsible for the nation's library services. There is no government authority responsible for the information services.

D. Central Information Coordinating Organisations

The National Council for Information Policy was established in 1975 by the Executive Yuan. The general objective of the Council is furthering of
a national policy for the organisation of scientific, technical and socio-economic information as well as the coordination and promotion of information activities in Taiwan.

1. Members

The Council has 14 members, who represent: (a) Government Ministries, (b) R. and D. organisations, (c) libraries, (d) information centres, (e) publishing organisations, and (f) industrial enterprises.

2. Terms of Reference

The Council's terms of reference are:

(a) Development of national information policies.
(b) Development of a national information network.
(c) Coordination of the activities of the constituent units of the national information network.
(d) Promotion of user education.
(e) Promotion of information specialist training.
(f) Promotion of R. and D. in information work.
(g) Functioning as a national focus for international cooperation.
(h) Long term planning for the nation's information services.
(i) Monitoring and control of objectives of information services.

E. National Institutions

1. National Libraries

The National Central Library (Taipei) founded in 1954 exchanges materials with 786 institutions in 64 countries. The library is the legal depository for all materials published in Taiwan. Its major tasks and functions are as follows:

(a) Central collection of the nation's literature.
(b) Receiving books under legal deposit.
(c) Fullest coverage of foreign literature.
(d) National bibliographical information centre.
(e) Research on librarianship.
(f) International exchange service.

(g) Centre for the distribution of duplicate material.

(h) Technical advice and assistance to the nation's libraries of all kinds.

(i) Planning centre for the nation's library services.

2. National Archives

The National Archives (Taipei) was established in 1955 to collect and conserve all permanent and quasi-permanent government documents, land registers, planning charts, designs and other important documents.

3. National Information Centres

The China Scientific and Technological Information Center (CSTIC) in Nankang is the national information centre of Taiwan. The Center was established as a division of the National Science Council of the Executive Yuan, and renders a full range of information services in all branches of science and technology including agriculture, public health and medicine. Its functions are summarised below:

(a) Registering of domestic R. and D. results.

(b) Processing of the world's information material.

(c) Publication of abstracts and indexes.

(d) Reprographic services

(e) Referral services

(f) Organisation of advanced training courses for information specialists.

(g) Centralised acquisition of scientific books and periodicals for the public, college and university libraries in Taiwan.

(h) Analytical reports.

(i) Promotion of cooperation among scientific and technical libraries and information centres in Taiwan.

E. Depository Collections

The National Central Library is the legal depository for all materials
published in Taiwan.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues
   (a) Chinese National Bibliography, published monthly by the National Central Library.
   (b) Directory of Chinese Periodicals, published by the National Central Library.

2. Bibliographies of Special Subjects
   (a) Bibliography of Sinology, published by the National University of Taiwan Library.
   (b) Bibliography of Social Sciences, published by the Social Science Materials Center of the National Chengchi University.

3. Abstracts and Indexes
   (a) Chinese Science Abstracts, published by the CSTIC.
   (b) Index to Chinese Periodicals, published by the National Central Library.

4. Union Catalogues
   (a) National Union Catalogue, published by the National Central Library.
   (b) Union List of the Scientific Serial Holdings of the Libraries of the Republic of China, published by the CSTIC.

H. Information Centres and Their Services

1. General Information Centres
   The CSTIC provides the most comprehensive information services in Taiwan. The National Institute for Compilation and Translation (Taipei) compiles thesauri of scientific and engineering terms and translates Western scientific works into Chinese.

2. Specialised Information Centres
   There are two important specialised information centres in Taiwan: the Social Science Materials Center of the National Chengchi University...
(Taipei) founded in 1961 and the Agricultural Information Service Center (Taipei) founded in 1973.

3. Data Centres

At present there is no institution devoted to collection and processing of data.

4. Referral Centres

Referral services are rendered on a limited scale by the National Central Library and the CSTIC. The former publishes The Directory of the Cultural Organizations in the Republic of China, and the latter Who's Who in Science and Technology in the Republic of China and The Directory of the Scientific and Technological Research Institutes in the Republic of China.

5. Translation Centres

Translation service is provided by the National Institute for Compilation and Translation and the CSTIC. Translation service at the popular level is rendered by the former, and that at the specialist level is rendered by the latter through a panel of extramural translators with linguistic qualifications.

6. Local Information Units

There are 33 local information departments established in the scientific, industrial and other organisations in Taiwan.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services and publications are available:

(a) Reference service.

(b) National union catalogues.

(c) National and international exchange of documents.

(d) Translation service.

(e) Register of translators.

(f) Reprographic services.

(g) Referral services.

(h) Centralised acquisitions.
(i) Analytical survey.

(j) Current awareness services.

J. Information Users

According to the respondents' view, the greatest demand in Taiwan for information services arises out of the industrial organisations, followed by the research and development institutes, higher educational institutions, government departments and agencies, and mass communications, in that decreasing order.

K. Mechanised Methods Being Used

In the CSTIC mechanised methods are applied to preparation of the Center's two bibliographical publications.

I. Methods of Communication in Use in Interlending

The postal service is almost exclusively used.

K. Cooperation among Library and Information Institutions

Cooperation in Taiwan for the most part takes the form of interlending. It also includes centralised acquisitions and union catalogues. The two union catalogues listed in C provide valuable sources on the location of monographic and serial publications in Taiwan.

N. Network Development

There is as yet no information network evolving in Taiwan. In 1975, however, the National Council for Information Policy was founded on the initiative of the Executive Yuan to develop a national information network.

O. Research and Development in Information Work

Research and development in information activities is limited. Research related to educational programmes is carried out at the two library schools.

P. Training for Information Specialists

At present there is no institutions for training in information services. The two library schools offer introductory subjects of information science and the CSTIC offers short refresher-type courses for practicing specialists.
C. Main Difficulties

The main difficulties with respect to the development of information services in Taiwan are:

(a) Shortage of qualified information personnel.
(b) Lack of user education.

R. Current Planning

Important projects for the near future in information services are:

(a) Establishing of the CSTIC's branches in two industrial towns.
(b) Establishing of a scientific and engineering data centre.
### 3.2.13 Turkey

**A. Basic Statistical Data**

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population (1,000)</td>
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<td>2. Surface area (km²)</td>
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<td>3. Density of population (to 1 km²)</td>
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<td>No. of students enrolled in 2nd level</td>
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<td>No. of students enrolled in 3rd level</td>
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<td>Adult illiteracy rate (%)</td>
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<td></td>
<td>No. of volumes (1,000)</td>
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<td></td>
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<td>School</td>
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<td></td>
<td>No. of volumes (1,000)</td>
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<td>No. of volumes (1,000)</td>
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</tr>
<tr>
<td>----------</td>
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<tr>
<td><strong>9. Scientific and technical manpower</strong></td>
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<tr>
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<td>Scientists and engineers</td>
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<td>Medical sciences</td>
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<td>Agriculture</td>
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<td>Social sciences and humanities</td>
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<td>All sectors</td>
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<td>Production sector</td>
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<td>Higher education</td>
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<td>General service</td>
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<td><strong>12. Selected indicators of scientific and technological development</strong></td>
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<td>Scientists and engineers: total stock</td>
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<td>Scientists and engineers per 10,000 population</td>
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<td>Technicians per 10,000 population</td>
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<tr>
<td>No. of technicians per scientist and engineer</td>
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<td>Scientists and engineers per 10,000 population</td>
<td>73</td>
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<td>Technicians per 10,000 population</td>
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<td>No. of technicians per scientist and engineer</td>
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<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>72</td>
<td>0.3</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

The Republic of Turkey was declared in 1923 and made great progress away from the traditions of the Ottoman Empire and towards European modernity. Turkey has looked to Europe for its institutions and technology, based on the principles of republicanism, populism and state control.

2. Government

Legislative power is vested in the bicameral Grand National Assembly. The Grand National Assembly elects one of its members to be President of the Republic. The President appoints the Prime Minister from among the members of the legislature. The Prime Minister appoints the Council of Ministers.

3. Economic Development

Agriculture, the most important sector of the Turkish economy, employed 65 per cent of the working population in 1970 and accounted 63 per cent of the total export earnings and 29 per cent of the G.N.P. in 1975. Cheap locally available cotton and low wages have made textiles Turkey's biggest industrial growth sector.

4. Social Welfare

Social insurance for wage-earners is provided by the Workers' Social Insurance Institution of the Ministry of Labour.

5. Education

Education is compulsory between the ages of 6 and 12. All state education up to higher educational institution level is coeducational and free. There are 18 universities in Turkey.

C. Government Authorities Responsible for Information Services

The Ministry of Cultural Affairs is responsible for the nation's library services. There is no governmental authority in charge of information services.

D. Central Information Coordinating Organisations
The Turkish National Scientific Documentation Centre (TURDOK) of the Scientific and Technical Research Council of Turkey guides and promotes information activities and also provides a nation-wide scientific and technical information services. Recently a special commission for information services was established by the State Planning Organisation. It is expected that the commission will shortly recommend one of the following two options:

(a) a policy coordinating body will be created for the social sciences, and the TURDOK's mandate will be revised to cover policy matters in information services, or

(b) one central information policy coordinating body will be created to cover both technical and social science information.

E. National Institutions

1. National Libraries

The Turkish National Library (Ankara) was established in 1946.

Its major tasks and functions are as follows:

(a) Central collection of the nation's literature.

(b) Receiving books under legal deposit.

(c) National bibliographical centre.

(d) International exchange service.

(e) Technical advice and assistance to the nation's libraries.

2. National Archives

The National Archives (Ankara) is a rich source of historical documents. Efforts are under way to modernise the archival law and to take an inventory of the documents so as to make them available.

3. National Information Centres

The TURDOK is the national information centre of Turkey. The TURDOK was set up in 1966 as a division of the Scientific and Technical Research Council of Turkey, which is directly under the authority of the Prime Minister. It tries to ascertain the quantity and nature of Turkish
information requirements, and to plan new information units in accordance with overall information policies. Much emphasis is placed on strengthening the national information network. Its other functions include:

(a) Registering domestic R. and D. results.
(b) Publication of abstracts and indexes.
(c) Reprographic services.
(d) Referral services.
(e) Translation service.
(f) Research and development in information work.
(g) Organisation of advanced training courses for specialists.
(h) Literature searches.
(i) Analytical reports.
(j) Assistance in organising other information units in Turkey.

F. Depository Collections

At present there are five depository libraries for Turkish copyright copies:

(a) National Library.
(b) Grand National Assembly Library.
(c) Istanbul University Library.
(d) Beyazit State Library, Istanbul.
(e) Millet Library, Izmir.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Turkish National Bibliography, published quarterly by the Turkish National Library.
(b) Bibliography of Turkish State Publications, published by the Turkish National Library.

2. Bibliographies of Special Subjects

(a) Complete Catalogue of Ankara Technical and Scientific Periodicals, published in 1971 by the TUNOK.
(b) Complete Catalogue of Istanbul Publications on Science and Technology, published in 1971 by the TURDOK.

3. Abstracts and Indexes
(a) Index to Articles in Turkish Periodicals, published monthly by the Turkish National Library.
(b) Key to Turkish Sciences, published in 10 subject series semi-annually by the TURDOK.

4. Union Catalogues

The TURDOK has published two regional union catalogues: The Union Catalogue of Scientific and Technical Periodicals Held by the Libraries in Ankara, which covers the fields of science, technology and economics; and The Union Catalogue of Scientific and Technical Periodicals Held by Istanbul Libraries, which covers science and technology only. Supplements to the former are issued at an interval of five years but no supplement to the latter has yet been issued since its publication in 1971.

II. Information Centres and Their Services

1. General Information Centres

The TURDOK provides the most comprehensive information services in Turkey. Another important institution is the Turkish Technical Information Centre (TTIC) in Istanbul, which provides similar services primarily to the users working in Istanbul area.

2. Specialised Information Centres

At present there are three important specialised information centres in Turkey that meet the needs for information on specialised topics: the Documentation Unit of the Ankara Nuclear Research Centre, the National Productivity Information Centre, and the Information Unit of the Institute of Population.

3. Data Centres

There are two data centres in Turkey: the Scientific and Engineering Data Centre of Hacettepe University and the Socio-economic Data Centre
of the State Institute of Statistics.

4. Referral Centres

Limited referral services are provided by the TURDOK.

5. Translation Centres

Although the TURDOK has no ad hoc translating service, it has organised translation service through a translator panel. Translation requests are met by giving the user a panel of extramural translators with specialist knowledge as well as linguistic qualifications. 991 titles of Turkish translations of foreign works were published in 1973.

6. Local Information Units

There are about 50 local information departments established in the scientific, industrial and other organisations in Turkey.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services are available in Turkey:

(a) Reference service.

(b) National and international exchange of documents (partially).

(c) Register of translators.

(d) Register of translations.

(e) Reprographic services.

(f) Scientific and technical data.

(g) Socio-economic data.

(h) Collections of patents.

(i) Literature searches.

(j) Analytical survey.

J. Information Users

Demand in Turkey for information services arises out of the research and development institutes, higher educational institutions, industrial organisations, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used
Information work in the following institutions has been partially mechanised: the Middle East Technical University Library and the Ankara Nuclear Research Centre Documentation Unit.

I. Methods of Communication in Use in Interlending

The postal service is almost exclusively used.

K. Cooperation among Library and Information Institutions

Although there is no formal interloan arrangement, the TUBOK and other institutions engage in friendly reciprocal sharing of material through the two regional union lists of serials mentioned in G.

N. Network Development

There is as yet no information network formed in Turkey.

O. Research and Development in Information Work

Research in information science is limited in Turkey.

P. Training for Information Specialists

There are no separate training courses for information specialists in Turkey. There are, however, two library schools at university level at the University of Ankara and the University of Istanbul, where some introductory subjects of information science are taught.

Q. Main Difficulties

The main difficulties with respect to the development of library and information services are: insufficient funds combined with the existence of autonomous small units responsible for services, shortage of qualified specialists, lack of coordination and cooperation in providing information services at all levels, and lack of user education.

R. Current Planning

Current planning and important projects for the near future in information services are: establishing two more specialised information centres, installation of telex communication systems, and implementation of the national information network planned by the TUBOK.
### Venezuela

#### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
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</thead>
<tbody>
<tr>
<td>1. Population (1,000)</td>
<td>76</td>
<td>12,361</td>
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<tr>
<td>2. Surface area ((\text{km}^2))</td>
<td>76</td>
<td>912,000</td>
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<tr>
<td>3. Density of population ((\text{to 1 km}^2))</td>
<td>75</td>
<td>13</td>
</tr>
<tr>
<td>4. Per capita gross domestic product ((\text{in U.S. dollars}))</td>
<td>75</td>
<td>2,145</td>
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<td>5. Education</td>
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<td></td>
</tr>
<tr>
<td>Number of students enrolled in 1st level</td>
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<td>Number of students enrolled in 2nd level</td>
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<td>Number of students enrolled in 3rd level</td>
<td>77</td>
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<tr>
<td>Adult illiteracy rate (%)</td>
<td>70</td>
<td>23</td>
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<td>6. Libraries and their holdings by type of library</td>
<td></td>
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<tr>
<td>National</td>
<td>75</td>
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<td>Number of volumes ((1,000))</td>
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<td>Special</td>
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<td>Number of volumes ((1,000))</td>
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<td>Public</td>
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<td></td>
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<td>Number of volumes ((1,000))</td>
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<td>65</td>
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<tr>
<td>7. Book production per year ((\text{no. of titles}))</td>
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<td></td>
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<td>Total number of titles</td>
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<td>943</td>
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<td>Social sciences</td>
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<td>Pure and applied sciences</td>
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<td>8. Journals</td>
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<td>Pure and applied sciences</td>
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<td>25</td>
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### 9. Scientific and technical manpower

<table>
<thead>
<tr>
<th>Category</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
<td>73</td>
<td>279,003</td>
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<tr>
<td>Scientists and engineers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total stock</td>
<td>73</td>
<td>113,598</td>
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<tr>
<td>Engaged in R. &amp; D.</td>
<td>73</td>
<td>2,720</td>
</tr>
<tr>
<td>Technicians</td>
<td></td>
<td></td>
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<td>Total stock</td>
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<tr>
<td>Engaged in R. &amp; D.</td>
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<td>783</td>
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### 10. Research and development (personnel by field of science)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
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<tr>
<td>Natural sciences</td>
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<td>Engineering and technology</td>
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<td>265</td>
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<tr>
<td>Medical sciences</td>
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<td>489</td>
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<td>Agriculture</td>
<td>73</td>
<td>684</td>
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<tr>
<td>Social sciences and humanities</td>
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<td>448</td>
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</table>

### 11. Research and development (personnel by sector of performance)

<table>
<thead>
<tr>
<th>Category</th>
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<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sectors</td>
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<td>2,720</td>
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<tr>
<td>Production sector</td>
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<td>17</td>
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<td>Higher education</td>
<td>73</td>
<td>1,801</td>
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<td>General service</td>
<td>73</td>
<td>602</td>
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### 12. Selected indicators of scientific and technological development

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists and engineers (total stock)</td>
<td>73</td>
<td>105.6</td>
</tr>
<tr>
<td>Scientists and engineers (per 10,000 pop)</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Technicians (per 10,000 pop)</td>
<td>73</td>
<td>154.2</td>
</tr>
<tr>
<td>No. of technicians per scientist and engineer</td>
<td>73</td>
<td>1.5</td>
</tr>
<tr>
<td>Scientists and engineers (engaged in R. &amp; D.)</td>
<td>73</td>
<td>2.6</td>
</tr>
<tr>
<td>Scientists and engineers (per 10,000 pop)</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Technicians (per 10,000 pop)</td>
<td>73</td>
<td>0.8</td>
</tr>
<tr>
<td>No. of technicians per scientist and engineer</td>
<td>73</td>
<td>0.3</td>
</tr>
<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>73</td>
<td>0.2</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

Venezuela was a Spanish colony from 1499 until 1821, and achieved independence in 1830. The country was governed principally by dictators until 1945. In 1961 the Constitution now in force was promulgated.

2. Government

Venezuela is a federal republic consisting of 20 states, a Federal District and two Federal Territories, each under a Governor. Executive power is vested in the President. The legislative organ is the Congress.

3. Economic Development

Venezuela's most important industry is petroleum production. Petroleum accounted for 85 per cent of government revenue and 90 per cent of export earnings in 1976. Industrial diversification is a high government priority. Agriculture employs about 30 per cent of the labour force.

4. Social Welfare

Labour legislation protects workers and there are benefits for accidents, sickness and old age.

5. Education

Primary education is free and compulsory between the ages of 7 and 13. In 1976, 225,000 students attended the 11 universities and 85,000 attended the 32 state higher educational institutions and the 13 private institutions.

C. Government Authorities Responsible for Information Services.

The Ministry of Education is responsible for the country's library services. There is no government authority responsible for information services in Venezuela.

D. Central Information Coordinating Organisations

The Centro Nacional de Informacion Cientifica y Tecnica (CENICIT) of the Consejo Nacional de investigaciones Cientificas y Tecnologicas (Carnica)
was set up as a national information policy-making body in 1967. The CENICIT operates at both policy-formation and operational level. It promotes and coordinates information activities in the country, and operates a full set of information services for all interested institutions.

1. Members

The CENICIT has a Board of Directors composed of representatives of: (a) government R. and D. authorities, (b) institutions of higher education, (c) industry, and (d) information centres.

2. Terms of Reference

The CENICIT's mandate is as follows:

(a) To develop and activate a national information network.

(b) To coordinate the activities of the component units of the national network.

(c) To formulate national information policies.

(d) To act as a national clearinghouse for information.

(e) To educate both users and specialists in information.

(f) To control standards and procedures in information activities in Venezuela.

(g) To operate a national referral services.

(h) To execute applied research in the field of information.

(i) To represent Venezuela in international organisations dealing with information, and to ensure the country's participation.

E. National Institutions

1. National Libraries

The Biblioteca Nacional (Caracas) was founded in 1833. Its major tasks and functions are as follows:

(a) Central collection of the nation's literature.

(b) Receiving books under legal deposit.

(c) National bibliographical information centre.
(d) Research on librarianship.
(e) International exchange service.
(f) Technical advice and assistance to the nation's libraries of all kinds.
(g) Planning for the nation's library services.

2. National Archives

The Archivo General de la Nacion (Caracas) was founded in 1910.
It comprises Seminario de Investigacion Archivistica and courses on paleography.

3. National Information Centres

Venezuela's national information centre is the Centro Nacional de Informacion Cientifica y Tecnica (CENICIT) in Caracas. The CENICIT is attached to the Consejo Nacional de Investigaciones Cientificas y Tecnologicas, which was founded in 1967 to promote research in the fields of physical, mathematical, natural, human and social sciences and technology. Its major functions include:

(a) Registering of domestic R. and D. results.
(b) Processing of the world's information material.
(c) Publication of bibliographies and indexes.
(d) Reprographic services.
(e) Referral services.
(f) Translation service.
(g) Literature searches.

F. Depository Collections

The Biblioteca Nacional is the legal depository for materials published in Venezuela.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Anuario Bibliografico Venezolano, published by the National Library.
(b) Boletin Bibliografico, published by the Biblioteca Tecnica Cientifica Centralizada.

2. Bibliographies of Special Subjects

Bibliografia Cientifica y Tecnica de Venezuela, published by the CENICIT.

3. Abstracts and Indexes

Indice Bibliografico, published by the National library.

4. Union Catalogues

(a) Catalogo Colectivo de Publicaciones Periodicas existentes en las Bibliotecas de Venezuela, published by the CENICIT.

(b) Union Catalogue of Books in Libraries of Paraguay, published by the Biblioteca Tecnica Cientifica Centralizada.

H. Information Centres and Their Services

1. General Information Centres

The general information centres in Venezuela other than the CENICIT are the Biblioteca del Instituto Venezolano de Investigaciones Cientificas (IVIC) and the Biblioteca Tecnica Cientifica Centralizada (BTCC).

2. Specialised Information Centres

The libraries of the following research institutes form the nucleus of the nation's specialised information resources:

(a) Instituto de Medicina Experimental (Caracas) founded in 1940.

(b) Instituto Nacional de Nutricion (Caracas) founded in 1949.

(c) Estacion Biologica de los Llanos (Caracas) founded in 1961.

(d) Instituto Botanico (Caracas) founded in 1920.

(e) Medica Venezolana de la Academia Nacional de Medicina (Caracas) founded in 1904.

(f) Sociedad de Ciencias Naturales "La Salle" (Caracas) founded in 1942.

3. Data Centres

At present Venezuela has no data centres that operate on a national
4. Referral Centres

Limited referral services are provided by the CENICIT and the BTCC through their published directories such as these given below:

(a) Directorio de Tecnicos y Cientificos en Petroleo, published by the BTCC.

(b) Directorio de Recursos de Informacion Especializada on Venezuela, published by the CENICIT.

5. Translation Centres

At present there is no translation service available in Venezuela. 77 titles of Spanish translations of foreign works were published in the nation in 1971.

6. Local Information Units

The number of the local information departments in Venezuela is unknown.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services and publications are available:

(a) National union catalogues.

(b) Reference service.

(c) International exchange of documents.

(d) Literature searches.

(e) Referral services.

(f) Reprographic services.

(g) Training in the use of information facilities.

J. Information Users

Great demand in Venezuela for information services arises out of the research and development institutes, higher educational institutions, industry, and government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used

Library operation has been partially computerised in the Biblioteca
Central de la Universidad Central de Venezuela and the Biblioteca de
Instituto Venezolano de Investigaciones Cientificas.

I. Methods of Communication in Use in Interlending

The postal service is almost exclusively used.

II. Cooperation among Library and Information Institutions

Cooperation in the country takes the form of interlending and union
catalogues, and is organised at both regional and national levels. Two
examples are introduced below:

(a) REDINSE. REDINSE, a socio-economic information network, is an
information cooperative organised through the initiative of the Consejo
Nacional de Investigaciones Cientificas y Tecnologicas (Caracas), to bring
together Venezuelan libraries and information centres specialising in that
field. Its aims are: to coordinate inter-institutional cooperation, to supply
suitable socio-economic information as required, and to coordinate the
processes of locating specialised information available elsewhere.

(b) Biblioteca Tecnica Cientifica Centralizada. This library was
established in 1966 upon the recommendations of the Conferencia Pro-
Desarrollo de la Region Centro Occidental de Venezuela, Barquisimeto, to
promote and assist inter-institutional cooperation within the region.

III. Network Development

No formal information network has as yet been formed in Venezuela.

IV. Research and Development in Information Work

Research activities in information work are as yet limited in Venezuela.

V. Training for Information Specialists

There are no training courses for information specialists. There is,
however, a library school at university level at the Universidad Central de
Venezuela in Caracas, where introductory subjects of information science are
taught.

VI. Main Difficulties
The main difficulties with respect to the development of information services in the country are: insufficient funds and shortage of qualified information specialists.

R. Current Planning

Current planning in information services is expansion of the coverage of the REDINSE.
### A. Basic Statistical Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Year</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population (1,000)</td>
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<td>20,522</td>
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<td>3. Density of population (to 1 km²)</td>
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<td>83</td>
</tr>
<tr>
<td>4. Per capita gross domestic product (in U.S. dollars)</td>
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<td>...</td>
</tr>
<tr>
<td>5. Education No. of students enrolled in 1st level</td>
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<td>No. of students enrolled in 2nd level</td>
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<td>No. of students enrolled in 3rd level</td>
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<td>360,000</td>
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<tr>
<td>Adult illiteracy rate (%)</td>
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<td>6</td>
</tr>
<tr>
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<td>Data</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------</td>
<td>------------</td>
</tr>
<tr>
<td>9. Scientific and technical manpower</td>
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<td></td>
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<tr>
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<td>Engineering and technology</td>
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<td>7,878</td>
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<td>Medical sciences</td>
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<td>1,691</td>
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<td>Agriculture</td>
<td>73</td>
<td>2,039</td>
</tr>
<tr>
<td>Social sciences and humanities</td>
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<td>3,132</td>
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<td>All sectors</td>
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<td>16,616</td>
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<tr>
<td>Production sector</td>
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<td>Higher education</td>
<td>73</td>
<td>2,310</td>
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<tr>
<td>General service</td>
<td>73</td>
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<td>11. Research and development (personnel by sector of performance)</td>
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<td></td>
</tr>
<tr>
<td>Scientists and engineers: total stock</td>
<td>73</td>
<td>105.0</td>
</tr>
<tr>
<td>Scientists and engineers: engaged in R. &amp; D.</td>
<td>73</td>
<td>7.9</td>
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<tr>
<td>Technicians per 10,000 population</td>
<td>73</td>
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</tr>
<tr>
<td>No. of technicians per scientist and engineer</td>
<td>73</td>
<td>10.0</td>
</tr>
<tr>
<td>Expenditure for R. &amp; D. as percentage of GNP (%)</td>
<td>73</td>
<td>0.8</td>
</tr>
</tbody>
</table>
B. Introductory Survey

1. Recent History

Yugoslavia has for many years followed a policy of non-alignment in its foreign relations. The Constitution adopted in 1974 aimed at involving the working class directly in the exercise of political power at all levels. A leading part is envisaged for the League of Communists in the organisation of the country.

2. Government

Yugoslavia is a socialist federal republic comprising six republics and two autonomous provinces. A collective Presidency, consisting of one representative of each republic and autonomous province and the President of the League of Communists, exercises the right and duties of the Head of State.

3. Economic Development

The rapid development of heavy and light industry since the end of the Second World War has reduced the proportion of the working population employed in agriculture from 80 per cent to less than 40 per cent. There has been a marked increase in the production of crude oil, machinery and motor cars.

4. Social Welfare

All employed persons and their families are covered by general social insurance schemes. This form of insurance is obligatory and is enforced by law.

5. Education

Elementary education is free and compulsory for all children between the ages of 7 and 15. Higher education is run on a very open system and is available to all who can qualify, irrespective of their school background.

C. Government Authorities Responsible for Information Service

There is no Federal government department totally responsible for the
nation's library and information services, which are decentralised at republican level.

D. Central Information Coordinating Organisations

The Jugoslovenski Centar za Tehnicku i Naučnu Documentaciju (JCTND) in Belgrade operates at both policy-formation and operational level.

1. Members

The JCTND has a committee of representatives of: (a) R. and D. institutes at federal level, (b) Chief Scientist's Offices of the Federal, Republican and Provincial governments, (c) institutions of higher education, and (d) industrial enterprises.

2. Terms of Reference

The JCTND's mandate is as follows:

(a) To programme and coordinate activities directed to the planned introduction and development of a national network of scientific, technical and economic information.

(b) To prepare long range plans for the development of scientific, technical and economic information.

(c) To control the realisation of objectives laid down in the various information programmes and plans, including R. and D. in the field of information.

(d) To act as a national clearinghouse for information.

(e) To participate in, and promote, international cooperation on information matters.

E. National Institutions

1. National Libraries

There is no truly national, central library in Yugoslavia serving at the federal level but there are six national libraries, one in each of the six Republics, serving at the republican level.

2. National Archives

As in the case of the national libraries, a national archives
centre has been established in each of the six Republics to collect and conserve important archives, mainly those connected with the history of their respective Republics.

3. National Information Centres

The JCTND (Yugoslav Scientific and Technical Documentation Centre) is the national information centre of Yugoslavia. The JCTND provides nationwide information services in all fields, particularly in those of applied sciences. Its tasks and functions are:

(a) Registering domestic R. and D. results.
(b) Processing the world's information material.
(c) Referral services.
(d) Research in information work.
(e) Organising advanced training courses for specialists.
(f) Literature searches.

F. Depository Collections

The six national libraries in E are the Federal copyright and deposit libraries in Yugoslavia.

G. Important Bibliographical Publications

1. General Bibliographies and Catalogues

(a) Catalogue of Books Published in the Languages of the Yugoslav Peoples, published by the Central Library for the Socialist Republic of Serbia.

(b) Bibliography of Official Publications in Yugoslavia, published by the Yugoslav Bibliographical Institute.

2. Bibliographies of Special Subjects

Yugoslav Bibliography of the Collections of Medical Prescriptions Known as "Lekaruse", published in 1973 by the Naucono Drustvo za Istoriju Zdravstvene Kulture Jugoslavije.

3. Abstracts and Indexes

Index Medicus Yugoslavicus, published by the Znanstveno
4. Union Catalogues

(a) The six national libraries compile union catalogues of their respective Republics, e.g., *The Catalogue of Foreign Periodicals in the Libraries of Serbia*, published by the Central Library for the Socialist Republic of Serbia.


H. Information Centres and Their Services

1. General Information Centres

The JCNID is the only institution that can be rightfully called a general information centre in Yugoslavia.

2. Specialised Information Centres

There are few organisations in Yugoslavia which are self-described as "specialised information centres" although the following special libraries and information services partially perform functions of a specialised information centre:

(a) Boris Kidric Institute of Nuclear Sciences (Belgrade).

(b) Federal Institute for Patents (Belgrade).

(c) National Agricultural and Forestry Centre (Belgrade).

(d) Institute of Social Studies (Belgrade).

3. Data Centres

At present Yugoslavia has no data centres that operate on a national scale.

4. Referral Centres

At present referral services are limited. However, referral centres are planned to be established in the republics and autonomous provinces of Yugoslavia to take an important role in the "decentralised
information network" which is now under implementation (206).

5. Translation Centres

There is no information institution in Yugoslavia that provides an ad hoc translating service. However, the JCTND provides limited ranges of translation service on request, through a register of extramural translators. 1,482 titles of translations of foreign works were published in 1973.

6. Local Information Units

Data for local information units in Yugoslavia are not available.

I. Kinds of Library and Information Services Available in the Nation.

At present the following services and publications are available:

(a) National union catalogues.
(b) International exchange of documents.
(c) Translation service.
(d) Register of translations.
(e) Register of translators.
(f) Reprographic services.
(g) Reference service.
(h) Current awareness services.
(i) Literature searches.

J. Information Users

Great demand in Yugoslavia for information services arises out of the industrial organisations, research and development institutes, higher educational institutions, government departments and agencies, in that decreasing order.

K. Mechanised Methods Being Used

On the whole, "Yugoslavia is not taking full advantage of modern possibilities of data processing and storage. Hardly any documentation services or special libraries utilize a computer" (206).

L. Methods of Communication in Use in Interlending
The postal service is almost exclusively used. Telex is not yet in use in any Yugoslav library.

M. Cooperation among Library and Information Institutions

Cooperation among information institutions for the most part takes the form of interlending and compilation of union catalogues.

N. Network Development

No information network as yet exists in Yugoslavia. However, a plan for a decentralised information network based on the cooperation of referral centres in the Republics and Autonomous Provinces has been drawn up and is now being implemented.

O. Research and Development in Information Work

The JCTRD has the primary responsibility for research in information science. Its formal assignments include study of principles, techniques, and organisation of information for the purpose of introducing and promoting improved methods in Yugoslavia.

P. Training for Information Specialists

The Centre for the Study of Librarianship, Documentation, and Information Science of the Faculty of Natural and Mathematical Sciences of Zagreb University offers a two-year postgraduate programme in the three field named. It also conducts training of users. There are three more courses for information specialists in Yugoslavia.

Q. Main Difficulties

The main difficulties with respect to the development of information services in Yugoslavia are: (a) the federal structure of the nation, and (b) lack of qualified information specialists.

R. Current Planning

Current planning in information services include: (a) implementation of the national information network outlined above, and (b) introducing of mechanised methods of information handling.
3.3 Common Characteristics of the Information Needs and Services in the Advanced Developing Countries

The data contained in the country reports presented in the preceding section are summarised here under the following headings:

1. Governmental role in information and library services
2. Central information coordinating bodies
3. National information institutions
4. Central depository collections
5. Situation in national bibliographical control
6. Information centres and services
7. Subject fields of information covered by information centres and libraries
8. Kinds of information services provided by information centres and libraries
9. Demand for information services
10. Distribution of research and development workers
11. Application of mechanised methods to information work
12. Methods of communication in use in interlending
13. Cooperation among information institutions
14. Development of information networks
15. Situation in research and development in information work
16. Situation in training of information specialists and librarians
17. Main difficulties in the development of information services
18. Current planning and projects for the near future in information services

3.3.1 Governmental Role in Information and Library Services

Table 3.1 shows the importance of the role played by the Government in the provision of information and library services. All the 15 countries investigated have established governmental authorities...
Table 3.1 Governmental authorities responsible for information and library services

I = Responsible for information services
L = Responsible for library services

<table>
<thead>
<tr>
<th>Governmental authorities</th>
<th>Ministry of Education</th>
<th>Ministry of Cultural Affairs/Information Services</th>
<th>Ministry of Science/Higher Education</th>
<th>National Council for Science and Technology</th>
<th>State Department of Education</th>
<th>Ministry of the Interior</th>
<th>Others</th>
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<td>Brazil</td>
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responsible for at least part of their library services. In five countries there now exist governmental authorities responsible for information services, the need for which has been recently recognised by the governments of the developing countries. The information services are usually administered by those authorities which cover the domain of science and technology, while the authorities responsible for administration of the library services are usually those covering the domain of education and culture. The "others" in Table 3.1 refer to the COLCULTURA in Colombia, the Urban Council in Hong Kong, the Prime Minister's Office in Iran, and the Kenya National Library Service Board in Kenya. Normally information and library services are to some extent regulated by government instructions, rules, laws, etc. In several countries including Brazil, Colombia, Iran, Kenya, Korea and Yugoslavia, there are prospective and operating plans for information and library services at government level. The analysis shows that the governments of the countries investigated organise and integrate their information services with different degrees of centralisation and decentralisation. They tend to view special libraries as essential part of the national network.

3.3.2 Central Information Coordinating Bodies

Attention must be paid to the effective management of information resources on a national scale if waste of effort is to be eliminated. In the United Kingdom, the Office for Scientific and Technical Information (OSTI) was established in the Department of Education and Science in 1965, and since then similar organisations have been established in many countries. (The OSTI was transferred to the British Library in 1974). The impetus for their formation has been encouraged by international organisations such as the OECD and Unesco. Tables 3.2 and 3.3 show that 13 out of the 15 countries investigated have already established such a central body to coordinate information activities nationally. Only two countries—Hong Kong and Malta—have not yet established such a high level organisation. In a strict sense,
Table 3.2 Composition of central information coordinating bodies

Number of the countries which have established a central coordinating body: 13

<table>
<thead>
<tr>
<th>Members representing:</th>
<th>Government ministries</th>
<th>Higher educational institutions</th>
<th>Central R. and D. institutions</th>
<th>Information centres</th>
<th>Libraries</th>
<th>Industrial organisations</th>
<th>Publishing organisations</th>
<th>Others</th>
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<td>62</td>
<td>62</td>
<td>46</td>
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</table>
the Kenya National Library Service Board and the Advisory Board of the National Library of Malaysia may not be called a coordinating body for information services. However, in the absence of such an information coordinating body, both Boards coordinate in practice the total information and library resources of their respective nations. At present there is no official, national information policy-making element in Turkey. The TURDOK of the Scientific and Technical Research Council of Turkey guides and promotes information activities in the nation while providing nationwide information services. Recently a more formal information coordinating element in Turkey has been proposed by the State Planning Organisation.

A. Composition of Steering Committees

As shown in Table 3.2 the general picture of the representation on the steering committees of the central information coordinating bodies is not unexpected. The committees are basically composed of the representatives of:

(a) Government ministries  (d) Information centres
(b) Academic institutions  (e) Libraries
(c) R. and D. organisations (f) Industrial organisations

The "others" in Table 3.2 refers to the Iranian National Archives Organisation, the Iranian National Commission for Unesco, and the National Iranian Radio and Television. Some questionnaire respondents noted that the composition of the steering committee was not absolutely defined; members are appointed on merit, but balanced sectoral representation was ensured.

B. Terms of Reference

This is difficult to analyse, since (a) in some cases (such as Mexican and Venezuelan ones), the steering committee and the operational unit are one and the same, and (b) in other countries (such as Brazil and Korea), the steering committee is removed from day-to-day activities. Considering Table 3.3 one sees a very wide spread in terms of reference of
<table>
<thead>
<tr>
<th>Terms of reference</th>
<th>Development of national information networks</th>
<th>Coordination of national networks</th>
<th>Coordination of international cooperation for R. and D. in information services</th>
<th>Long-range planning for information policy</th>
<th>Organisation of information specialisation training</th>
<th>Promotion of R. and D. in information work</th>
<th>Involvement in international cooperation services at operational level</th>
<th>Organization of information networks</th>
<th>Promotion of standardization of new services</th>
<th>Promotion of standardization of new services</th>
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<tr>
<td>Developing countries</td>
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<td>Taiwan</td>
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<td>Malaysia</td>
<td>Kuwait</td>
<td>Korea</td>
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<tr>
<td>Number of countries</td>
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<td>5</td>
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<td>10</td>
<td>62</td>
<td>77</td>
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<td>Total</td>
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</table>
the various organisations. Basically three types of organisation can be identified in this context:

(a) Those organisations such as the Mexican, Venezuelan, Yugoslav, and to some extent, the Kenyan and Turkish bodies which have a wide mandate covering policy formation, advisory functions, planning and operational information activities (38%).

(b) Those organisations such as the Brazilian, Colombian, Iranian, Iraqi, Korean, Kuwait and Taiwanese bodies the mandate of which are similar to those listed in (a) above, but without the involvement at operational level (54%).

(c) Those organisations such as the Malaysian body the mandate of which is restricted to an advisory role (8%).

For the ADC the second type of organisation (such as the Brazilian model) has much attraction. The first type of organisation (such as the Mexican body) might introduce an element of bias against the role of libraries and archives in the transfer of information. One feels that the third type of organisation (such as the Malaysian body) suffers from lack of real involvement in decision making in the information field.

It must be carefully considered whether to confine the activities of the central information coordinating body strictly to scientific and technical information matters (as do Colombia, Iran, Iraq, Kuwait, Mexico, Turkey, and Venezuela—54%) or to embrace the social sciences and humanities (as do Brazil, Kenya, Korea, Malaysia, Taiwan, and Yugoslavia—46%). The latter definition might be advisable to the ADC. Although the central information coordinating body has been established in most of the ADC, its functions are still ineffective because the machinery is not often used. The problem now is not the lack of the coordinating body but the lack of the will to use it and to make available the resources to back it up.

3.3.3 National Information Institutions
One of the essential items investigated in this study is the question whether or not the country runs national libraries, national archives and national information centres, and what their assignments are. A "national institution" is interpreted here as a coordinating body in a specific field the central service of which is available to the whole country. As shown in Table 3.4 such institutions are operating in most of the countries investigated: national libraries and national archives are operating in 11 countries (73%), and national information centres in 10 countries (67%).

In the countries where a national library has not yet been established, the functions and services of such a library are partly covered through the work of one or more major libraries in the country concerned, e.g., the Urban Council Public Libraries in Hong Kong; the Macmillan Memorial Library, the University of Nairobi Library and the Kenya National Library Service, in Kenya; and the Kuwait University Library and the Kuwait Central Library, in Kuwait. Yugoslavia does not have a national central library serving on a Federal scale but there are six national libraries established in each of its six Republics and serving on a Republican scale. Where a national archives centre has not yet been established, archival documents of national importance are housed in the national library or other major libraries in the nation, e.g., the Urban Council Public Libraries in Hong Kong, the Kuwait University Library in Kuwait, and the Malta Library in Malta. As in the case of its national libraries, Yugoslavia has six national archives, established in each of its six Republics and serving on a Republican scale.

The functions of a national information centre are partly performed in Colombia by the Institute for Technological Research and several other specialised information services; in Hong Kong by the Hong Kong Productivity Centre and the Library of the Federation of Hong Kong Industries in Malaysia by the Institute for Medical Research and several other special
Table 3.4 National information institutions

<table>
<thead>
<tr>
<th>Kinds of institutions</th>
<th>National libraries</th>
<th>National archives</th>
<th>National information centre</th>
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<td>Brazil</td>
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<td><strong>Total</strong> 73 73 67</td>
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</table>
libraries; and in Malta by the Malta Library and the University of Malta Library. An approach towards establishing a national information centre is seen in Colombia, Hong Kong, Kenya, and Malta. The following three main types of the relations among national libraries, national archives and national information centres have been observed:

(a) Three independent institutions under different government authorities (as seen in Brazil).

(b) An integrated library and archival institution, and an independent information centre (as seen in Malaysia).

(c) An integrated library, archival and information institution (as seen in Malta).

The first type of relation is most common (53%).

A. National Libraries

The tasks and functions performed by the national libraries investigated are summarised in Table 3.5. The principal tasks and functions in common are enumerated below:

(a) Central collection of national literature (100%)

(b) Legal deposit (100%)

(c) Exchange of material (91%)

(d) Advice and assistance to other libraries (91%)

(e) Publication of national bibliographies (82%)

(f) National bibliographical information centre (82%)

(g) Planning of the nation's library services (55%)

(h) Promotion of interlibrary cooperation (55%)

All the 11 national libraries perform the two vital functions of a national library, i.e., receiving books under legal deposit and publishing national bibliographies, both of which are fundamental to the effective national bibliographical control, except those of Brazil and Colombia. In these two countries national bibliographies are published by other institutions, i.e., the Instituto Nacional do Livro in Brazil,
Table 3.5 Tasks and functions of national libraries

Number of the countries which have established one or more national libraries: 11

<table>
<thead>
<tr>
<th>Tasks and functions</th>
<th>Brazil</th>
<th>Colombia</th>
<th>Hong Kong</th>
<th>Iran</th>
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</table>

| Total No.                           | 11     | 11       | 10       | 10   | 9    | 9     | 6     | 6     | 3       | 2     | 1      |        |        |           |            |
| Percentage                           | 100    | 100      | 91       | 91   | 82   | 82    | 55    | 55    | 27      | 18    | 9      |        |        |           |            |
and the Instituto Caro y Cuervo in Colombia. A national library is normally expected to assume responsibility for initiation and promotion of cooperation between itself and other libraries in the country and abroad. This function is performed by six (55%) out of the 11 libraries. Another prime task of a national library is the fullest coverage of foreign literature or the planned acquisition of foreign material based on a policy of national coordination on the lines of the Farmington Plan, the Scandinavia Plan and the Programme of the Deutsche Forschungsgemeinschaft. Only two (18%) out of the 11 libraries perform this function.

B. National Archives

The system of interrelations between people generally needs to be organised, and to some extent this is achieved by means of documents, which provide the immediate executive authority with the information needed for decision-making. Working with documents is an important part of the activities of administrative staff in all aspects of the life of society. Therefore, documents contain retrospective information about society and about the past history, the achievements and the traditions of the nation. Society, therefore, needs its documents to be carefully preserved. Most of the countries investigated (73%) have established their national archives. The question is how well the document collections are organised so as to make them readily available to users. During the course of interviews with the students from the countries investigated who studied at Loughborough University of Technology the investigator received a strong impression that most of their national archives were mere document depositories, playing only in part the role of a true national archives centre. Efforts are, however, being made to modernise the activities of national archives in some of the countries including Korea, Turkey and Yugoslavia.

C. National Information Centres

The tasks and functions performed by the national information centres in the countries investigated are summarised in Table 3.6. Those
<table>
<thead>
<tr>
<th>Tasks and functions</th>
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<td>Greek</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
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<td></td>
</tr>
<tr>
<td>Abuse and assistance to other centres</td>
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<td></td>
</tr>
<tr>
<td>Reprographic services</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Processing of the world's literature</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promotion of inter-institutional cooperation</td>
<td>3</td>
<td></td>
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<tr>
<td>Literature searches</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Translation service</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Referral services</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Publication of indexes</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Register of domestic R. and D.</td>
<td>3</td>
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</tr>
</tbody>
</table>

Number of the countries which have established a national information centre.

Table 3.7 Tasks and functions of national information centres.
tasks and functions in common are enumerated below:

(a) Register of domestic R. and D. results (100%)  
(b) Reprographic services (90%)  
(c) Processing of the world's information material (80%)  
(d) Publication of indexes (70%)  
(e) Referral services (60%)  
(f) Translation service (60%)  
(g) Literature searches (60%)  
(h) Promotion of inter-institutional cooperation (50%)  

A prime function of a national information centre is to supply scientists and experts of all fields in an efficient manner with information needed for their research and production processes. This function comprises the tasks of registering domestic R. and D. results, reprographic services, processing of the world's information material, publication of indexes, referral services, translation service, literature searches, publication of abstracts, state-of-the-art studies, reference service, and current awareness services. These tasks are performed by most (60-100%) of the centres polled, except the last four which are performed by a relatively small proportion (30-40%) of the centres.

Other important functions of a national information centre is the guidance, planning and coordination of the nation's information activities which comprise the central task of promotion of inter-institutional cooperation, and advice and assistance to other libraries. The task of promotion of inter-institutional cooperation is performed by 50% of the centres polled, and the task of advice and assistance to other centres by 20%. As a whole, it may be said that the developmental phase of the national information centres investigated have not yet reached the level of national planning and coordination of information services.

Separate information science courses of one type or another are offered by three (30%) out of the 10 centres. Brazil's IBICT offers a degree-granting postgraduate course. Unesco has recommended that "the
national information centre should, on a national scale and within the scope of its possibilities, carry out basic research on the development of the science of information" (ISORID, circular letter C1/2165). Four (40%) out of the 10 centres polled have been carrying out this function on a limited scale.

3.3.4 Central Depository Collections

It is quite obvious that to provide effective information services on a very large scale, any nation would require at least one rich collection of documents in all fields and of all types as the base of its service activities. All the countries investigated have one to six legal depository libraries, except Kuwait which does not yet have one (see Table 3.7). A copyright bill has been drafted and recently introduced by the government of Kuwait. If the bill be passed, the Kuwait University Library will be the legal depository of books produced in the country. All the national libraries polled have been designated as legal depositories. They constitute 42% of the 36 legal depositories in the 15 countries investigated. Nine (25%) out of the 36 legal depositories are "other institutions" which refer to the Instituto Nacional do Livro in Brazil, the Instituto Caro y Cuervo in Colombia, the British Library in the United Kingdom, and the six national libraries established in the six constituent Republics of Yugoslavia. Five university libraries (14%), four public libraries (11%) and three national information centres (8%) have also been designated as legal depositories. In some countries such as Iran, depository libraries appear to have difficulties in ensuring complete coverage because books produced in local areas are not deposited directly in them.

3.3.5 Situation of National Bibliographical Control

It is difficult to present in tabular form a general situation of the bibliographical control of a group of countries. For the purpose of comparison, one of the countries investigated is selected for the norm. Korea is selected because, as outlined in 3.2.7, the situation in Korea
Table 3.7 Central depository collections

<table>
<thead>
<tr>
<th>Types of libraries</th>
<th>National libraries</th>
<th>University libraries</th>
<th>Public libraries</th>
<th>National information centres</th>
<th>Other institutions</th>
<th>Total number</th>
</tr>
</thead>
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<td>3</td>
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<tr>
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<td>Malaysia</td>
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<td>11</td>
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</table>
of the bibliographical control is neither so good as that of the industrialised countries nor so bad as that of the least developed ones, and because the investigator is more familiar with the situation in the country than with those in others. The comparison of the situation of each of the countries with that of Korea was hoped to produce a useful picture of their general situation revealing some interesting patterns of distribution of the characteristics peculiar to those countries investigated. The comparing and grading work was difficult because the data used for this purpose were limited. The results were summarised in Table 3.8.

The "situation indices" in Table 3.8 show that in each of the 12 countries (80%) the indices of which are 7, 8 and 9, the situations of the national bibliographical control are much alike. These countries, according to their respective national problems and priorities, publish general bibliographies, bibliographies of special subjects and indexes, and union catalogues, of one kind or another, in order to control the current and retrospective literature. These bibliographies are not all complete and usable. However, the countries manage to control the current literature of most fields and the retrospective literature of some fields, responding to urgent, local demand. At present Kenya (situation index: 13), Malaysia (situation index: 12), and Malta (situation index: 14) have few usable bibliographies, except national bibliographies. Demand for bibliographies is increasing in these countries as their academic, research, and industrial activities are rapidly expanding, and attempts are being made to control their national literature more effectively.

A. General Bibliographies

All the 15 countries investigated publish their respective national and other general bibliographies.

B. Bibliographies of Special Subjects

More bibliographies, and more complete and usable bibliographic of this kind are needed in the countries investigated especially in Iran
Table 3.8 Situation of national bibliographical control

1 = Above the norm
2 = The norm, i.e., the situation corresponding to that of the bibliographical control in Korea
3 = Below the norm
4 = Very limited

<table>
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<th>Bibliographical control</th>
<th>Publication of general bibliographies</th>
<th>Publication of bibliographies of special subjects</th>
<th>Publication of abstracts and indexes</th>
<th>Publication of union catalogues</th>
<th>Total (Situation Indices)</th>
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and Venezuela.

C. Abstracts and Indexes

All the countries, especially Colombia and Iraq need to pay more attention to more and improved abstracts and indexes in the fields of natural and social sciences. The present bibliographical control in these fields is embryonic.

D. Union Catalogues

All the 15 countries, especially Hong Kong, Kuwait, Malaysia and Turkey need to pay more attention to regional and national union catalogues. Union catalogues are essential for identification of the national literature when it is dispersed in a variety of scattered libraries and private collections and for the facilitation of interlibrary cooperative ventures, which are urgently needed in these countries.

3.3.6 Information Centres and Services

The various information centres and services established in the 15 countries investigated are summarised in Table 3.9. It shows whether or not the six different types of centres and services exist in these countries. The number of the centres and services has not been specified in the Table because the number is insignificant as such in the comparative analysis of the situation of the information services in each of the countries.

A. General Information Centres

The "general information centre" is interpreted here as a central information institution which covers most of the domains of the natural and social sciences, technology, and humanities, and the services of which are available to the whole country. Such centres have been established in 11 (73.3) out of the 15 countries. Their coverage and the size of their staff vary. Some centres such as the INICT in Brazil and the JUTND in Yugoslavia cover nearly all fields, while others such as the CSID in Mexico and TÜRKAD in Turkey covers only science and technology.
Table 3.9 Information centres and services

<table>
<thead>
<tr>
<th>Types of information centres and services</th>
<th>General information centres</th>
<th>Specialised information centres</th>
<th>Data centres</th>
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<th>Translation services</th>
<th>Local information units</th>
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<tr>
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<td><strong>Total</strong></td>
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<tr>
<td><strong>%</strong></td>
<td><strong>73 93 13 60 73 100</strong></td>
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</tbody>
</table>
Some comparatively old centres such as the KORSTIC in Korea have a large staff of more than 200 full-time employees, while newly established centres such as the ISDC in Iraq and the NSTIC in Kuwait are rather small and with a limited staff. In some countries such as Iran and Kuwait, the national information centre is the only general information centre in the country. The analysis shows that in the first stage it is commonly the centralised form in which the information services for the whole country are provided from one national centre. In the next stage the process of decentralisation begins to assert itself. In the countries where no general information centre has been established, the services of such a centre are partly provided by university information centres as in Colombia and Malta, or by the libraries of major research organisations as in Kenya and Malaysia.

B. Specialised Information Centres

A specialised information centre is an information centre which attempts to meet as many as possible of the needs for information on a particular specialised topic of the workers interested in that topic, regardless of their location. All the countries investigated have established such centres, except Malaysia where information services are provided by libraries. The subject fields commonly covered by the specialised information centres operating in the countries are: natural sciences (57%), technology (57%), agriculture (50%), and social sciences (50%). Distribution of the other subject fields is scattered and insignificant for comparative purposes (see Table 3.10). This logically implies that in these countries demand for information services arises out of the fields of natural sciences, technology, agriculture and social sciences.

C. Data Centres

Data centres concentrate on gathering, processing and provision of scientific, engineering, industrial and socio-economic data. Such centres are operating only in two (13%) out of the 15 countries investigated: Korea and Turkey. In the absence of data centres some of
Table 3.10 Subject fields covered by specialised information centres

<table>
<thead>
<tr>
<th>Subject fields</th>
<th>Natural sciences</th>
<th>Technology</th>
<th>Agriculture</th>
<th>Social sciences</th>
<th>Public health</th>
<th>Medicine</th>
<th>Education</th>
<th>Law</th>
<th>Humanities</th>
<th>Total</th>
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<tr>
<td><strong>Total</strong></td>
<td><strong>No.</strong> 8 8 7 7 3 1 1 1 1</td>
<td><strong>%</strong> 57 57 50 50 21 7 7 7 7</td>
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</tr>
</tbody>
</table>
their functions are often performed by other institutions and agencies such as the IBICT in Brazil, and the governmental offices of statistics in Iraq and Kuwait. Because of the high cost involved in collecting and processing data, these countries depend almost entirely upon the output from the industrialised countries for scientific, technological and medical data. Most of the data processed in these countries are socio-economic ones relative to their respective countries.

D. Referral Services

As yet none of the 15 countries has established a referral centre or a department devoted to referral services within an information centre. A referral centre or service directs inquirers to specialised sources in scientific, industrial and other disciplines or fields. However, in the absence of such a centre basic referral services are provided by some of the general information centres (such as the IBICT in Brazil and the KORSTIC in Korea) and specialised information centres (such as the Office of Information in Colombia) through their published directories of research institutes, research in progress, scientists and experts in various fields, special libraries and information facilities, etc. Table 3.9 shows the availability of referral services of one kind or another in nine (60%), out of the 15 countries.

E. Translation Service

Many people come across a book or an article relevant to their interests in a language they cannot read. The first step is to find out whether a translation already exists, and the second is to have one made if considered justifiable. At least one information centre or library in every country should assume the responsibility to provide extensive help at both stages, in terms of publication of indexes of translations and ad hoc translating services. As will be seen in Table 3.13 indexes of translations are available in only two out of the 15 countries investigated. Although Table 3.5 shows that ad hoc translating services are available in
11 countries (73%), they lack the commissioning function which is supposed to be fundamental to any ad hoc translating service. Translation service in these countries are not easily accessible because it is restricted in many cases to certain limited user groups. The most common practice followed is to help the user by providing him with a panel of extramural translators with specialist knowledge as well as linguistic qualifications. Such service is provided by general information centres, specialised information centres, and in Malaysia and a few others, by libraries. In any case, there is as yet no institution in these countries responsible for the overall financial control of the nation's translation programme.

Table 3.11 shows a general picture of the publication of translations of foreign works in the countries. These translations are published by research associations, universities, learned societies, industry and commercial publishers. It is quite plain that at present published translations do not have any significant place in the information transfer in these countries, except a few like Brazil, Yugoslavia and Turkey. So far as scientific and technical information is concerned, published translations can hardly be expected to meet any meaningful proportion of the information needs in these countries.

F. Local Information Units

"Local information units" here refer to those information bodies attached to scientific, industrial and other institutions and enterprises. Such information units are mostly entrusted with the following tasks and functions:

(a) Prompt and accurate information and library services to scientists, specialists and industrial workers.

(b) Diffusion of progressive scientific and technical experience.

(c) Control over the utilisation of information material.

The number of local information units in each country is
Table 3.11 Translations published in 1973

<table>
<thead>
<tr>
<th>Subject fields of translations</th>
<th>Generalities</th>
<th>Humanities</th>
<th>Social sciences</th>
<th>Pure and applied sciences</th>
<th>Total number of titles</th>
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<td>1,419</td>
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<td>32</td>
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<tr>
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<tr>
<td>Mexico</td>
<td>59</td>
<td>46</td>
<td>133</td>
<td>218</td>
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<td>Turkey</td>
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<td>793</td>
<td>77</td>
<td>120</td>
<td>991</td>
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<td>32</td>
<td>6</td>
<td>77</td>
</tr>
<tr>
<td>Yugoslavia</td>
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<td>921</td>
<td>405</td>
<td>133</td>
<td>1,482</td>
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<table>
<thead>
<tr>
<th>Country</th>
<th>No. of local information units</th>
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</thead>
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<tr>
<td>Brazil</td>
<td>210</td>
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<tr>
<td>Colombia</td>
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<tr>
<td>Hong Kong</td>
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<tr>
<td>Iran</td>
<td>N.A.</td>
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<tr>
<td>Iraq</td>
<td>17</td>
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<tr>
<td>Kenya</td>
<td>N.A.</td>
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<tr>
<td>Korea</td>
<td>391</td>
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<tr>
<td>Kuwait</td>
<td>6</td>
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<tr>
<td>Malaysia</td>
<td>N.A.</td>
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<tr>
<td>Malta</td>
<td>N.A.</td>
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<tr>
<td>Mexico</td>
<td>N.A.</td>
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<td>Taiwan</td>
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<td>Turkey</td>
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<tr>
<td>Venezuela</td>
<td>N.A.</td>
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<tr>
<td>Yugoslavia</td>
<td>N.A.</td>
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</tbody>
</table>

Data for eight countries are not available. One receives an impression from Table 3.12 that most of the industrial organisations in these countries lack adequate information resources of their own.

**3.3.7 Subject Fields of Information Covered by Information Centres and Libraries**

The data on the subject fields of information covered by the information centres and libraries in the 15 countries investigated are summarised in Table 3.13. The subject fields commonly covered are: technology (93%), natural sciences (80%), agriculture (73%), social sciences (60%), and medicine (53%). This practically corresponds to the
Table 3.13 Subject fields of information covered by information centres and libraries

<table>
<thead>
<tr>
<th>Subject fields</th>
<th>Technology</th>
<th>Natural sciences</th>
<th>Agriculture</th>
<th>Social sciences</th>
<th>Medicine</th>
<th>Public health</th>
<th>Humanities</th>
<th>Education</th>
<th>Law</th>
<th>Total</th>
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<tbody>
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<td>Hong Kong</td>
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<td><strong>Total</strong></td>
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<td><strong>%</strong></td>
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<td><strong>93</strong></td>
<td><strong>80</strong></td>
<td><strong>73</strong></td>
<td><strong>60</strong></td>
<td><strong>53</strong></td>
<td><strong>33</strong></td>
<td><strong>27</strong></td>
<td><strong>20</strong></td>
<td><strong>13</strong></td>
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</tbody>
</table>
distribution of the subject fields covered by the specialised information centres operating in the same countries (see Table 3.10). The minor differences are noticed in the former: an addition of the medical field and slightly increased frequencies of the subject fields, which do not substantially change the general picture of the latter. This consistency confirms the concluding remark made in 3.3.6 that great demand for information services in these countries arises out of the fields of natural sciences, technology, agriculture and social sciences.

3.3.8 Kinds of Information Services Provided by Information Centres and Libraries

As shown in Table 3.14 reference service, reprographic services, and international exchange of information material are provided or carried out by either information centres or libraries in all the 15 countries. Other information services available in most of the countries include: national union catalogues (87%), translation service (73%), referral services (67%), current awareness services (60%) and literature searches (60%). Distribution of other services is scattered and has little comparative value.

There should be at least one clearinghouse for the national exchange of books and periodicals including duplicates in each country. The national exchange service is fundamental to the efficient utilisation of existing information materials in the country. Table 3.14 shows that such service is available only in six countries (40%). Attention should also be given to collection and provision of standards and patents, both of which are indispensable to any modern industrial activity. Standards specify the types and models of products as well as their quality, testing methods, packing, marking, transportation and storage. They continually promote better use of materials, fuel and power, faster designing and lower costs of industrial products, and serve as a source of information on technical accomplishments. Another important source of scientific and
Table 3.14 Kinds of information services provided by information centres and libraries

<table>
<thead>
<tr>
<th>Kinds of information services</th>
<th>Reference service</th>
<th>International exchange of documents</th>
<th>Reprographic services</th>
<th>National union catalogues</th>
<th>Translation service</th>
<th>Referral services</th>
<th>Literature searches</th>
<th>Scientific and socio-economic data</th>
<th>National exchange of documents</th>
<th>Collections of standards</th>
<th>Literature analysis</th>
<th>Register of translators</th>
<th>Collections of patents</th>
<th>Register of translations</th>
<th>Total</th>
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<td>13</td>
<td>11</td>
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<td>5</td>
<td>4</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>% 100</td>
<td>100</td>
<td>100</td>
<td>87</td>
<td>73</td>
<td>67</td>
<td>60</td>
<td>47</td>
<td>40</td>
<td>33</td>
<td>27</td>
<td>20</td>
<td>20</td>
<td>13</td>
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</tr>
</tbody>
</table>
technical information is patent literature which makes it possible to trace the history of any invention or discovery and to get a clear picture of the present state-of-the-art and development trends in a specified field of science or technology. The service for standards is available in five countries (33%), and that for the patent literature in three countries (70%).

3.3.9 Demand for Information Services

Demanding groups for information services in each of the 15 countries were ranked by the questionnaire respondents, according to their own views. These rankings are summarised in Table 3.15. Even though such rankings inevitably introduce an element of subjectivity, this can be justified, because it is the investigator's aim to get a general picture of the distribution of the demanding groups within the whole category of these countries, not such a picture of that within each country, and as many as 31 responses have been analysed for this purpose. Table 3.15 shows that in these countries the greatest demand for information services is made by the workers in the research and development institutes, followed by two user groups with nearly identical "demand index", i.e., the workers in the higher educational institutions (demand index: 2.2) and those in the industrial organisations (demand index: 2.4). The user group from the government departments and agencies is the fourth in the rank order. Three countries include the group from the mass communications in their rankings, and four countries that of the general public, but both are ranked as the least demanding categories. From these analyses, it may be said that the demand for information services in the countries arises, for the most part, from the personnel of the research and development institutes, higher educational institutions, and industrial enterprises.

3.3.10 Distribution of Research and Development Workers

In the preceding subsection (3.3.9) the analysis revealed that the greatest demand for information services in the countries investigated was made by the workers in the research and development institutes. In this
Table 3.15 Demand for information services ranked by respondents

1 = User group making the greatest demand  
2 = User group making the second greatest demand  
6 = User group making the least demand

<table>
<thead>
<tr>
<th>User groups</th>
<th>Demand for information services ranked by respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Colombia</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>2 3 1 4 5</td>
</tr>
<tr>
<td>Iran</td>
<td>1 3 2 4</td>
</tr>
<tr>
<td>Iraq</td>
<td>2 1 3 4</td>
</tr>
<tr>
<td>Kenya</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Korea</td>
<td>2 3 1 5 6</td>
</tr>
<tr>
<td>Kuwait</td>
<td>1 2 3 4 6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>3 1 2 4</td>
</tr>
<tr>
<td>Malta</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Mexico</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Taiwan</td>
<td>2 3 1 4 5</td>
</tr>
<tr>
<td>Turkey</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>2 3 1 4</td>
</tr>
</tbody>
</table>

| Demand index | Total | 22/15 | 33/15 | 36/15 | 60/15 | 14/3 | 22/4 | Index (Average) | 1.5 | 2.2 | 2.4 | 4.0 | 4.7 | 5.5 |

---
connection, two questions arise: what the proportion of the researchers being engaged in a given field of science or discipline is and what the proportion of those being engaged in a given sector of performance is. In order to answer the first question, the relevant data presented in the "Basic Statistical Data" for each country have been processed and tabulated in Table 3.16, which shows the general distribution of the research and development workers in the countries investigated by field of science or discipline. 25.3% of the total researchers in the countries are engaged in the field of engineering and about the same proportion (25.1%) of them in agriculture. 15.8% of them are engaged in natural sciences and 13.8% in medical sciences. The proportion of the researchers who are engaged in the fields of social sciences and humanities is 20%. The two major fields which attract comparatively large proportions of researchers in these countries are: engineering and agriculture. If one use the generic term "science and technology" for the natural sciences, engineering, medical sciences and agriculture, the analysis may be restated as follows: 80% of the researchers in these countries work in the fields of science and technology, and the rest (20%) in the fields of social sciences and humanities. This summary data may not effectively show the real situation of every country. For instance, it disagrees considerably with the situation of Hong Kong in which the percentage distribution of the researchers being engaged in the social sciences and humanities is 10%, that of Malta where the percentage distribution in the social sciences and humanities is 46%. These data only present an overall distribution of the researchers in these countries. An answer to the second question is given in Table 3.17, which shows the general distribution of the research and development workers in the countries by sector of performance. The distribution of the researchers in these countries are nearly even in the three sectors of performance as shown in Table 3.17. The production sector employs a slightly more researchers than the other two. As in the case
Table 3.16 Percentage distribution of researchers by field of science or discipline

<table>
<thead>
<tr>
<th>Field of science or discipline</th>
<th>Average percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>25.3%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>25.1</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>15.8</td>
</tr>
<tr>
<td>Medical sciences</td>
<td>13.8</td>
</tr>
<tr>
<td>Social sciences and humanities</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

1 Based on the "Basic Statistical Data" for each country.

Table 3.17 Percentage distribution of researchers by sector of performance

<table>
<thead>
<tr>
<th>Sector of performance</th>
<th>Average percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production sector</td>
<td>39.5%</td>
</tr>
<tr>
<td>Higher education</td>
<td>30.4</td>
</tr>
<tr>
<td>General service</td>
<td>30.1</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

2 Based on the "Basic Statistical Data" for each country.

above, this statement too does not apply to some of the individual situations, such as the situation of Kenya where the percentage distribution of the researchers being engaged in the general service sector is zero, and that of Iraq where the percentage distribution in the same sector is 51%.

3.3.11 Application of Mechanised Methods to Information Work

The questions related to mechanization were to determine the level of mechanisation in the field of information services in the countries
The answers have been summarised in Table 3.18, which reveals the following three types:

(a) Integrated mechanised information services for special fields on national level

(b) Computerised information services in certain information centres or large libraries

(c) Noncomputer mechanised methods applied in information centres or large libraries

The second type is most common, and observed in 10 countries (67%). Two or all of these types are combined in Brazil and Korea. As shown in Table 3.18. Application of mechanised methods is being planned in five countries (33%). As a whole, mechanisation of information work in these countries is still in its infancy, but a basic level of mechanisation is to be attained in all of these countries in the near future, by introduction of modern computerised data processing methods.

3.3.12 Methods of Communication in Use in Interlending

The postal service is almost exclusively used in interlending. An exception is Korea in which telex is also used in the KORSTIC and some major libraries.

3.3.13 Cooperation among Information Institutions

Any country has more or less intellectual, scholarly, and research resources to be found in its libraries and information centres. Without integration and close cooperation, however, these resources will remain a series of separate insulated ones. But if maximum cooperation can be established among them, these resources can be converted into a national resource of immense value to researchers, engineers, students, and general public throughout the country. No library can be self-sufficient. It is, therefore, a good policy for a library to support the immediate needs for books and journals which will be heavily used, and rely on interlending, photo-reproduction, or translation service for specific problems. Reliabil
<table>
<thead>
<tr>
<th>Country</th>
<th>Informal interlending</th>
<th>Cooperative acquisition and processing</th>
<th>Interlending cooperatives</th>
<th>Forms of cooperation</th>
<th>Mechanised services being planned</th>
<th>Mechanised methods</th>
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</thead>
<tbody>
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<td>Cuba</td>
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<tr>
<td>Brazil</td>
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Table 3.18: Use of mechanised methods

Formed information, national libraries and information centres are the main users of mechanised methods. The use of mechanised methods also includes applications in libraries, information centres and certain national libraries. The mechanisation of services on a national level is aimed at improving the efficiency and effectiveness of information services.
in the importance and value of this cooperation was expressed by many of the respondents.

A. Kinds of Cooperation

The kinds of cooperation prevalent among the information centres and libraries in the countries investigated are summarised in Table 3.19. Cooperation in these countries for the most part takes the form of interlending. Formal interlending cooperatives are functioning in eight (53%) out of the 15 countries. Formally organised cooperation in acquisition and processing of information and library material exists in four countries (27%), and such cooperation in compilation of union catalogues also in four countries (27%). At present there are no formal cooperatives in seven countries (47%). In these countries, however, cooperation among institutions is carried on informally. Most of the major information centres and resource libraries in these countries engage in friendly reciprocal sharing of materials through union catalogues or other locating tools. One of the principal factors which hamper wide participation in inter-institutional cooperative ventures in providing information services appears to be the lack of usable union catalogues.

B. Levels of Cooperation

One generalisation or hypothesis may be useful in characterising the current levels of cooperation among information institutions in these countries before turning to actual survey of the individual situations. Drawing on Cory's generation concept applied to library organisation (46), this investigator proposes from the viewpoint of cooperation the following classification of five generations of information services:

(a) The first generation is limited to a single, large scale information centre (such as the KORSTTC in Korea in 1960s).

(b) The second generation consists of a large scale information centre and multiple specialised information centres which have newly come into existence. These centres remain an uncoordinated
conglomeration of various types of establishments, duplicating each other's work to a considerable extent and largely unaware of each other's activities.

(c) The third generation opens the era of cooperation. Most of the scientific organisations, institutions and enterprises now have their own information centres or libraries. Cooperative activities evolve at local level to set up a small scale network with a communication centre at a leading establishment in an area or field. These local networks are not yet linked to each other on a national scale.

(d) The fourth generation refers to the era of the nation-wide network. Approaching to the end of the third generation, the time is ripe for a more closely coordinated network to collect and disseminate information at national level. Such information networks have existed since 1950s in a number of countries, notably in Eastern Europe.

(e) The fifth generation reaches the final and ideal stage of the information activities. Since even the wealthiest and most powerful nation cannot attain complete self-sufficiency in the field of information, any nation in the world must depend more or less on outside sources of information. Thus national information networks come to establish and maintain close contacts with similar networks abroad, forming various international information networks.

The characteristics of the current level of cooperation among information institutions in each of the countries investigated are compared with those of the five generations outlined above, and the results are charted in Figure 3.1. Although Colombia, Kenya, Malaysia and Malta do not yet have a large scale general information centre, their levels of cooperation are classified as the second generation, more precisely, its middle and late stages, for all these countries have already set up specialised information centres which are a characteristic feature of the second generation, except Malaysia in which information services are traditionally provided by libraries. Hong Kong, Mexico and Turkey are in a time of
Figure 3.1 Level of cooperation among information institutions

<table>
<thead>
<tr>
<th>Country</th>
<th>Cooperation</th>
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<tbody>
<tr>
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<td>Colombia</td>
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<td>Yugoslavia</td>
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</table>

transition from the second to the third generation. Figure 3.1 shows that the current levels of cooperation among information institutions in most (87%) of the countries are nearly identical, i.e., the late stage of the second generation to the early stage of the third generation.

3.3.14 Development of Information Networks

An analysis of the questionnaire responses shows that the networks of information centres and libraries in the 15 countries are undergoing gradual development. This development is, however, still in its infancy. No large scale information network exists in 12 countries (see Table 3.70).
### Table 3.20 Development of Information Networks

<table>
<thead>
<tr>
<th>Information Networks</th>
<th>At local level</th>
<th>At national level</th>
<th>National information networks planned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
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<tr>
<td>Colombia</td>
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<td>Yugoslavia</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>No. 1 2 3</strong></td>
<td></td>
<td><strong>% 7 13 20</strong></td>
</tr>
</tbody>
</table>

### Table 3.21 Research and Development Activities in Information Work

<table>
<thead>
<tr>
<th>R and D activities in information work</th>
<th>Applied research conducted by information institutions</th>
<th>Research related to educational programmes at library schools, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Colombia</td>
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<td>Iraq</td>
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<td>Malta</td>
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<td>Venezuela</td>
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<tr>
<td>Yugoslavia</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>No. 5 11</strong></td>
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Only in three countries embryonic forms of network are functioning, but they are mere beginnings of a true network. More elaborate forms of national information network have been planned in some countries such as Iran, Korea and Yugoslavia, to be implemented when conditions will make it possible. To sum up, most governments in these countries believe in the need for development of national information networks as an indispensable tool for their countries' economic, cultural and social well-being, but in many instances they do not yet exist, and in some others they are too embryonic to meet growing requirements.

3.3.15 Situation in Research and Development in Information Work

At present research and development activities in information work are not extensive in the countries investigated. These countries rely almost entirely on the achievements in the industrialised countries for basic research on the development of information science. Applied research is occasionally conducted in five countries (335) by information institutions in relation to the development of their various services (see Table 3.21). In 11 countries research related to educational programmes is conducted at their schools of library and information studies. Most of the information science research conducted within the postgraduate programmes at these schools has aimed at illuminating communication patterns in science and technology in their countries, at uncovering characteristics of associated literature, at defining problems and solutions associated with automation of information processing, etc. This research effort is reflected in the master's theses and associated publications in the countries. There is no central research and development institute or unit with grant allocation powers in these countries that plans at national level a unified programme of critical research and development in information practices, and finds, guides, and supports contractors in the conduct of such research and development. The research in information work is in general not extensive in the countries. A small number of people are involved so far, but its
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<tr>
<th>Country</th>
<th>Library schools including information subjects in their curricula</th>
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**Table 3.22: Institutions of Information and Library Education**
impact in creating an awareness, and its practical potential seems to be great.

3.3.16 Situation in Training of Information Specialists and Librarians

On the basis of the answers to the questionnaire it is possible only to summarise general information on the situation in the training of information specialists and librarians in the countries, as shown in Table 3.22. No detailed information on the level, methods and forms of such training was provided. Institutions dealing with the training of information specialists developed, as a rule, from library schools and courses. This was the case in the industrialised countries and a similar process is now seen in the countries investigated. In many cases information subjects are taught only in library schools. Separate training of information specialists is observed in three countries (20%), and integrated training of information specialists and librarians in two countries (13%). All the 15 countries have at least one library school, in which some subjects of information science are also taught, except two countries, i.e., Hong Kong and Kenya. The latter has not established its own institution for regular training, because there is a regional centre which offers training courses for the East African countries. Short refresher courses for practicing information specialists, and courses for information users are offered in two countries, i.e., in Korea and Yugoslavia. The training of scientists, technicians and social scientists in the use of information needs to be undertaken by at least one information centre or other institution in every country.

3.3.17 Main Difficulties in the Development of Information Services

On the basis of the answers to the questionnaire some of the main problems hampering the development of information services in the countries investigated are summarised in Table 3.23. They are: shortage of qualified information specialists (93%), lack of a national information policy (67%), insufficient funds (53%), lack of coordination and cooperation among
Table 3.23 Main difficulties in the development of information services

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<th>Main difficulties</th>
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<th>Insufficient funds</th>
<th>Lack of coordination and cooperation</th>
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<th>Lack of a central information service</th>
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information institutions (47%), and lack of user education (47%). Four countries (27%) suffer from lack of their central information services. Mexico reports the lack of a national union catalogue, and Yugoslavia is inconvenienced from its federal structure. Unfortunately, all these problems are not properly reflected in their national priorities, as will be seen in the following discussion.

3.3.18 Current Planning and Projects for the Near Future in Information Services

As shown in Table 3.24 the distribution of the current planning and projects in information services in the countries investigated are scattered. There is no characteristic planning or projects. Projects for computerization of information and library work are under way in six countries (40%). In four out of the five countries which have not yet established their national information centres, projects for setting up such a centre are now under way. Preparation for national union catalogues is in progress in five countries (33%) and implementation of the plans for national information networks in four countries (27%). The other current planning and projects are scattered and appear to have little value for analytical purposes. It is plain that the main difficulties hampering the development of information services in these countries are not properly reflected in the current planning and projects. For instance, 93% of the countries report shortage of qualified information specialists (see Table 3.23), but training institutions or courses for information specialists are being planned in only three countries (20%).
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3.4 Conclusions

These conclusions are basically a general synopsis of the common characteristics of the information needs and services in the ADC analyzed and discussed in the preceding section (3.3). Each conclusion is followed by the appropriate subsection number for ease of reference to the main body of the chapter.

A. General Situation

(1) The governments of the ADC believe in the need for development of national information networks as an indispensable tool for their countries' economic, cultural and social well-being (3.3.14).

(2) The governments of the ADC consider the establishment and operation of such a network an important function of the State. The ADC have established governmental authorities responsible for at least part of their information and library services (3.3.1).

(3) In the ADC, information services are commonly administered by the authorities which cover the domain of science and technology, and the authorities responsible for the administration of library services are usually those covering the domain of education and culture (3.3.1).

(4) Most of the ADC have recently established their central coordinating bodies to promote the orderly development of information services, but they do not yet effectively function because of the lack of experience in using them and of the will of the governments to make available the resources to back them up (3.3.2).

(5) The central information coordinating bodies established in the ADC are basically composed of the representatives of government ministries, academic institutions, R. and D. organisations, information centres, libraries, and industrial organisations (3.3.2).

(6) Most of the central information coordinating bodies in the ADC have a wide mandate covering policy formation, advisory functions, planning and operational activities. About half of them are free from the
last mentioned activity—the involvement at operational level (3.3.2).

(7) Most (80%) of the researchers, who form the largest
information user group in the ADC (3.3.9), work in the fields of science
and technology, and the rest (20%) in the fields of the humanities and
social sciences (3.3.10).

(8) The distribution of the researchers in the ADC are
nearly even in the three sectors of performance: production sector, higher
education, and general service (3.3.10).

(9) In most of the ADC the situations of national bibliog-
graphical control are much alike. They publish national bibliographies,
bibliographies of special subjects, indexes and abstracts, and union
catalogues, of one kind or another, to control the current literature of
most fields and the retrospective literature of some fields. Some of these
bibliographies are not complete (3.3.5).

(10) The current levels of cooperation among information
institutions in the ADC are nearly identical, that is, from the late stage
of what might be called the second generation to the early stage of the
third generation (3.3.13).

(11) In many ADC information networks do not yet exist. In
some others they are too embryonic to function effectively (3.3.14).

(12) The ADC rely almost entirely on the achievements in the
industrialised countries for basic research on the development of infor-
science. In most of the ADC schools of library and information studies
carry out research related to their educational programmes. There is as
yet no central research and development institute with grant allocation
powers (3.3.15).

(13) Institutions dealing with the training of information
specialists are developing from library schools and courses in the ADC.
At present information subjects are in many cases taught only in library
schools (3.3.16).
B. National Needs and Desires for Information Services

(1) There is an urgent need for the formulation of national information policy in each of the ADC (3.3.17).

(2) There is no single comprehensive collection in all fields and of all types, in most of the ADC. Every ADC needs to build at least one rich collection that may serve adequately as a national lending library (3.3.4).

(3) There should be at least one clearinghouse for the national exchange of books and periodicals including duplicates in each of the ADC (3.3.8).

(4) Most of the national archives operating in the ADC are mere documentary depositories, playing only in part the role of a true national archives centre. The documents housed need to be effectively organised so as to make them readily available to information users (3.3.3).

(5) The present developmental phase of most of the national information centres in the ADC demand their acceptance of the responsibility for the overall planning and operational coordination of the information services

(6) Although interlending in the ADC represents a major cooperative effort, there seem to be long delays in obtaining wanted material because of the exclusive use of the postal service in communication. Improvements are required to guarantee fast document supply (3.3.13).

(7) The ADC need to establish data centres which concentrate on the gathering, processing, and providing of scientific, engineering, industrial and socio-economic data (3.3.6).

(8) A translation centre with the responsibility for the nation's overall financial control of translation programmes is needed in each of the ADC (3.3.6).

(9) Although information is often urgently required, most industrial companies or firms lack adequate library resources of their own. The needs of industry require special attention (3.3.6).
(10) Demand for information services in the ADC arises, for the most part, from the workers in the research and development institutes, higher educational institutions, and industrial enterprises (3.3.9).

(11) The greatest demand for information services in the ADC arises out of the field of natural sciences, followed by those of technology, agriculture, social sciences, and medicine, in that decreasing order (3.3.7).

(12) Although patents and standard specifications are indispensable to any modern industrial activity, they are not widely available or used in most of the ADC. Special attention should be given to these serious deficiencies (3.3.8).

(13) The training of additional information specialists and librarians, and of scientists, engineers, and others in the use of information is of fundamental importance and should form a permanent element in the network for information services in the ADC (3.3.16).

C. Resources and Services Currently Available in the ADC

(1) National libraries, national archives, and national information centres are operating in most of the ADC (3.3.3).

(2) Most of the national libraries in the ADC perform the two vital functions of a central library, namely, receiving books under legal deposit and publication of national bibliographies, both of which are fundamental to national bibliographical control (3.3.3).

(3) The other tasks and functions performed by most of the national libraries in the ADC are: central collection of the nation's literature, international exchange of material, advice and assistance to other libraries, acting as the national bibliographical information centre, planning for the nation's library services and promotion of interlibrary cooperation (3.3.3).

(4) Bibliographies of special subjects, abstracts, indexes, and union catalogues are available in most of the ADC, although their coverage is often incomprehensive (3.3.5).
(5) The functions performed by most of the national information centres in the ADC are: register of domestic R. and D. results, reprographic services, processing of the world's information material, publication of indexes, referral services, translation service, literature searches, and promotion of inter-institutional cooperation (3.3.3).

(6) Most of the ADC have established their general information centres which cover most of the domains of the natural and social sciences, technology, and the humanities (3.3.6).

(7) Most of the ADC have established various specialised information centres. The subject fields commonly covered by them are: natural sciences, technology, agriculture and social sciences (3.3.6).

(8) Limited data service is provided by information centres, governmental offices of statistics and other institutions and agencies in the ADC (3.3.6).

(9) Limited referral services are provided in most of the ADC by general and specialised information centres mainly through their published directories of research institutes, research in progress, scientists and experts in various fields, special libraries and information facilities, etc. (3.3.6).

(10) Translation service is provided in most of the ADC by general and specialised information centres, usually through panels of extramural translators with specialist knowledge as well as linguistic qualifications (3.3.6).

(11) The information services currently available in most of the ADC are: reprographic services, reference service, international exchange of information material, national union catalogues, translation service, referral services, current awareness services and literature searches (3.3.8).

(12) Computerised information handling is observed in one or more large information centres and libraries in most of the ADC. In some countries, such mechanisation is under planning (3.3.11).
Cooperation among information institutions in the ADC for the most part takes the form of interlending. There are not many formal schemes of cooperation but there is considerable involvement in informal, reciprocal sharing of materials in the provision of information and library services in the ADC (3.3.13).

D. Requirements and Constraints

(1) In the ADC the information and library services are to some extent regulated by government instructions, rules, laws, etc. (3.3.1).

(2) There is no functional relation among national libraries, national archives, and national information centres in most of the ADC (3.3.3).

(3) The central coordinating bodies in the ADC very often emphasise on the scientific and technical information. About half of them confine their activities strictly to scientific and technical information matters. The other half of them embrace the humanities and social sciences but their priorities are low (3.3.2).

(4) There is no institution in most of the ADC responsible for the fullest coverage of foreign literature or the planned acquisition of foreign materials based on a policy of national coordination (3.3.3).

(5) In some of the ADC, depository libraries have difficulties in ensuring complete coverage because books produced in local areas are not deposited directly in them (3.3.4).

(6) The ADC rely almost entirely upon the output from the industrialised countries for scientific, technological and medical data. Most of the data processed in the ADC are socio-economic ones relative to their respective countries (3.3.6).

(7) There is no institution in the ADC responsible for the nation's overall financial control of translation programmes. The ad hoc translating services in the ADC lack the commissioning function which is fundamental to any of such services (3.3.6).

(8) At present translations of foreign works published in the ADC do not have any significant place in information transfer chains.
(3.3.6).

(9) The postal service is almost exclusively used in inter-institutional lending in the ADC (3.3.12).

(10) Lack of usable union catalogues often hampers wide participation in inter-institutional cooperative ventures in the provision of information services in the ADC (3.3.13).

(11) Shortage of qualified information specialists, lack of a national information policy and insufficient funds are the main problems in common which hamper the development of information services in most of the ADC (3.3.17).

3.5 Summary

The main purpose of the present chapter is to verify the first hypothesis of this study—"Common information needs and desires exist in a group of countries with an identical level of development, for instance, in the ADC chosen for this study"—through an attempt to identify common characteristics of the information needs and desires shared by the fifteen countries investigated. Another attempt has also been made to identify some common characteristics of the present situation of the information services in the countries to meet the needs and desires. A number of common characteristics of the information needs, desires, and various aspects of the existing information services, became apparent in the course of analysis and discussion. These common characteristics are sufficient enough to provide a base for a unique structure of a national information network with unique objectives, functions, entities, processes and configurations, and without any large ambiguous area left. The investigator can now proceed with confidence to next chapter, in which an attempt to design a generalised structure of national information networks for the ADC based on the common characteristics identified in the present chapter will be made to test the other hypothesis of this study.
Attention has been given throughout this chapter to certain requirements and constraints which may exist in the current information services in the countries investigated. A number of such requirements and constraints have been revealed, and these will be taken into consideration in the design of a generalised structure in the following chapter.
Chapter 4

NATIONAL INFORMATION NETWORKS FOR THE ADVANCED DEVELOPING COUNTRIES

4.1 Introduction

The main purpose of the present chapter is to verify the second hypothesis of this study—"Identical information needs and desires lead to identical objectives, functions and configurations of a national information network." This purpose will be achieved by designing a generalised structure of national information networks based on the common characteristics of the information needs and desires shared by the ADC which have been identified in the preceding chapter.

The structural aspects of a national information network for a given country can be studied from many different points of view. A national information network is often viewed as a formal linkage of discrete information networks serving different subject fields in the nation, e.g., those in agriculture, mines and energy, education, health services, economics, etc. It seems neither desirable nor feasible to propose in a similar way a model structure of national information networks for a certain group of countries. Local conditions such as political traditions, current practices in information provision, population size, etc. greatly influence the requirements in individual countries. Therefore, the investigator attempts to view a national information network in this study as an arrangement of different functional units working together to accomplish the purpose of the whole, rather than an integrated set of different subject networks. This will be outlined in the following section. Discussions of subject fields covered by specific information units are avoided in order to concentrate on the functional and structural aspects of the network.

A general model of national information networks is built to learn what specific functions the network components need to perform to achieve the purpose of the whole. The functions are then assigned to various
information units which would best perform them in the present and future
ADC situations, and productive working relations among them are established.
In order to do this, relevant theoretical alternatives in the literature and
examples of the existing networks in the world are gathered and evaluated
in relation to the common information needs and desires identified in Chapter
3. The objectives, functions and working relations of all the units within
the network will be determined according to the results of this evaluation.

4.2 A General Model of National Information Networks

4.2.1 Information Transfer

No matter what we do, we have to make decisions at any point where
there are at least two available alternatives. Decisions can only be as
good as the information on which they are based. This makes it important
in a modern society to transfer information effectively and efficiently from
source or store to recipient or user. In real life, however, we have great
difficulty in getting relevant information when it become critical to have
it within a very short period of time.

Information transfer takes place through a specific channel. It
is mainly via the spoken or written word. In its simplest terms, we may
diagram the direct transfer of information from source to user as a direct
link:

![Diagram of direct transfer of information]

Figure 4.1 Direct transfer of information

The arrow in Figure 4.1 represents the channel whereby information transfers.
Figure 4.1 is a highly simplified schematic of what actually occurs. In the
complexities of our time, it is rare that one scientist communicates so
directly with another. Team efforts are usually involved. In many instances,
information must pass barriers of distance, discipline, repeated handling,
proprietary interests, patent rights, language and political boundaries.
Although direct transfer of information between source and user is desirable and effective, direct channels are usually impractical. Information transfer between source and user is multichanneled in various kinds and forms of documents, e.g., journal articles, magnetic tape, abstracts, charts, etc. Factors adding complexity are the increased volume of information and the increased number of potential users of the information. The user cannot find time to read the many papers and journals related to his interests; not only may he be overwhelmed by the sheer volume in his own language, but also he may face the language barrier of foreign papers as well as the problem of their inaccessibility. Adding to these is the frequent difficulty that the literature contains contradictory data and information. Today information users are, therefore, depending more and more on the services provided by various information institutions—information centres, libraries, archives, translation centres, referral centres, data centres, etc., which, when aggregated, would become a national information network. Figure 4.1 might then be redrawn (Figure 4.2) to show a more realistic and efficient channel of information transfer.

![Diagram of national information network](image)

**Figure 4.2** Information transfer through a national information network

### 4.2.2 Functions of Information Institutions in the Transfer of Information

The basic functions of an information institution are to collect, process, and make available information. All operations and services of any information institution are related, directly or indirectly, to these three basic functions, which thus form a logical framework for a study of a
general model of information networks. Collection involves the identification, selection, and procurement of the required information materials; processing involves analysis and synthesis of information contained in the materials for subsequent storage, retrieval and use; and making it available for use involves the whole range of operation and services concerned with recording its existence and location, making such information accessible to users, and helping and encouraging users to make the most effective use of it. The first two basic functions—collection and processing—have as their ultimate objective the effective performance of the third function, namely, the provision of adequate services to users. Information institutions collect and process in order to make available, and the effectiveness of the third function is always dependent upon the efficiency with which the first two are performed.

Before any of these three basic functions of information institutions can be performed, certain fundamental conditions must be satisfied. Although we may, for convenience, refer to these functions as being performed by information institutions, they are, in fact, performed by information specialists and librarians; which implies that adequate numbers of people must be properly trained to perform these functions effectively. In order to improve the effectiveness and efficiency of the services of information institutions research and development on information handling methods must be conducted on a continuing basis. There must also be at least one central document depository in which to deposit rarely used materials in other information institutions and to which to forward in the last resort the requests unsatisfied by any other information centre or library in the country. Finally, a country needs a central institution which provides technical advice and assistance to other information institutions. These general needs for the specialist training, research and development in information work, central depositories, and technical advice and assistance imply a fourth function to be required in the provision of the services by information institutions.
As defined in 2.2, a national information network is a linkage of the information institutions in a country. From the discussion above four distinct groups of units constituting a national information network are apparent: a group of units primarily collecting information, a group of those primarily processing information, a group of those primarily providing information, and a group of those serving general network needs. Since the first and the second groups are identical in most cases, a national information network may realistically be analysed into three constituent groups: a group of units primarily collecting and processing information, and the other two groups mentioned above. The specific functions of a national information network considered to be fundamental to accomplishing its purpose are examined and listed under each of the three constituent groups below.

A. Functions of the Group of Units Primarily Collecting and Processing Information

(1) Collecting the world's literature in all fields of knowledge and of all kinds and forms of documents, including patent and standard specifications.

(2) Processing it in the form of abstract journals, bibliographies, indexes, printed cards, etc.

(3) Distributing them among the various research institutes, industrial enterprises, institutions of higher education, regional information centres, individual researchers, etc.

(4) On requests from these institutions, enterprises, and individuals, furnishing copies of the original primary documents announced in the secondary publications enumerated in (2).

(5) Functions similar to those listed in (1) - (4), but with concentration on the range of specific subjects in a given field.

(6) Analysing the specialised literature in depth, and evaluating and publishing its results in a compact standard form.
(7) Collecting, processing and storing scientific, engineering, industrial, socio-economic and other data.

(8) Collecting and maintaining records of research and development being planned, currently in progress, or completed: of research institutes; of scientists and experts in various fields; and of special libraries and information centres; to direct searchers for information and data to suitable sources.

(9) Collecting translations of foreign works and maintaining a catalogue of them.

(10) Issuing periodical announcements of new translations, and on request, furnishing copies of them.

(11) Providing translating service for foreign language literature.

B. Functions of the Group of Units Primarily Providing Information

(1) Providing basic collections of books and journals to meet the general, immediate needs of users at the research institutes, industrial enterprises, academic institutions, government offices and others, in the places where they work.

(2) Providing users with access points to the regional and national information resources to meet their specific needs.

(3) Coordinating inter-institutional cooperative activities at regional level.

(4) Providing regional repositories so that users may have easy and fast access to most of their wanted information in their own area.

C. Functions of the Group of Units Serving General Network Needs

(1) Training information specialists and librarians, and users in the use of information facilities.

(2) Conducting research and development in information work.

(3) Coordinating the network activities at operational level, and giving technical advice and assistance to all the network units.
Providing central depository collections in which to deposit rarely used information materials and to which to forward unsatisfied requests in the last resort.

If these functions, with other ancillary ones, are effectively performed maintaining proper relations among them, a national information network is assumed to accomplish its purpose. A model of a national information network in general is presented in Figure 4.3. Specific networks follow its framework with an additional, but essential, unit. That unit is the element of coordination. Coordination is the function of assembling and synchronising differentiated activities so that they function harmoniously in the attainment of the purpose. Mooney (124) defines coordination as "the orderly arrangement of group effort, to provide unity of action in the pursuit of a common purpose" (p.5). Coordination means unity of action in the accomplishment of the purpose, without which no network can efficiently attain its purpose. In the working of a national information network, coordination takes the form of information policy which is an effort to assure a smooth interplay of the functions of all the different component units of the network to the end that its purpose will be realised with a minimum of friction and a maximum of collaborative effectiveness. Figure 4.3 might then be redrawn (Figure 4.4) to show a completed general model of national information networks with the coordinating unit which provides unity of actions of people within the network.

4.2.4 Summary

This section has discussed what role a national information network needs to play in the transfer of information in the modern society, what basic functions are needed to perform within a national information network in general to accomplish its purpose, and what specific tasks ought to be included in each of the basic functions. It is now necessary to establish various information units which best perform these functions in the ADC situations, and to define the most productive relations among the units. This is the subject of the remaining sections of this chapter.
Figure 4.3 A general model of national information networks

Figure 4.4 A general model of national information networks with the coordinating unit
4.3 Central Information Coordinating Body

4.3.1 Introductory Comments

Division of labour creates the need for coordination. Regardless of where and on what level in the organisation the division of labour takes place, there arises simultaneously the need for coordination. As a multi-unit organisation, in which various activities are carried out by many different units and subunits, the national information network needs coordination to avoid duplication and conflict in its providing services, in its translating foreign literature, in its conducting research and development, and in its training users in the use of information.

The preceding chapter has shown that there are the beginnings of an information network or at least a library network in almost every ADC. Elements of a library network normally include a national library, university, public and school libraries, and various types of special libraries. As for archives, possible elements are national, regional, departmental and institutional ones or record offices. Information services can be of various forms. In the ADC all or most of these elements exist, and their development has often been a haphazard affair with no overall coordination. Today, however, there is a growing tendency to base further development on systematic plans for the various sectors or even for the whole field of information, comprising all services concerned. Such plans can only be successful through coordination. The ADC, where a network is just emerging, could especially benefit from the early establishment of a central information coordinating body.

Coordination is not easily attained. Each interest group stresses its own view of how network purposes should be accomplished, and tends to favour the policy that will further its own interests. These differences in viewpoint are a problem to all levels in a network structure. In spite of cooperative attitudes and self-coordination by each unit of a network, duplication of action and conflict of effort will occur unless a synchronising function exists. Only such purposeful coordinating function can
bring about a level of accomplishment far greater than the sum of the individual parts. Information activities present an organisational problem which must be understood if the coordinating body is to be governmental. Unlike all other problems which can be referred to one department or another, information is concerned with activities in all departments. Even if the coordination of information is centralised within a specific department, decentralised information activities will continue to exist at all levels, from the government to individual schools or industrial firms.

4.3.2 Organisation

A. Governmental vs. Nongovernmental Organisation

In certain countries with well developed information services, information planning and coordinating activities are sponsored and carried out by the private sector*, mainly research institutes or industrial enterprises (83). However, the NATIS document says that "government should establish the appropriate organs for the operation of NATIS and clearly designate responsibilities and determine priorities at all level ... It is therefore highly desirable that a central coordinating body (bodies) be set up to advise the government on the formulation and implementation of national information programmes ... (177, p. 2). Levai (107) sees some advantages of the governmental organisation, particularly in the developing countries. She stated at a UNIDO seminar that "with due consideration to past development, it would seem advantageous for those developing countries ... to build up their systems under governmental organisation and coordination from the very beginning" (p. 6). In the present age, only governments, particularly in the ADC, have the opportunity and the resources necessary to create the conditions for the effective functioning of a national network for information transfer that meets the needs of the whole community. The quantities of documents and data now being produced far exceed the resources of any single service acting on its own.
Governments should therefore set up the central coordinating bodies to plan and coordinate their national information networks. Such coordinating bodies exist in 13 out of the 15 countries investigated in this study, and all of them have been established by the governments (see Table 3.2).

B. Members

A NATIS document proposes that the central coordinating body be composed both of representatives of all appropriate government departments, state bodies, and semi-official institutions, and of representative specialists from the information field (83, p. 12). This indicates a rather large number of people. For a developing country, however, the coordinating body should not be too large in order to be effective. Urquhart (200) and Tell (177) believe that a body with a maximum of 16 members could act with agility, give fast response and focus on available resources. Such a limitation presents a problem because as a rule the number of organisations in a country which are concerned with information is much larger than this. A solution may be to organise the coordinating body in two or three levels:

(1) Case of Two Levels (200; 177)
   (a) Large Representative Assembly, made up of a large number of representatives of interested organisations, could receive and discuss reports from the coordinating body and suggest ideas which might be considered. This assembly could play an important part in the public relations activity.
   (b) Small Coordinating Unit, with a maximum of 16 members, is responsible for detailed planning and implementation.

(2) Case of Three Levels (53)
   (a) Inter-ministerial Committee: council of ministers, would meet once a year.
   (b) Ministerial Subordinate Body: high-level committee of seven or eight members (including three experts), would meet first to define main objectives, and then again at the time of the budget.
(c) Commission Responsible for Detailed Planning and Implementation: group of specialists comprising ministerial representatives, users, information specialists; would meet once or twice a month. This commission would also provide detailed guidance in regard to international relations.

For the ADC, the case of two levels has many attractions.

C. Secretariat

It is most important that the coordinating body should have a permanent secretariat with responsibility for the execution of the body's decisions. The secretariat would handle its administrative burden and ensure its functionings. In some ADC, this secretariat is incorporated in the national library or national information centre. In others it is completely independent. The question then arises as to which way is advisable to the ADC. Examples from industrialised countries and from some ADC show that such governmental agencies as ministries responsible for scientific and technical development are usually in charge of scientific and technical information as well (87). As the secretariat would be a governmental agency responsible for the whole information services in the nation and interacting with the international organisations in the information field, it could prove convenient to locate the secretariat in the ministry responsible for scientific and technical development. However, no uniform model can be suggested. The solution will depend on the division of governmental functions in each country.

4.3.3 Tasks and Functions

The UNISIST study report recommends that "a governmental or government-chartered agency should exist at the national level to guide, stimulate and conduct the development of information resources and services in the perspective of national, multi-national regional and international cooperation" (Recommendation 15). A central coordinating body would be in charge of establishing the plan, acquiring resources and distributing responsibilities, as well as of international liaisons on
the governmental level. Most of the central coordinating bodies in the ADC include these functions in their terms of reference. Two important questions arise as to whether or not the coordinating body should carry out operational activities, and whether or not it should be given control of finances.

A. Operational Involvement

In certain ADC, the central coordinating body forms part of other organs responsible for the national information centre or the national library. In other countries it directly involves the information activities at operational level. Such direct or indirect operational involvement at a particular field of information services might introduce bias against the role of other fields of information, e.g., library and archival services (see Figure 4.5). This would be unfortunate, particularly in the ADC where the prime requirement is maximum utilisation of the existing resources. As suggested by a FID/DC working group, the coordinating function should rest with the central government agency to which the national library, national information centre, and other national information institutions are subordinate (87). This organisational relationship is shown in Figure 4.6. It would not be expected to carry out operational activities, but rather to initiate activities by delegating them to project groups or operational agents.

B. Control of Finances

Most of the coordinating bodies in the ADC do not have control of finances. Urquhart (200), Borko (22), d'Olier and Delmas (53), and Tell (177) assert that it should be given control of financial resources in order to increase the effectiveness of its policy-making function. The work of the coordinating body would largely consist in making proposals to the government, based on an analysis of the situation as it is and on a study of needs. This requires a research and development capacity which will make objective surveys of the existing information supply arrangements within a country, and the research and development
Figure 4.5 Example of a central information coordinating body as part of an information institution

Figure 4.6 Central information coordinating body as a central government agency
activities need adequate financial resources. These needs for control of finances are particularly important in the ADC, where research and development in the field of information is not extensive and the funds for information services are insufficient and will remain so for many years to come. The central information coordinating body also needs to have grant allocation power. With such power it is able to "buy control and introduce proper coordination and effectiveness" as Clifford (42) states, and provide financial support for the more important elements for the information development plan.

C. Summary of the Tasks and Functions

The major tasks and functions of a central information coordinating body may be summarised as follows:

(a) To propose to the government the guidelines of a national policy in the area of information services, and prepare the measures for the application of the policy.

(b) To develop and activate a national information network, and coordinate the activities of its component units.

(c) To control the realisation of objectives laid down in the various information programmes and plans, including training of specialists, and research and development in information work.

(d) To make grants or contracts, as appropriate, for activities having regard to the national interest and similar or related activities carried on by other organisations.

(e) To act as the national focal point for international cooperation in information and library areas. (The investigator will revert to this particular aspect later on).

4.3.4 Conclusions

(1) The central information coordinating body should be organised in two levels in the ADC: a large representative assembly to act as an advisory council, made up of a large number of representatives of interested organisations; and a small coordinating unit responsible for
detailed planning and implementation (4.3.2).

(2) The central information coordinating body should have a permanent secretariat to ensure its functionings, to execute its decisions, and to handle its administrative work. An advisable location of the secretariat is in the ministry responsible for scientific and technical development. It is undesirable to incorporate it into the national library or national information centre (4.3.2).

(3) The information coordinating body should be a central government agency to which the national library, national information centre and other national information institutions are subordinate. It should not carry out operational activities but rather initiate activities by delegating them to operational agents (4.3.3).

(4) The central information coordinating body should be given control of finances to increase the effectiveness of its policy-making function and to support for the more important elements of the information development plan (4.3.3).

(5) The major tasks and functions of a central information coordinating body are: to develop and activate a national information network; to coordinate the activities of its component units, to formulate national information policies; to control the realisation of objectives laid down in the various national information programmes and plans including research and training; and to make grants or contracts for activities having regard to the national interest, carried on by other organisations (4.3.3).

4.4 The Group of Units Primarily Collecting and Processing Information

4.4.1 Introductory Comments

This group of units is the main information input device of a national information network. The group's tasks and functions are to collect the whole range of information sources from the country and the world to serve the nation's particular information needs and to process
the acquired information so that it can be readily, effectively and efficiently stored, retrieved and utilised. The tremendous amount of information being accumulated in the world, and financial and other constraints usually make it impossible for any single information centre or library to achieve complete coverage of information needed. The tasks are, therefore, divided among several units, each of which is responsible for a specific function, subject or kind of documents.

The purpose of this section is to determine what types of units would actually need to be established within this group, what their functions would be, and what organisational relations would need to be established among them, in order to achieve better coverage of the information in demand and avoid unnecessary duplication of expensive information materials. Efficient performance of this group of units of a national network is particularly crucial in the ADC where existing resources are limited. Most of the ADC rely for a high proportion of their acquisitions on foreign literature because of their inadequate local publishing industries, yet their purchase funds are not sufficient to acquire all that they need.

The physiognomy and physiology of information is discerned by means of documents in which ideas, thoughts, experiences, observations, facts, premises and conclusions are recorded. Documents may be in the form of books, periodicals, reports, films, cards, tape, in microform or in any type of medium of record. The mission of an information network is to expedite utilisation by its population of users of the information within its collection of documents. The effectiveness of a national information network depends, therefore, largely on the quantity and quality of the collection of documents. Without an adequate collection of documents which can meet the basic needs of users in the country concerned, well-trained professional staff, modern service methods, and sophisticated and expensive equipments are all less meaningful in the functionings of a national information network.
From one point of view, most of the units of this group might be called index systems, since one of their main tasks is the production of various indexes which provide users with identification and location of the documents acquired and stored by the units. One of the important functions of an information network is to help users learn what information is available on the subject fields and to identify the documents in which that information can be found. The index is the mechanism by which the extent of availability of such information is determined. The index serves as a guide to the literature. It directs a user to bibliographical data, to abstracts, microfiche or to the document itself. A document's index terms also permit selective dissemination of information to those who want to be kept abreast of current developments in their fields of interest.

The index file and the units of this group which produce it, is a key component of a national information network. In order to give the reader a picture of the division of work within this group of a national network, some preliminary conclusions are made below concerning what units need to be established within the group to achieve its two prime objectives: collecting the world's information materials and producing indexes to the materials.

(a) General information centres
   Collecting and processing the world's literature in all fields

(b) Specialised information centres
   Collecting and processing the world's specialised literature in depth

(c) Data centres
   Collecting and processing data

(d) Patent offices
   Collecting and processing patent literature

(e) Offices of standards
   Collecting and processing standard specifications

(f) Archives services
   Collecting, organising and conserving major part of the nation's historical source material

(f) Referral centres
   Collecting and maintaining records of various specialised
sources of information

(h) Translation centres

Providing translation services for foreign language literature, and guides to translations housed in the centre and those available elsewhere.

These are of course not organisational but functional units. Therefore, these may be seen operating efficiently in various organisational forms. Some may be part of others which belong to a different group. Some may be placed in a geographical area and others may not. Some may constitute a department of a large library and others a department of a governmental office. The geographical, jurisdictional and organisational location of the units is not important in a theoretical model so far as all these units exist to function properly and their performance is efficiently coordinated to attain the object of the whole group. The tasks and functions of each of these units and the organisational relations to be established among the units will be discussed at some length in the following subsections.

4.4.2 General Information Centres

A. Definition

A precise definition of an information centre is difficult because the concept has been changing. The tremendous increase in scientific research and development activities, as Cohan and Craven (44) observe, has "... stepped up the demands of laboratory and administrative personnel for expanded, more efficient, and better-integrated information services. The result has been a trend to unify library, patent, translation, report writing, archival, abstracting, literature search, editorial, communications and publications activities within a single facility" (p. 139). The centralisation of all, some, or only two or three of these activities has at times received the appellation of "information centres". Some information centres offer additional services such as providing replies to queries, retrospective searches, selective dissemination of information and other services.
A general information centre is an information centre which covers most of the domains of the natural and social sciences, technology, and humanities, and the services of which are available to the whole country. General information centres, varying in size and level, exist in most of the ADC while others are making efforts to set up such centres. The national information centre is often the only general information centre in the ADC, and constitutes a major part of the national information network.

Some authors use such terms as "documentation centre" and, in a broader sense, "information clearinghouse". The term "information centre" has been chosen by the investigator because such centres have to serve quite definitely the purpose of informing the users and the various institutions in the country. The term "general information centre" is used in contrast to the term "specialised information centre" which refers to an information centre the activities of which are confined to a specific branch of science or a particular subject. A general information centre is designed to meet general, basic information needs in all fields including new and interdisciplinary fields while a specialised information centre is designed to serve specialist needs in a particular subject field.

B. Tasks and Functions

The tasks and functions of a general information centre include:

(a) Collecting all information produced in the country, or pertaining to the country that would be useful for national development. The general information centre should be a repository for all research papers, reports, reviews, surveys, etc. that are produced in the country as a result of the work of learned societies, commercial or industrial firms, government departments as well as individual researchers. As most of this material is not published or listed, it tends to escape the attention of those working in similar or related fields. As a consequence, there is a danger of wasting time, money and effort due to unnecessary duplication of work that has already been done.
(b) Establishing a comprehensive collection of the world's literature in all fields for the information to meet general needs in the government, industry, research, education, and other fields of the country, in collaboration and linking up with national libraries and specialised information centres. The collection should include all types of documents, e.g., books, periodicals, bulletins, research reports, government provisions, regulations, parliamentary documents, project plans, statistics and conference papers. Use should be made of all methods of acquisition with special stress on international exchange of material and international library loans.

(c) Processing the information sources acquired by the centre, in conformity with the profile of demand, especially for the provision of secondary information and publication services, e.g., printed catalogue cards, bibliographies of specific subjects, and indexing and abstracting services. This often involves the publication of collections of digests of articles of topical interests ("express information").

(d) Disseminating the information collected and processed to the various research institutes, industrial enterprises, institutions of higher learning, government departments and agencies, regional information agencies, and individuals in the country, by means of information guides such as those listed in (b), selective dissemination of information services, etc. Attention should be paid to large external reference and indexing services (e.g., Chemical Abstracts, Medlars, Compendex, etc.). Users with specific information profiles will benefit most from these services, especially through centres where computer equipment allows the introduction of SDI services.

(e) Reprographic services for users of information. On requests from the institutions and individuals listed in (c), the centre furnishes copies of the original primary documents announced in its secondary publications. The services are provided to the users largely through the regional coordinating centres and local information units, that is, terminals.
These tasks and functions of a general information centre are shown in a flow chart in Figure 4.7.

C. Relations with Other Units

Centralisation or decentralisation of information activities in a country poses a problem. In a United Nations document, reference was made in 1963 to the advantages and drawbacks of centralisation and decentralisation, one of the views expressed being that each of the various branches of science should have its own specialised information centre (161). Another opinion was that a centralised information facility, that is, a general information centre could operate more efficiently, saving on personnel and equipment by using, among other things, various possibilities of mechanisation and automation.

The investigator's conclusion is, in the light of some previous studies including the FID/DC study in 1975 (87) and the joint Unesco/FID study (184), that an ADC should aim at establishing a general information centre at the initial stage, in order to capitalise on the possibilities of rationalisation, thus ensuring a high degree of efficiency from the very start. Then the process of decentralisation follows according to the national needs. Specialised information centres, regional centres, data centres, referral centres, translation centres, etc. eventually come into existence. The prevailing opinion is that this is the rule followed by the majority of countries (87), and most of the ADC have been following this rule (3.3.6). At the stage of multiple information centres the general information centre should not be in a position to compete with the decentralised centres, namely specialised information centres, data centres, etc. Instead, it can effectively reinforce and supplement their activities through coordination. How it does in individual cases will be set forth in the following subsections.

D. The Specialised Library of a General Information Centre

A general information centre should naturally have its own
Figure 4.7 Functions of a general information centre
specialised library equipped with resources necessary for the activities of the centre. Such a library should form an integral part of the centre. The same holds true, in the investigator's opinion, for all other information centres. Specialised libraries required for activities of various information facilities should be part and parcel of every such facility.

The analysis of the data from the questionnaire responses has shown that library services precede information services, and that most of the ADC have their national libraries and one or more networks of specialised libraries of different types (3.3.3; 3.3.6). An information centre frequently emerges from, or bases on an existing library and enjoys a close working relationship with the library (49; 94). Where this is not yet the case, such a relationship ought to be established. The relationship between information centres and libraries could be developed under the following structural and organisational aspects: (a) integration of the two systems, (b) coordination of their activities, and (c) their independent operation. Since independent operation would be in contradiction with the findings of the science of information (165), the aspects worthy of consideration are integration and coordination, which are reality in many industrialised countries such as Australia, Belgium, Canada, United Kingdom, and United States (29; 35; 49; 145; 180). In the ADC which still enjoy more or less freedom of choice for the matter, the link between information centres and libraries should be as close as possible. One of the most important factors to be considered in the provision of information in the ADC is the limited financial resources of these countries (3.3.17) and the consequent emphasis on economy in the establishment of their information facilities. The importance of taking advantage of existing library resources is thus reaffirmed.

E. Sources of Finance

There are two possible sources of funds for the establishment and maintenance of a general information centre, irrespective of whether it has public or private status. They are: (a) subvention from public
authorities, and (b) payment for services rendered. In many countries the acquisition of information on development is considered of sufficient public value for the service to be given free of charge (169). It would be then the State's duty to maintain a general information centre and its main source of funds will be the national budget. This would, however, constitute a heavy burden on the national budget of the ADC where financial resources available for use are generally limited (147). The activities of a general information centre in the ADC should, therefore, be organised with a view to economic efficiency, that is, there should be a maximum degree of self-financing.

The general information centre normally charges fees for its services. A precondition for the sale of information is that the centre provides information of a quality and quantity such that the user is prepared to pay a reasonable fee. User fee can be many things: a search fee, a current awareness charge, a transaction fee for processing an interlibrary loan, or a charge for the performance of a service or combination of services. In the ADC it will hardly be possible, at the start, to finance a general information centre in accordance with economic principles. It is therefore necessary to finance the centre from State funds at the initial stage.

4.4.3 Specialised Information Centres

A. Definition

A potentially useful tool for the transfer of information exists in specialised information centres. Such centres, usually serving specific fields in which large amounts of data exist and require critical evaluation, consists of one or more active specialists who (a) systematically collect, index, and store information in a field; (b) analyse and evaluate the information; and (c) make it available in a form and language most convenient for specific groups of users. A standing panel of the Committee on Scientific and Technical Information of the U. S. Federal Council for Science and Technology defines a specialised information centre
as "a formally structured organizational unit, specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analyzing, and synthesizing a body of information and/or data in a clearly defined specialized field or pertaining to a specified mission with intent of compiling, digesting, repackaging, or otherwise organizing and presenting pertinent information and/or data in a form most authoritative, timely, and useful to a society of peers and management" (194, p. 190).

Research workers, having spent a considerable amount of their time on acquiring information, entrusted information specialists with the task of collecting the most useful information on their behalf; then they realised that it would be more profitable to join forces and share part of the information facilities of their laboratories. The specialised centre, which still conforms more or less to this original plan, is therefore the principal tool for acquiring information which the research worker has at his disposal. As an offshoot of this, one finds discipline-oriented centres in pure science sectors, while for their part applied research workers and engineers have set up mission-oriented centres. Specialised information centres, of course, are not limited to the hard sciences and technology. Business, industry, the social sciences, and humanities also can benefit from the specialised centre. Among the specialised centres those for industry and agriculture are, for the ADC, of the utmost importance in the light of the strong demand for information services in the fields (3.3.10).

B. Tasks and Functions

The functions, products, and services of a specialised information centre vary in detail—vary in accordance with the needs of its user population—but are, on the whole, similar. Much of the tasks and functions of a specialised information centre is similar to those of a general information centre. The major difference is that whereas a general information centre collects and processes the information and data which would meet general and basic needs in all fields, a specialised information
centre collects and processes those which would meet specialist needs in a particular field. A specialised information centre is similar to a normal special library or information department. The difference is that whereas the latter is run for the benefit of a group of workers in the same organisation or at the same geographical location, the former serves a widely-distributed, often international, group. Another difference is that whereas the majority of information departments are supported financially by the organisations they serve, a specialised information centre must at some stage in its life meet the necessity of supporting itself from the proceeds of sales of its services.

Figure 4.8 borrowed from Brady (25) shows the sequence of operations and possible products of a specialised information centre. The first step—true also in all information centres—is the selection and acquisition of relevant documents. This may yield a comprehensive but unevaluated archival bibliography. The next step is abstracting and indexing the documents. This process often consists of assigning key words to each document to identify the data or information. An indexed bibliography becomes a more useful document, since it can indicate to a user exactly the type of data contained as well as parameters of data points.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection and collection of documents</td>
<td>Bibliographies, Current awareness</td>
</tr>
<tr>
<td>Abstraction/Indexing</td>
<td>Indexed bibliographies, Literature searches</td>
</tr>
<tr>
<td>Extraction</td>
<td>Descriptive reviews, Compilation (unevaluated)</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Critical review of area</td>
</tr>
<tr>
<td></td>
<td>Critical compilation of data</td>
</tr>
<tr>
<td></td>
<td>Criteria for experimentation</td>
</tr>
<tr>
<td></td>
<td>Recommendations</td>
</tr>
<tr>
<td></td>
<td>Solutions to (immediate) problems</td>
</tr>
<tr>
<td></td>
<td>Correlation of data</td>
</tr>
<tr>
<td></td>
<td>Prediction of properties</td>
</tr>
</tbody>
</table>

Figure 4.8 Activities and products of a specialised information centre
The next phase consists of selective extraction of information, such as quantitative data, description of methodologies, interpretations, and other material necessary for the ultimate utilisation. The products resulting from this phase might be an unevaluated compilation of data or a descriptive review, sometimes also referred to as a state-of-the-art review. The descriptive review is a selective extraction of information from the literature on some particular subject. Uncritical data compilations can be a useful product in that they provide a handy, time-saving amalgamation in a convenient format. These products are prerequisites for the fundamental function of a specialised information centre. This function is the intellectual activity, falling under the general rubric of analysis that results in the creation of new knowledge. The new knowledge takes the form of the products noted in Figure 4.8—critical reviews, critical data compilations, criteria, recommendations, solutions to problems, correlations, and predictions. This is, however, seldom seen in the present practice in the AEC, although it still should be borne in mind as a goal worthy of attainment. These tasks and functions of a specialised information centre are shown in a flow chart in Figure 4.9.

C. Division of Subject Fields

The potential benefits of expanding the number of specialised information centres were emphasised in the 1963 report of the U. S. President's Science Advisory Committee (203): "Ultimately we believe the specialised centre will become the accepted retailer of information." Unless coordinated, however, considerable overlapping between the specialised centres appear to occur as they proliferate. Ideally, there may be a dozen specialised centres in each country, which would cover information sources in all fields while remaining in contact with one another. This idea is theoretically attractive, but in reality leads to an impossible state of affairs, since "a fair number of specialised centres are still, and to an increasing extent, mission-oriented" (53, p. 73). This is quite simply due to the fact that they have to meet requirements,
Figure 4.9 Functions of a specialised information centre
and the requirements nearly always arise from research objectives, whether these objectives are chosen by the research workers themselves or they spring from economic circumstances. It is impossible to divide up the field of knowledge according to objectives, of whatever kind. Only the keyword method, used on a large scale, will make it possible to arrive at comparatively satisfactory solutions.

D. Relations with Other Units

Specialised information centres came into existence in response to the needs of both pure and applied research. Discipline-oriented centres appeared in pure science sectors, while mission-oriented centres did in applied research sectors. The first category includes centres concerned with physics, chemistry, astronomy, mathematics, biology, etc. In the second category, the most typical are those dealing with the environment, pollution, and agronomy, which have practical relevance to a great many scientific sectors according to the traditional classification. Clearly, considerable overlapping between a specialised centre and other units, especially general information centres and data centres within a network, may occur unless early and effectively coordinated. The assignment of a specialised centre should be closely linked with those of general information centres which collect and process information sources in all fields. This could be done by defining, through continuous cooperation between the two, the line of demarcation between the information sources which would meet general and basic needs and those which would meet specialist needs. Such demarcation may be diagrammed as in Figure 4.10. Another possible area of overlapping is the data compiling function of the specialised information centre. Although specialised centres are primarily concerned with the critical compilation of data as discussed above, also deal with unevaluated data, which is normally considered to be the realm of data centres. Unnecessary duplication may be avoided by informing the central information coordinating body of the kinds and fields of data available within the specialised centre or data centre. Reciprocal sharing
of products could be arranged by the coordinating body.

E. Sources of Finance

For the same reason as explained in the preceding subsection in relation to the main sources of finance for a general information centre, a specialised information centre operating in an ADC should aim to be self-supporting at some stage in its life. It must therefore charge for its services at an economic rate. This is justified by considering that information is a necessary service to science and technology, like computer services or laboratory facilities, and should be paid for as a normal part of research or development expenditure. However, this view is not yet universal, and in many areas the funds available for information are meagre or non-existent. Individual users are not often willing to spend much of his own money on information services, so in many cases the achievement of economic independence of a centre is likely to prove difficult. This does not, however, mean that every attempt should not be made to reach this state.

4.4.4 Data Centres

A. Definition

As Saracevic (158) has observed, the general concepts of a
data centre "are not widely reported and known or even agreed upon" (p. 39). Different data centres have unique characteristics but they also have common features. System Development Corporation (175) defines a data centre as "an organisation handling numeric data—ostensibly without evaluation (p. 328). A data centre may be rather broadly defined as an organisation primarily for acquiring, processing, storing, retrieving and disseminating data. The data processing done at a data centre does not normally include evaluation. This is done at specialised information centres as discussed in the preceding subsection. In the first place a data centre is an information centre. Basic to information centres and thus to data centres are communication processes, that is, sequence of events where information is transmitted from one object (source) to another (destination). In that sense data and information are used as synonymous notions and primitive (undefined) concepts. However, one can approach data as a primitive concept and characterise its relation with "information within the process of decision making as Whittemore and Yovits (207) did: "Information is data of value in decision making" (p. 221). Why did ideas for data centres arise? Complex systems and problems so frequent nowadays require for rational decision making utilising a large variety of information structured and analysed in many ways. A data centre aims to provide structured information from various sources of data to decision makers and workers in complex systems and situations. In short, a data centre provides a base for better decisions. It does not make decisions, but it enables sounder rational judgement that may have many economical and social benefits.

B. Tasks and Functions

There are three major functions a data centre performs: (a) acquisition, (b) analysis, and (c) products. A data centre must perform a number of operations on the data that are similar to those performed by other information centres, e.g., cataloguing, indexing, storing, retrieving, duplicating, etc. However, these will not be discussed here.
A data centre may collect data which have been recorded or (a) microfilm, (b) digital magnetic tapes, (c) photographic positives and negatives, (d) graphs and roll charts, (e) microfiche, or (f) printed material.

When appropriate, data centres should develop a strong capability for analysis to meet the user needs for various data products. The end products of such analysis should be new and useful products, compilations, or models which are desired by the user community. Only in this way will centres be able to attract professionals of sufficient competence in the various disciplines to guarantee the proper data inputs and internal data management. Once a data centre is able to attract competent professionals and develops a strong capability for analysis, several specialised information centres may evolve within the centre. It must be realised that both "the analysis and information-type functions require a number of years to develop. The data centre must reach a certain minimum size, both as to resources and the types and amounts of data, before it can really become effective" (61, p. 420). This minimum size will depend upon both the discipline associated with the centre and the segment of the user community to which the centre is responsive. There is no valid reason for having a data centre if the centre cannot provide a wide variety of products and services to users. Everyone concerned with data centres must realise that a centre will probably never have sufficient resources to satisfy all user demands for services. Products and services of a data centre should include, but are certainly not limited to, the following:

(a) Disseminating catalogues and data centre publications
(b) Retrieving, reformatting, and furnishing data
(c) Analysing data to meet individual requests
(d) Summarising and preparing graphic displays
(e) Providing data directories and referral services
(f) Consulting, reducing, and processing data

The general tasks and functions of a data centre are shown in a flow chart in Figure 4.11.
Figure 4.11 Tasks and functions of a data centre
C. Relations between Data Centres

Because data centres will tend to become discipline-oriented and will tend to serve the needs of a particular portion of the scientific community, there does not appear to be any requirements for a monolithic data centre or close links among all data centres. There is, however, a genuine need for close coordination and cooperation among existing data centres, particularly in the ADC where such centres and services are limited. Such coordination and cooperation would facilitate the reduction of unnecessary overlap, and the development and spread of technological advances in storage, manipulation, and retrieval. In addition, each centre should be aware of the holdings and services of the others so that requests may be funneled to the correct centre for action.

D. Relations with Other Units

The special relationship between data centres and specialised information centres have been discussed above. In the ADC, a convenient start of a data centre may be made within the framework of a general information centre, as in the case of the Data Bank at the IDICT in Brazil.

E. Sources of Finance

As was said before, all information centres in the ADC are expected to be efficiently organised so as to permit maximum self-financing. Data centres usually charge for their services. While they may be able to recover part of their output cost with income from such sale of services, it is doubtful if data centres would ever be totally self-sufficient. Because of complex requirements there cannot exist a data centre at low cost. This is why governmental support to data centres is general practice today. The increased effectiveness of data services in the ADC largely depends on the continuing government support and encouragement. Necessary subsidies for the maintenance of data centres should be a fixed item in the national budget.

4.4.5 Collections of Patents
A. Definition

A patent is a specification concerning the design or manufacture of something which is legally protected and secured for the exclusive profit of the designer or inventor for a limited number of years which varies in different countries. The government department which controls the registration of patents is called a "patent office". Patents are, in other words, the publications issued by such an office which give details of designs and processes. The patent office normally establishes and maintains a patent collection. From the point of view of an information specialist, patents may be regarded from two angles, i.e., the legal and the information aspects. As a legal document a patent grants a monopoly to its owner, to exclusively enjoy the benefits of manufacture, use and disposal of the invention to which the patent refers. Such a monopoly is of course restricted in two respects, firstly territorially in that the patent provides legal protection only in the country in which it is issued, and secondly, by having a time limitation of between ten and twenty years during which period such a monopoly may be exploited. The strength of protection provided by a patent will of course depend on the novelty of the invention, but also on the extent of examination which the issuing authority devotes to the application.

As the respect for the patent system by trade and industry will to a great extent depend on the value of the patents issued and thus on degree of examination, it is clear that a patent system in an ADC should try to follow as closely as possible the examples set by such patent examining countries as the United Kingdom, the United States of America and the Federal Republic of Germany. The preeminence of these countries has been gained by a long tradition of attention to details, elaborate classification schemes, comprehensive collections of relevant patent literature, and training of qualified staff. As the ADC seek to augment their technological resources by introducing more sophisticated methods and techniques it becomes more urgent to support such trends by a more viable
patent system. However, the criteria required for establishing and maintaining such a system do not always exist in the ADC, and will have to be created within a short space of time.

B. Information Contained in Patents

Patent documents are important sources of scientific and technical information, making it possible to trace the history of any invention or discovery and to get a clear picture of the present state of the art and development trends in a specific field of science or technology. Patents provide an opportunity for comparing and assessing the technological levels in different countries. Timely acquaintance with patent literature prevents duplication of inventions or the development of techniques and machinery that already exist. In order to enable the examiner to conduct a realistic novelty search in the examination of patent applications, the examiner must have access to a comprehensive collection of literature (including patents) from the major industrial countries. As collections require a great deal of space, if they are to be obtained as hard copy (microfilm is not a suitable medium for literature requiring frequent consultation) a considerable amount of shelving space has to be provided.

Patent literature is very ample. The first patent was granted in Great Britain in 1649 and since the middle of the seventeenth century patenting of inventions has been a regular practice. The overall number of patent specifications published since is estimated at 7.5 million items, to which some 300,000 new titles are added every year. It is estimated that "at least about 2 million U.S. patents, some 800,000 British patents and similar numbers of French and German patents would be required for a collection of moderate usefulness" (108, p. 68). Periodical publications of the patent offices are also treated as patent literature. These are bulletins of inventions, aids for classifying inventions, and other publications giving information on patents.

C. Tasks and Functions
A collection of patents acquires, processes, stores and disseminates domestic and foreign patent documents for use by the examining staff of the patent office, the scientific community, the legal profession, and the public in general. Patent documents are normally of four kinds—utility patents, design patents, reissue patents, and plant patents—with utility patents comprising the largest percentage. In order to provide adequate current-awareness search facilities, regular publication of recently accepted and granted patents is essential. This takes two forms, namely the publication of a patent journal, and the printing of the patent specifications themselves. The former must have a regular schedule of publication, contain full and correct bibliographical details and should preferably include abstracts or full versions of the principal claims. The prints of the specifications should be preferably on a standard format, and be legible. Retrieval of patent information may be facilitated by proper use of patent abstracting services. Most of these—such as Derwent, Chemical Abstracts, INSPEC—are available only in the language of the major industrialised countries and thus may produce a further barrier. On the other hand these services frequently cover patent literature in less common languages and thereby help to bridge the language gap.

D. Placement of Collections of Patent Literature

Since the examiner must have access to a comprehensive collection of patent literature in order to be able to conduct a realistic novelty search in the examination of patent applications, the placement of a central collection of patent literature within the structure of the patent office might be advisable to the AEC. If there exist any large-scale patent collections other than the patent office collection and those built within individual organisations, they should be efficiently coordinated to avoid unnecessary duplication of effort. In such cases the central collection is expected to complement and reinforce the activities of all others.
E. Sources of Finance

If a central collection of patent literature be established within the structure of the patent office, which is normally a government agency, there would be no such problems as have been observed in the other types of information centres. The establishment and operation of the patent collection would be fully supported from state funds.

4.4.6 Collections of Standards

A. Definition

In all countries, standards are drawn up for the manufacture of goods and provisions of services with the object of trying to ensure the provision and maintenance of high qualities. Standards are scientifically substantiated technical documents which specify the types and models of products as well as their quality, testing methods, packing, marking, transportation and storage. Standards also define technical values, dimensions, terms, and symbols. Usually they give a comprehensive description of the product concerned, but sometimes they deal with particular aspects, for instance, the testing procedures. Standards serve to ensure high quality of industrial and agricultural products and the unification of parts and assemblies, as well as separate items. They continually promote better use of materials, fuel and power, faster designing and lower costs of industrial products, and can serve as a source of information on technical accomplishments.

B. Office of Standards

An office of standards is normally the chief government agency for fundamental research in physics, chemistry, metallurgy, and engineering sciences. It functions as a national physical science laboratory to improve physical measurement, determine physical constants and critical properties of materials, and render technical services to other government agencies. It is responsible for maintaining and developing the country’s standards of measurement. It constructs physical standards, tests and
calibrates measuring apparatus, improves measuring techniques, and promotes better laws, industrial practices, and international agreements concerning standards. The office normally investigates the chemical nature of materials, high- and low-temperature phenomena, radiation, atomic and molecular structure of chemical elements, electronics, radio transmission, building materials and metallurgy. These investigations are instrumental in advancing basic science, industrial technology, merchandising communication and public health and safety.

C. Tasks and Functions

A collection of standards acquires and processes comprehensive sets of domestic and foreign standard specifications, keep them up-to-date, and make them available to the scientific, technical, and industrial communities as well as to the research staff of the office of standards. It prepares and publishes analytical information about standard specifications and related materials, and sometimes information material on standardisation problems.

D. Placement of Collections of Standards

Since the research staff of any office of standards needs a comprehensive collection of standard specifications both domestic and foreign to support its activities, the placement of a central collection within the structure of the office of standards might be advisable to the ADC.

E. Sources of Finance

If a central collection of standard specifications be established within the structure of the office of the standards, which is normally a government agency or instrumentality, there would be no funding problems, as in the case of collections of patent literature. The establishment and maintenance of the collection of standards would be fully supported from state funds.

4.4.7 Archives Services

A. Definition
It is said that archives are the memory of nations. They contain everything relating to the more or less distant past of nations and people, their history, their laws, their economy and their social life. They also serve as the information store for government departments and they are increasingly inclined to fulfill this function everywhere. In other words, they assist government departments by preserving the recent documents, while eliminating masses of paper that are of no interest. Delmar (53) defines archives as "all documents, regardless of their nature, which are automatically and organically collected by any administrative body, any person or corporate entity, by virtue of its (or his) functions or activity" (p. 231).

The history of socio-economic relationship in society and of political, cultural and ethical thinking is reflected in documents. A document enables man to record information about his environment and to set down in print the results of his intellectual and creative activity.

The originator of a document is concerned primarily with what it can do toward accomplishing a specific task, and he is rarely conscious of the historical significance of the document as such. However, many of the socio-economic, political, scientific and cultural activities that society undertakes, entail an accumulation of documents, each of which is the product of a particular action, phenomenon, or idea. The quantitative aspect and, more especially, the substance of social information recorded in documents and accumulated over a specific period of the development of a society reflect the history of that society.

The use of archive documents in the most advanced areas of contemporary science and technology, in connection with original solutions to problems, is a rather special case. Original solutions in science and technology depend primarily on the present level of technological development. Nevertheless, retrospective information has certain importance in this field. In particular, it is essential in the following situations: (a) when full information is required concerning specific features of the environment; (b) when general inferences have to be drawn from observations covering...
long period of time; (c) when it proves necessary to trace the history of a particular discovery in the field of science and technology; and (d) when specialists disagree about the proposed solution. Archivists are not called upon to study the content of the information in the field of natural or social sciences. However, they should be familiar with such information, so as to be able to perform satisfactorily the fundamental social function of archives, that of supplying potential users with documentary information in as comprehensive and concise a form as possible. Thus, archives services are the scientific information organs of society as far as retrospective information is concerned.

C. Tasks and Functions

The archives service as an information facility performs the following tasks and functions:

(a) To acquire, organise and conserve a major part of the nation's historical source material and its communication to users for research, educational and administrative purposes.

(b) To inform research organisations and government departments as well as individual scholars, of previously unknown documents which may be of interest to them. This may be achieved through systematic compilation of information on the content of documents that have a bearing on various problems of the day. Newsletters and checklists dealing with the results of such work may be prepared and sent to the appropriate organisations and individuals.

(c) To publish information and reference material concerning the most important categories of documents. Directories, reviews, and inventories of archives are commonly published. The user of information is thus given guidance to the contents of the nation's archives, which considerably simplifies his search for information.

(d) To display documents to the public and to organise excursions to the archives.
C. Relations with Libraries and Information Centres

What should be the nature of the relationship among archives, libraries, and information centres? They have a good many points of cultural interest in common, but they also have different points in nature and purpose. While libraries are concerned with intellectual life, and information centres are usually geared to immediate and clearly defined tangible objectives, archives have a function to fulfil in the working of society. That is why there can be no question of integration or of competition. Instead, there should be cooperation on common problems, so that limited resources can be pooled in such a way that all concerned, provided they derive benefit from such cooperation, can solve their own specific problems. "Cooperation is more likely to be of value in small countries with limited resources and above all at the local level" (53, p. 271). The main areas of cooperation involved are: sharing of certain technical facilities; sharing of work connected with legal deposit; extramural activities such as the organisation of exhibitions, etc.

D. Sources of Finance

A national archives service is a public service financed, for the main part, from the national budget. Two types of expenditure are incurred by archives services: ordinary expenditure, covered by the annual operating budgets of government departments, and extraordinary expenditure on equipment or development, covered by the plan. Archives services may be partially financed from other budgets and may even have their own extra-budgetary resources. There are several types of such resources, differing according to the country. They are: registration fee for searchers (rarely); certified copies of various documents and certificates for legal purposes for which a charge may be made; subvention for scholarly research, or for research undertaken officially for the administration, for university institutes and private research workers; sale of rights of reproduction (copyright) of documents cited in publications; sale of archives publications;
rental for microfilms loaned, etc. The sums obtained in this way are generally paid into the treasury. It is to be hoped that at least some of this money will be returned to the archives and be added to their budgetary allocation, rather than being deducted from it (as is sometimes the case).

4.4.8 Referral Centres

A. Definition

Often the most useful answer to an urgent question is to be obtained from a specialist in the field concerned. Some attempts have been made in this respect to effect means whereby the person with the need can be referred to the person, document, or organisation that has the appropriate knowledge. A referral centre is an organisation for directing inquirers for information and data to appropriate sources such as libraries, specialised information centres, documents, and individuals. A referral centre does not supply data or documents. Such centres have been established within many national libraries and national information centres. An example is the National Referral Center of the U.S. Library of Congress which "lists organisations and individual experts and which, although not guaranteeing particularly fast response, nevertheless is a valuable supplement to the information available in published form" (114, p. 127). Also in the United States, the Smithsonian Institute operates the Scientific Information Exchange (SIE), an annually updated record of unclassified research projects in progress in the life, physical and social sciences. Before most U.S. Federal Government agencies may finance a new research project they must show that an SIE subject search has revealed no other current research on that topic. The National Science Library in Canada has developed its Information Exchange Centre which lists federally supported research projects in the Canadian universities (29). Although there are few organisations in the ADC which are self-described as "referral centres" referral services of one kind or another are provided in most of the countries by national information centres, national libraries, and other organisations (3.3.6).

B. Tasks and Functions
A referral centre normally has the threefold function of (a) inventorying all information resources in the country concerned, (b) of publishing general and special book-form directories of such information resources, and (c) of providing, in-house and by post, responses to requests for referral information. The centre does not answer bibliographic or substantive questions, but through its inventory of resources, refers users to the persons, organisations or services best able to render expert assistance. Regarding the first task, a referral centre lists any facility, collection, or service maintained on a continuing basis that provides data or material of any kind in any form that may help satisfy the information needs of members of the research community in the country—a any organisation, group, service, library, information centre, or even individual from which or from whom authoritative technical information is available. Regarding the second task, a referral centre acts as a clearinghouse. It does not provide substantive answers to questions, but instead serves as a kind of technical equipment of the telephone directory's "yellow pages", directing inquirers to reliable, expert information on particular topics. The third task is actually an extension of the centre's referral services although, in a sense, it competes with them. Publication and distribution of directories were originally intended to increase general familiarity with existing services and thereby decrease reliance upon individual requests to the centre. Experience has shown, however, that "referral requests are stimulated by the publication of directories" (114, p. 127).

C. Organisational Positions

A referral centre is normally established as a department of a large information institution, most commonly, of a national library or a national information centre. In some cases, such a centre is a function rather than an organisational unit.

D. Relations with Other Centres

The referral service technique is not a new one in information
transfer. It is rather an attempt to categorise and systematise a service that libraries have long provided in a more or less haphazard way. Existing services may therefore be developing independently and involve some duplication. If their expansion remains uncoordinated, there is every reason to suppose that the extent of unnecessary duplication will increase in future. It is, therefore, desirable that all referral centres or services should cooperate with one another in order to produce the maximum economy of effort coupled with the best possible service to users.

E. Sources of Finance

If a referral centre is a part of an information institution as discussed above, there would be no financial problems of its own. Operation of the centre is financed by funds for the parent library or information centre. Thus the centre is not self-supporting in many cases. The centre may or may not charge its services but it usually sell its publications.

4.4.9 Translation Centres

A. Translation Service in Information Transfer

Whatever a scientist's knowledge of foreign languages may be, many of the papers in which he is interested will be written in languages with which he unfamiliar, and here we have one of the greatest barriers to the transfer of information. To make a large amount of foreign language material accessible and comprehensible to potential users—the research scientist, engineer, manager, patent officer, etc.—it is essential to bridge the language gap in an efficient and effective manner since the user is rarely capable of properly understanding an original article in a foreign language. To help users overcome the language barrier, two solutions can be offered: a quick one, the provision of translation; and a second, slow but more permanent one, namely the teaching of foreign language. The teaching of foreign languages, to facilitate direct access to foreign scientific literature, is a much longer enterprise than merely preparing
translations, but the results are lasting. Technical language courses have been organised in some countries such as Mexico and the Philippines (186). More common is of course the provision of translations. Translation centres are established to issue translations and give information on translations available elsewhere. The translation centre normally supplies written or oral translations of foreign works and maintains a register of qualified translators.

B. Translation Service in the ADC

Every translation service or centre attempts to constitute a panel of translators with appropriate subject background, so as to provide translations offering good guarantees of accuracy from both the subject and the linguistic points of view. Unfortunately, it is difficult to establish such panels in the ADC where translations are most needed. The general monolingualism of the scientists and the narrow linguistic diversity of the foreigners resident in such countries are the reasons for this difficulty. Translation services are less used in the ADC (186). Scientists have little difficulty in finding a friend or a colleague ready to offer his linguistic help free of charge for the required translation. In some cases, although the work is done at a nominal cost, the rates prove too high for the means of the potential customers. If the government authorities did not agree to subsidise the cost of translations, the rates might be an obstacle for the full utilisation of the translation service in the ADC.

C. Tasks and Functions

A translation centre serves as a depository and information source for published and unpublished translations. Such function is designed to eliminate duplication of translation effort, to disseminate information regarding available translations, and to provide copies of translations or refer inquiries to other sources. In order to achieve this purpose, it builds a comprehensive collection of translations in all subject fields and from all languages, maintains a catalogue of the collection, and issues
periodical announcements of new translations. The translation centre also provides translating service for foreign articles and books. Before a translation is undertaken, it must be demonstrated by the requester that the translation will fill a definite gap in the national knowledge. Actual translations are prepared by a panel of extramural translators with specialist knowledge as well as linguistic qualifications. A charge is normally made for such service, and the cost is notified in advance of the translation being made. Charges vary according to the language of the original.

The translation centre is responsible for the overall control of translation activities in the country concerned. Translation activities, unless most carefully controlled, are liable to swallow up such a vast quantity of effort for comparatively little return, that any such programme must be carefully planned by the centre. The mission of the staff of a translation centre is not merely the turning of papers and articles into the national language, on demand, but the seeking-out and active dissemination through the medium of the national language of books, articles, patents, and reports, chosen from the literature of the world for their potential seminal influence on the national development.

D. Placement of Translation Centres

As in the case of referral centres, a translation centre is normally established as a department of a large library or information centre. For example, the National Translation Centre in the United States constitutes a part of the John Crerar library, and the Belgian translation centre is a department of the National Centre for Scientific and Technical Documentation in Brussels. In some cases such a centre is a function rather than an organisational entity, an example of which is the Lending Division of the British Library. The Lending Division provides the services of a typical national translation centre, with many other services.

E. Relations with Other Organisations

A translation centre is responsible for the overall financial
control of the translation programmes of the country, but a common working pattern is that translating, technical editing, printing and distribution of cover-to-cover or selective translations of foreign journals are organised on behalf of the centre by learned societies, research associations and commercial publishers which carry out the work under contract.

F. Sources of Finance

As the translation centre constitutes a department of a central library or an information centre in most cases, it rarely has its own financial problems. The operating costs of a translation centre are included in the budget of its parent library or information centre. In some countries a small service fee is included in the price of each translation to help support the centre (194). The practice, however, should not be hastily introduced to the translation centres in the ADG. As previously discussed, the translation rates are already high for the means of the potential customers in these countries. Governments are expected to subsidise part of the cost of translations to ensure the maximum utilisation of the services of the translation centre.

4.4.10 Conclusions

General information centres, specialised information centres, data centres, collections of patents, collections of standards, archives services, referral centres, and translation centres form the main information input device of a national information network. To ensure the best possible coverage of information relevant to the national needs, these network units ought to ensure the following specific functions, working relations with others, organisational positions, and sources of finance.

(1) A general information centre collects domestic and foreign information sources of all kinds and in all fields; processes them with the output in the form of abstract journals, information bulletins, indexes and printed cards distributed among the various research institutes, industrial enterprises, institutions of higher learning and individuals; and
on request from those institutions and individuals, furnishes copies of the original documents announced in its secondary publications (4.4.2).

(2) In the ADC a general information centre is usually established at the first stage, in order to capitalise on the possibilities of rationalisation, thus ensuring a high degree of efficiency from the very start. Then the process of decentralisation follows according to the national needs and priorities (4.4.2).

(3) The link between information centres and libraries should be as close as possible in the provision of information in the ADC (4.4.2).

(4) Although it is necessary to finance general information centres from State funds at the initial stage, their activities should be organised with a view to economic efficiency, that is, there should be a maximum degree of self-financing (4.4.2).

(5) A specialised information centre collects, processes, stores and disseminates a body of information and data in a clearly defined subject field or pertaining to a specified mission. A specialised information centre collects and processes information and data which would meet specialist needs in a particular field (4.4.3).

(6) Ideally, there may be a dozen specialised information centres which would cover information sources in all fields while remaining in close contact with one another (4.4.3).

(7) The assignments of a specialised information centre should be closely linked with those of general information centres and data centres within the same network (4.4.3).

(8) A specialised information centre in the ADC should aim to be self-supporting at some stage in its life (4.4.3).

(9) A data centre collects, processes, stores, and disseminates data. When appropriate, a data centre should develop a strong capability for analysis to meet the user needs for various data products (4.4.4).

(10) There is a need for close coordination and cooperation
among existing data centres, which would result in the reduction of
unnecessary duplication of effort and the spread of technical advances in
manipulation of data (4.4.4).

(11) The increased effectiveness of data services in the ADC
largely depends on the continuing government support to data centres (4.4.4).

(12) A collection of patents acquires, processes, stores and
disseminates domestic and foreign patent literature for use by the examining
staff of the patent office, the scientific community, the legal profession
and the public in general (4.4.5).

(13) The placement of a central collection of patent litera-
ture within the structure of the patent office is advisable to the ADC
(4.4.5).

(14) A collection of standards acquires and processes compre-
hensive sets of domestic and foreign standard specifications, keep them
up-to-date, and make them available to the scientific, technical and
industrial communities as well as to the research staff of the office of
standards (4.4.6).

(15) The placement of a central collection of standard
specifications within the structure of the office of standards is advisable
to the ADC (4.4.6).

(16) An archives service as an information facility acquires,
organises, and conserves a major part of the nation's historical source
material (4.4.7).

(17) An archives service publishes directories, catalogues,
and reviews of important categories of documents to facilitate the user's
search for needed information (4.4.7).

(18) A referral centre inventories all information resources
in the country concerned, publishes general and special book-form directories
of such information resources, and provides, in-house and by post, responses
to requests for referral information (4.4.7).

(19) A translation centre builds a comprehensive collection
of translations in all subject fields and from all languages, maintains a
catalogue of the collection, issues periodical announcements of new
translations, and provides an ad hoc translating service for foreign
articles and books. Such a centre should be responsible for the overall
control of translation activities in the country concerned (4.4.9).

(20) A translation centre is normally established as a
department of a large library or information centre (4.4.9).

(21) Now that the translation rates are high for the means
of the potential customers in the ADC, the government is expected to
subsidise part of the cost of translations to ensure the maximum utili-
sation of the service of translation centres (4.4.9).

Figure 4.4 can now be redrawn (Figure 4.12) to show the
constituent units of "the group of units primarily collecting and process-
ing information".

4.5 The Group of Units Primarily Providing Information

4.5.1 Introductory Comments

Having collected and processed the necessary information and
stored it within a national information network, the next task to perform
is to make the information available for use. The use of information is
the ultimate goal of all information activities. This in a way brings to
a focus all the collecting and processing functions of the units outlined
in the preceding section since, after all, their diverse tasks and
functions simply serve the common purpose of making the use of information
as efficient as possible.

It is necessary to distinguish, here, between regional services
which are concerned with making information available for use throughout
the region, such as regional interlending schemes, and local services
provided to their own users by individual libraries and information
departments, that is terminals. The effectiveness of both kinds of
service may be enhanced by cooperation among the terminals in a geographical
Figure 4.12 The group of units primarily collecting and processing information within a national information network.
region. As Davis (48) believes, the successful network is developed from "vigorous, lively, and progressive systems at a ... regional level" (p. 19).

The present section turns to these terminals and regional centres that form the main output device of the national information network, and to the functional and organisational structures that bind them together in a service subnetwork. To Recker and Olsen (17), a formal network organisation occurs when "... many units sharing a common information purpose recognise the value of group affiliation and enter into a compact" (p. 290). Such organisations are often conceived as having hierarchical levels of cooperating units and affiliations. From any local service point, the search for information and data might rise, if need be, through two or more layers of cooperating groups of information units--regional, national, or even international--each group at each level having its own communications centre.

The network idea, in a sense, is the full modern extension of a drive that began in such countries as the United Kingdom and the United States many decades ago to organise larger units of public library service--a drive that has resulted in county, regional, and to a certain extent, nation-wide public library systems. Characteristically, such organisations consist of local service that are then affiliated under second-level centres with higher switching capabilities, and so on. Theoretically, the ultimate national network should have some sort of super-centre at the apex of the hierarchy. One major concern, then, is the conformation of such hierarchical organisations. What, for example, would be the optimum size of a regional subnetwork of the national network? What would be the best balance between resources that are regionally available from any particular terminal and those which must be sought in a general information centre, a specialised information centre, a data centre, etc., at the national level? What level of regional sufficiency would be most cost-effective? What would be the functions of a regional centre? At what levels of centralisation should certain technical processes occur, such as circulation control and the production of union lists? These and some other topics are discussed in
the present section.

4.5.2 Terminals

A. Definition

The word "terminal" is used here in the sense of an apparatus for transmission of messages to and from a communication system. A national information network has been defined in 2.2 as "a closely coordinated structure which interconnects existing and future libraries and information centres at a national level to collect and process information and to disseminate it through a convenient local outlet and with a minimum of delay to those who need it". A terminal is the "convenient local outlet" through which the information resources of a national network are provided to users. Every user needs his local point of contact with the huge information store of the national information network, where he is, and the local point is his terminal. Terminals are represented by various types of libraries and information departments attached to research institutes, industrial enterprises, institutions of higher education, and government departments and agencies. Public libraries are those for the general public.

Certainly many librarians and information specialists are well aware that an individual service cannot cover all the information requirements and recognise that pooling of information resources on a regional basis can expand the availability of information to their users. Each terminal should therefore build its own resources to the practicable limit, but it must then supplement these resources by drawing upon other collections. A usual policy is to acquire the books and journals to meet the immediate needs which will be heavily used, and rely on interlending and reprographic services through the regional coordinating centre, for specific information needs.

The ultimate criterion of value to the reader is not the size or quality of the collection of a local library or information department, however important it may be; it is the service he actually receives in
terms of the delivery of books and information regardless of where or how it gets them. Realistic access to the nation's total information resources at any point of local service depends upon the ability of all libraries and information departments to exploit the resources in addition to building their own local collections, that is, efficient performance of their function as a terminal.

B. Tasks and Functions

A major function of a terminal is to provide accurate and timely information to its primary users. If the needed information is not available in its own collection, the unsatisfied request is forwarded to the regional centre, which is supported by the central depository collection, general information centres, specialised information centres, data centres, etc. at the national level as the last resort for obtaining the requested items. It is important, however, to point out that the concept of a national network does not imply the absurd notion that only one copy of a particular book or publication will be sufficient for the entire country to use. People need material at the most immediate and most accessible level. A national plan must, therefore, be built upon strong local resources. An ideal national network requires provision of local holdings in every terminal of sufficient scope and quantity to satisfy the immediate needs of local users. The concept of a national network does not imply a substitution of computer technology for human resources. The bulk of user services would be delivered at the terminal level, but the network would provide additional supporting resources as well as communication directions for reaching specialised information in other units and terminals when it is needed locally.

In the ADC attention must be paid to the many small industrial and other organisations without their own information terminals (3.3.6). A solution to this problem is the establishment in the regional centres or libraries of higher education of information disseminating centres, which
would be similar to the Industrial Liaison Centres in the United Kingdom (64) and the Agricultural Extension Service in the United States. An information disseminating centre would maintain close contact with local organisations and encourage them to use technical information more fully in their activities.

C. Organisational Positions

Where a terminal is placed organisationally varies in practice, often depending on the historical motivations of its evolution. It may be found:

(a) At the corporate or headquarters level as an autonomous department.

(b) As part of the department it mainly serves, for example, the research and development department.

(c) As part of the administration or service department.

Ideally, the terminal should be unencumbered of organisational loyalties that might deter its usefulness to the full community of users it has been designed to serve. Organisationally, it should be free to interact with its users and to present opportunities for them to participate in its planning, development and assessment. Its close interaction with users enhances services because their needs can be more readily determined and met. If the majority of users are homogeneous, then the terminal could well be located within the department requiring the major needs. If the user community is heterogeneous then an autonomous organisational structure might be advisable.

D. Sources of Finance

Most terminals are established within various local organisations to provide information and library services to their workers, and are supported financially by the organisations they serve. An exception is the public library which is financed from public funds.

4.5.3 Regional Coordinating Centres
A. Definition

For a national information network to operate efficiently, certain units in the network must function as major switching or referral points for communication between local service units, that is, terminals, and the national network. Regional coordinating centres could perform this function. Their responsibilities would include the compiling and maintaining of union catalogues of the collections within the region, locating requested items and the controlling of regional inter-borrowing, contributing union catalogue entries to the national union catalogues and lists, maintaining records relating to interlending of the region, and extensive reference, referral, lending, and reprographic services for participating terminals. The interrelationships of the regional coordinating centre with the other network units may be diagrammed as in Figure 4.13.

The growth of participating terminals would cause the central depository collection, general information centres, specialised information centres, etc. at the national level to be faced with the problem of too many demands with consequent delay and congestion. A solution to this lies in linking up the terminals in large groups, each centred on a regional coordinating centre which is preferably the largest library within, and the natural centre of, the region. The regional centre would relieve these collections at the national level by placing its information resources at the disposal of the terminals within the region, and would in turn benefit by better service from these central collections. Another advantage of this regional service subnetwork developed around the regional coordinating centre is speed. A location of the desired information item is obtained by telephone, and the transaction is then arranged between borrower and lender. Thus the loan can often be arranged and a messenger sent in the matter of a few minutes. In other instances, where time is not so important, located items may be sent by post or photocopies sent instead.

B. Tasks and Functions
Figure 4.13 Interrelationships of the regional coordinating centre with the other units of a network

Terminals 3 and 4 are convenient to the user shown, and through them he accesses the network.
The major tasks and functions of a regional coordinating centre are as follows:

(a) To act as an agency for the loan of materials among its participating terminals and for the loan of materials in its own collection and the participating terminals to other regions. If a reader asks for an item not available in a participating terminal, the request is sent to the regional coordinating centre. By means of the regional union catalogue, the item is located and the request is forwarded to one of the participating terminals which have it. And this terminal sends the item to the terminal requesting it. If the item cannot be located in the regional union catalogue, the request is forwarded by means of the national union catalogue, to the central depository collection, general information centres, etc., which send it direct to the terminal requesting it.

(b) To acquire the secondary publications produced by the general information centres, specialised information centres, data centres, referral centres, etc., and the primary information sources which would meet the particular regional needs in order to provide most of the needed information directly or through terminals to the qualified users within the region.

(c) To forward unsatisfied information requests to the other regions or the central collections for location and reprographic services.

(d) To determine the information needs of the region through its close and constant interaction with users and supply the results in the form of feedback to the general information centres, specialised information centres, data centres, etc. to help them react immediately to demands and requirements on them.

(e) To act as a centre of bibliographical information to the participating terminals and to maintain union catalogues of their holdings. In this second connection it is also responsible for forwarding details of materials added or withdrawn from the region, to the institution responsible for maintaining national union catalogues.
The tasks and functions of a regional coordinating centre may be diagrammed as in Figure 4.14.

C. Designation

It is not necessary to establish a new independent regional coordinating centre. As has already been mentioned it is advisable to designate an existing library with a large collection within the region, or such a centre. One might, therefore, be a library attached to an institution of higher education, a research institute, a government agency, or the like.

D. Sources of Finance

A regional coordinating centre should be financed from the membership fees collected from its participating terminals. The activities for the centre's own user group are not funded by the money from the same source but supported by its parent organisation. It would be difficult, however, at an initial stage to collect fees sufficient enough to fund all the activities of the centre. Alternative sources of funds should therefore be sought. Subscriptions from all the library authorities in the region should provide an appropriate avenue for funding the activities of the regional coordinating centre at its initial stage of development.

4.5.4 Regional Resources of Information

The regional resources may be the existing collections of books and journals, special collections, and nonbook materials held by the regional coordinating centre and the participating terminals in the region. These resources are supplemented with those held by other units outside the region, through the routing function of the regional coordinating centre. The total information resources of the national information network are, therefore, potentially those of each regional service subnetwork. Although regional service subnetworks are primarily designed to be the main output device of the national information network, they cannot rely entirely on the resources held by other units. A question then arises as to what a regional subnetwork is expected to provide, i.e., what proportion of the requests received
Figure 4.14 Tasks and functions of a regional coordinating centre
should be filled at the regional level. A region is expected to "supply the bulk of the requested material, the most-used items" (75, p. 14) and those items to meet the region's particular needs. An obvious advantage of using regional resources instead of far away resources is that it can reduce time element considerably.

Items which are supposed to be available within a region may not be so, either because expensive new publications are not bought on the grounds of cost and because they are of a specialist nature, or because older books are withdrawn by all terminals and no copy remains within the region. To remedy these possible defects each regional service subnetwork is advised to devise a subject specialisation scheme similar to that which the London Union Catalogue has successfully developed (701). By such a scheme each participating terminal is made responsible for purchasing and storing indefinitely material within certain Dewey classes. The whole of the Dewey Classification can be divided between the terminals and each will agree to spend at least a specified amount of money annually in buying specialist material within the subject groups allotted to it—thus it is anticipated that there will be few items of value not included in at least one terminal in the region. If each terminal plays its part it means that such material is preserved indefinitely. It should aid interlending and, in particular, should assist in direct application from a terminal to the specialised one. This could cut delay to a minimum as it would obviate the need to channel such requests through the regional coordinating centre. It materially reduce the work of the regional centre both in routing requests from its member terminals and in work on its union lists. It should lead to a more economic use of book funds of individual terminal as specialist material can be left to be purchased by a specialised terminal. Terminals can adopt a more generous withdrawal policy if the specialised terminal is to be responsible for preserving at least one copy of every book or journal within its subject groups. Thus shelving space should be saved. Each regional coordinating centre is in an ideal position to devise such a
subject specialisation scheme best suited for the region, activate, and coordinate the activities for it.

4.5.5 Conclusions

Terminals and regional coordinating centres form the main output device of a national information network. To ensure realistic access to the nation's total information resources at any point of local service, terminals and coordinating centres ought to have the following specific functions, working relations with others, organisational positions, and sources of finance.

(1) A terminal provides accurate and timely information to its immediate users. If the needed information is not available in its own collection, the unsatisfied request is routed to the regional coordinating centre, which is supported by the central collections such as general information centres, specialised information centres and data centres (4.5.2).

(2) An information disseminating centre should be established in a regional centre or a library within each region, to maintain close contact with local industrial and other organisations without their own terminals, and encourage them to use information more fully in their activities (4.5.2).

(3) If the majority of users are homogeneous, the terminal could well be located within the department requiring the major needs. If the user community is heterogeneous, then an autonomous organisational structure might be advisable (4.5.2).

(4) Most terminals are supported financially by the organisations they serve (4.5.2).

(5) The regional coordinating centre acts as an agency for the loan of materials among its participating terminals and for the loan of materials in its own collection and in the participating terminals to other regions (4.5.3).

(6) The regional coordinating centre acquires secondary
publications produced by general information centres, specialized information centres, data centres, referral centres, etc., and primary information sources which would meet particular information needs of the region, in order to provide most of the needed information directly or through terminals to qualified users within the region (4.5.3).

(7) The regional coordinating centre acts as a bibliographical information centre to the participating terminals and maintains union lists of their holdings. It also forwards details of materials added or withdrawn from the region, to the institution responsible for maintaining national union catalogues (4.5.3).

(8) It is advisable to designate an existing library with a large collection within the region as a regional coordinating centre rather than to establish a new independent centre (4.5.3).

(9) The regional coordinating centre should be financed from membership fees collected from its participating terminals. At its initial stage of development, however, subscriptions from all library authorities in the region should provide an appropriate avenue for funding its activities (4.5.3).

(10) Although a regional service subnetwork is primarily designed to be an output device of the national information network, it should supply the most-used items and those to meet the region's particular information needs (4.5.4).

(11) In order to acquire and preserve such material effectively and efficiently, each regional service subnetwork is advised to devise a subject specialisation scheme. The regional coordinating centre is in an ideal position to devise such a scheme suited for the region concerned, activate, and coordinate the activities for, it (4.5.4).

Figure 4.4 can now be redrawn (Figure 4.15) to show the constituent units of "the group of units primarily providing information".
Figure 4.15 The group of units primarily providing information within a national information network.
The Group of Units Serving General Network Needs

4.6.1 Introductory Comments

The structure and function of the group of units primarily collecting and processing information and those of the group of units primarily providing information were discussed in the two preceding sections. These two groups, which are a product of the division of labour, can organisationally be viewed as the key line organisations of the national information network. Like any other line organisation, both groups are "concerned directly with the creation and distribution of saleable utilities or with the management of such activities" (63, p. 78-79). Their functions contribute to the achievement of the network object—transfer of information to those who need it.

The present section will discuss another group of units, namely, the group of units serving general network needs. This group, also forming an important part of the national information network, is a staff organisation. Like other staff organisations, this group too guides, advises and serves the line. It is given responsibility and authority, within an established network policy, over specialised activities such as training of personnel at various levels to operate the network, research and development on general network problems, building a comprehensive collections to fill the gaps of holdings of the acquiring centres, and acting as an operational coordinating unit. Unlike the tasks and functions of the aforementioned two line groups those of the group of units serving general network needs do not contribute directly to the achievement of network objectives, yet they are equally important in the working of a national information network. A statement made by a working group of a 1970 conference widely known as the Airlie House Conference (212) is an instance that support this. The working group states that "the ultimate success of ... information networks will rest on the capacity of qualified personnel to propose, develop, implement, and interpret the services required" (p. 91).

As a network grows in size and complexity, the role of this
supporting group will develop into more, specialised service units. There is no unanimity concerning the functions that are performed by this group. Nonetheless, the following four functional units frequently appear in national information networks:

(a) Training unit
(b) Research and development unit
(c) Central depository collection
(d) Operational coordinating unit

It must be understood that these four functional units are not always organisationally separate entities. Rather, they are seen in most cases within the framework of a national library, a national information centre, or a national university library.

4.6.2 Training Units

A. Definition

It is clear that no information service can be provided without materials on which the service is based, but without trained staff no service can be effective and any money spent on materials may quickly be wasted. Therefore, one necessary function of the network is to train personnel at all levels to operate it. As Olson (133) concludes, the extent of training of the network personnel is an important factor in the ability of the network to adjust to new demands which will be placed on it in the future. Of all problems facing the network planner, particularly in the ADC, staff training is most critical because the time lag between the identification of the need and its satisfaction is the longest. Books, if bought from a local supplier, can be acquired in a matter of days; a new building can be constructed in months; but trained staff takes years to produce. The network planner must devote early and earnest attention to the staffing implication of any new service.

The training unit is a network entity that coordinates and supervises the training of information specialists and scientists, including
training abroad, in close cooperation with the Ministry of Education and universities, colleges and other institutions. Although most of the programmes of professional training for information workers are run by universities and other educational institutions, the primary responsibility for elaborating such training programmes and profiles for the national training system ought to be assumed by the network training unit, which is best informed of the national needs in terms of number, quality and time. Such overall coordination of training programmes at national level is essential both to ensure an adequate supply of qualified personnel to meet increasing national demands and to avoid overproduction.

B. Tasks and Functions

The major tasks and functions of a training unit may be summarised as follows:

(a) A training unit coordinates, guides and sometimes organises the training of information specialists and information scientists in cooperation with the Ministry of Education, universities, colleges and other educational facilities.

(b) A training unit undertakes, in cooperation with other facilities, such major work as elaboration of training programmes. Such a unit is best informed of how many people and what qualifications are needed and when.

(c) A training unit should plan such training in close cooperation with library services. In the ADC it might even be advisable to make the fullest possible utilisation of existing training facilities for librarians (3.3.16).

(d) A training unit may organise continued training programmes for the information specialists working in various units of the national information network, on the science of information, and recent problems and developments of information practice.

(e) A training unit, with the aid of the central information coordinating body, coordinates and sometimes organises training
programmes for information users.

(f) It might be advisable to the ADC that a training unit includes training abroad for future teachers and highly qualified administrators, in its overall training programmes.

Although a training unit organises some of its training programmes, for example, by arranging courses, the major functions are to take centrally coordinated measures to be applied in various suitable training facilities. A NATIS document proposes that "national institutions and programmes of professional education for information manpower should be established as integral parts of the national educational structure at universities or equivalent institutions of higher education, and as the principal means of supplying adequate numbers of professional staff to meet the demand for qualified personnel at various levels to operate the national information system ... " (82, p. 27). Most of the training programmes for future personnel should be carried out in universities or equivalent institutions of higher learning for the following reasons: to ensure close contact for the trainee with members of other professions of equivalent status such as research workers, historians and university teachers; to use teaching staff and facilities already available so as to reduce costs and integrate these programmes with those of other academic discipline; and to provide access to library and information resources not only because the professional training requires the use of these resources for the trainee's studies but also because they provide the opportunity for practical as well as academic training.

C. Organisational Positions

In many cases a training unit is a functional unit rather than an organisational one. A training unit is established commonly as a department or a departmental function within a national information centre. A NATIS document proposes that the coordination of training activities for information specialists and users should be carried out by the central
information coordinating body (82, p. 28). In 38.5% of the ADC investigated the central coordinating bodies include such function in their terms of reference (3.3.2). An FID/DE working group, however, suggested that "the training of documentation and information specialists and scientists ... should be coordinated and supervised by the national documentation centre" (87, p. 113). As this particular coordinating function involves close cooperation with the Ministry of Education and universities, colleges and other institutions of higher learning, the former appears to have many attractions to the ADC. However, in a country where the central information coordinating body does not effectively work, the latter would probably be better. Where the training unit is organisationally placed does not really matter as far as it performs all its assigned functions effectively.

4.6.3 Research and Development Units

A. Definition

Transforming a nation's heterogeneous information facilities and services into a nation-wide network will pose many new problems. Some of these problems may arise from the effects of new information supply arrangements on users, some may derive from the application of the new technology, and others may originate with the profession itself as it struggles with the dynamics of change. A central programme of research and development, through grants and contracts, can provide an overall framework within which common investigations can be carried out. By concentrating specialised skills on crucial common problems, such a programme helps reduce duplicate and costly piecemeal research that would otherwise be performed by individual institutions, provides for research and demonstration across jurisdictional boundaries and, at the same time, greatly accelerates the rate at which new methods and equipment can be transformed into operational system. The British Library Research and Development Department (BLRD), which has incorporated the functions of the former Office for Scientific and Technical Information, is a well known example. The BLRD has, by the
size of its resources, the opportunity to direct and coordinate library and information research efforts in the United Kingdom. It sponsors—rather than carries out—research and development related to library and information operations in all subject fields. The BLRD's work is directed to the benefit of the national library and information network as a whole and to this end it can award research grants also to outside bodies.

Throughout this thesis, the importance of coordinating information activities has been stressed. This is especially important in the field of information research, which though it has great potential for increasing national prosperity, is itself very costly. Consideration should, therefore, be given to the creation of machinery to bring together the major national interests engaged in the development of information practices, so as to coordinate effectively the total research effort and assist in the formulation of national research policies. A research and development unit is established to meet this need. Such a unit may be defined as a network entity that plans a unified programme of critical research and development in information practices, and finds, guides, and supports contractors in the conduct of the research and development. A research and development unit may itself carry out part of its programme. Without this unit or its function, research and development could only be conducted in a variety of disciplines and work settings, and the different methods, sampling techniques, and analysis employed would limit the generality and usefulness of the findings.

B. Tasks and Functions

The major tasks and functions of a research and development unit are as follows:

(a) A research and development unit initiates and carries out comprehensive analyses of the functioning of the different parts of the national network as well as of the network as a whole.

(b) A research and development unit initiates and carries
out basic research on the development of information science, as well as research and development that more directly supports missions of various information services within the network.

(c) A research and development unit plans a unified programme of critical experiments in information transfer, and finds, guides and supports contractors in the conduct of these experiments. In most of the ADC research related to educational programmes is carried out within the postgraduate programmes of their schools of library and information studies (3.3.15). The research and development unit should work in close cooperation with these educational institutions.

C. Funds for Research

The tasks and functions of a research and development unit enumerated above would need adequate financial resources. Since it is the responsibility of the national government to plan and develop the national information network (3.3.1), the bulk of the resources should be provided by the government. From one point of view, research is part of the planning function. Only research can provide an accurate picture of future developments and new needs, on which every forward planning must base. Many projects are financed by the organisation carrying out the work. In particular, these may include a substantial number carried out in universities and schools of library and information studies. However, most of the basic research on the development of information science and of large-scale experiments should be supported by the government grant and contract assistance.

D. Organisational Positions

Because information is of interest to everybody it can be the responsibility of none. In an attempt to eliminate this danger in one country, the function of the research and development unit was made the responsibility of the executive office of the president. However, as Urquhart (200) observed, this was ineffective because the machinery was not used.
An FID/DC working group proposes that the research and development unit be placed within the framework of the national information centre (87, p. 43). Since, in most of the ADC, the national information centre is the largest and most important institution in the field of information services the unit might find it convenient to work within the centre.

4.6.4 Central Depository Collections

A. Definition

A central depository collection serves the national information network as a central lending library of final resort for those materials unavailable elsewhere within the network. A national information network comprises the collections organised for three sequential service levels (4.5.3). Loan of library and information materials will, in some cases, have to come from the most comprehensive collection, that is, a central depository collection. To fulfil this requirement for complementing other resources within the network will call for some special arrangements, which include improved methods of interlibrary communication, an efficient mechanism for obtaining copyright permission, and fast document and text delivery techniques. The copyright deposit system will ensure that the collection holds at least one copy of everything printed in the country. To this end, it will need to establish good relations with book trade, in order to serve full and speedy deposit, and any legislation passed should not appear to publishers as a punitive imposition.

It will survey and supplement the lacunae in the major collections by acquiring them itself. In acquiring materials, the holdings of other important units of the network should be taken into consideration to avoid duplication of holdings as far as possible. The central depository collection will acquire and preserve discards from other units of the network for which there is a continuing need elsewhere. Thus it will become a dormitory for housing old periodical runs. In short, it can be said that a central depository collection will not be competing with any of the existing
libraries and information centres within the network. On the other hand it is envisaged to be a unit to supplement their resources by its own selective acquisitions.

B. Tasks and Functions

The British Library Lending Division (BLLD) is probably the best example of the central depository collections in the world. The BLLD, which comprises the former National Lending Library for Science and Technology and the former National Central Library, obtains all literature likely to interest the British researchers and experts, making it available rapidly on request by lending and photocopying services. It was developed as a supporting library supplying research materials to the whole nation. It enlists the assistance of other libraries when it cannot satisfy requests from its own holdings. It acts as the national centre for international interlending, making special arrangements with similar centres abroad concerning loans and photocopies. According to the Division's 1976 statistics (28), it satisfies 83% of the requests it receives, from its own stock, and 11% from elsewhere. The BLLD lends only to libraries and similar accredited organisations, and not directly to individuals who must apply through such an organisation. The main categories of literature acquired by the BLLD are all significant books in English and periodicals in all languages. In order to build up its stock of older material, it acts as the national centre for libraries wishing to dispose of publications. Major tasks and functions of a central depository collection are summarised as follows:

(a) Each of the terminals and regional coordinating centres, however enthusiastic about the network concept, will naturally still retain as its top priority the fulfilment of its own specific mission and the needs of its own immediate users. In order to counteract such tendencies, the central depository collection surveys the holdings of the other units within the network, and supplement the lacunae in their collections by acquiring them and making them available itself.
(b) There will almost certainly be some subject areas of importance for national economic growth that are the specific responsibility of no one unit of the network. The central depository collection takes action to plug such information gaps.

(c) The central depository collection pays special attention, if required, to the information needs of special communities, which would otherwise not be the concern of any particular unit.

(d) The central depository collection acquires and preserves discards from units for which there is a continuing need elsewhere. This function allows all the other units of the network to adopt a more generous withdrawal policy. Thus shelving space will be saved.

(e) The central depository collection compiles national union catalogues and keeps them up-to-date by incorporating the catalogue entries forwarded by the regional coordinating centres and other units of the network (4.5.3). Its tasks of surveying the network collections mentioned in (a) can only be done efficiently through these union catalogues. The object of a union catalogue is to record the location of books, journals, and other library and information materials, mainly to facilitate access to a particular, known item by a library or an information centre that does not hold it; and because the central depository collection is theoretically the most comprehensive collection within the network, it is in an ideal position to assume the responsibility for the compilation and revision of various national union catalogues.

C. Advantages in the ADC

The advantages of a central depository collection in the ADC are set out below:

(a) The existence within the network of a central depository collection suggests an obvious first point for terminals to approach when seeking information or materials uncertain where else to try.

(b) There is major economy to be gained from the
rationalization of holdings on a national scale.

(c) Terminals and regional coordinating centres are able to concentrate their resources on optimum purchase of the materials most needed, in the knowledge that fulfilment of their other needs is ensured by a prompt and efficient response from the central collection.

(d) Systematic review of subscriptions in a time of rapidly rising costs, with consequent economies, is practicable when a single known centre can be relied upon to maintain its current subscriptions.

(e) Where the subject specialisation schemes of the regional service subnetworks (4.5.4) do not work effectively, the difficulty can be overcome partly by a central depository collection.

D. Organisational Positions

A realistic proposal is the expansion of the acquiring and lending function of a national library to include that of the central depository collection. For the primary function of a central collection is to acquire, preserve and make available all literature likely to interest the researchers and experts in the country, which is the main concern of any national library. In such case, the national library will need to take a series of important decisions as to the nature of its holdings, particularly with regard to the holdings of the national (or general) information centre. The degree of duplication of stock between the national information centre and the national library should be kept to an absolute minimum. It would be unwise to use scarce foreign exchange for duplicate materials of insignificance.

The best way of ensuring the required degree of coordination between the central depository collection and the national information centre would be to integrate them into one administrative unit. There are a number of precedents for this: an example can be seen in Belgium where the National Centre for Scientific and Technical Documentation (NCSTD) was founded in 1964 with close association with the Albert I Royal Library of Belgium,
benefits from the collections of the Library, which currently has more than
three million volumes and well over twenty thousand periodical titles (49).

4.6.5 Operational Coordinating Units

A. Definition

Ideally, as Urquhart (200) observes, "the central information
coordinating body should be executive but in view of the wide ramifications
of the information system it will usually be impossible to make it executive
with regard to all information activities" (p. 12). It does not usually
carry out operational activities, but rather initiates such activities by
delegating them to project groups or operational units. Thus the central
coordinating body would have only to consider the overall information policy
of the government and coordinate the functions of the network units.

The central coordinating body has a semi-judicial function—it is concerned mainly with collecting and assessing the evidence. To ensure
that its recommendations are respected, it clearly should not have a majority
of members who are actively concerned with organisations which have major
information activities. In particular, those who are actively concerned with
library and information services should normally not be its members but be
used as professional advisers at an operational coordinating unit established
to supplement the function of the central information coordinating body, at
the operational level. An operational coordinating unit is charged with the
day-to-day integration and coordination of the network activities. Expert
consultants at the unit would supply information on demand from other units.
They may visit the libraries and information centres regularly with on-the-
spot assistance. In short, a national information network is elaborated by
the central information coordinating body, and the actual organisation and
realisation of such a network is coordinated by the operational coordinating
unit.

B. Tasks and Functions
The major tasks and functions of an operational coordinating unit are set out below:

(a) To supervise implementation of a national information network within the framework of the information policies and plans made by the central information coordinating body.

(b) To take charge of the day-to-day integration and coordination of all activities of the national network, under the supervision of the central information coordinating body.

(c) To give advice and guidance about methods and techniques of information handling where necessary.

(d) To ensure the availability of technical advice and assistance to organisations wishing to create or improve their information units.

(e) To link the central information coordinating body and the network units, and help translate the policies and plans of the former into the daily activities of the latter.

C. Organisational Positions

Penna and others (148) conclude that an operational coordinating unit "should be based on or at least have close links with the body charged with responsibilities for the development of the public library service" (p. 82). An FID/DC working group sees some advantages of the unit's position within a national information centre. For the ADC, the latter appears to have more attractions.

4.6.6 Conclusions

The training units, research and development units, central depository collections, and operational coordinating units discussed in this section form the main supporting group of a national information network. This group guides, advises and serves the network's two main groups—of units primarily collecting and processing information and of units primarily providing information—the functions of which contribute directly to the
achievement of the network object. To support the two key line groups effectively, the supporting group's four units described above ought to ensure the following functions, working relations and organizational positions.

(1) A training unit coordinates, guides, and sometimes organizes the training of information specialists and scientists, continued training of those working in various information units, and training of information users, in cooperation with the Ministry of Education, universities, colleges and other facilities (4.6.2).

(2) A training unit undertakes elaboration of training programmes in cooperation with other educational facilities. In the ADC it should make the fullest possible utilisation of existing training facilities for librarians, for such programmes (4.6.2).

(3) A training unit might be attached to the central information coordinating body in the ADC. However, in a country where the central body does not effectively work, it might be better to be placed in the national information centre (4.6.2).

(4) A research and development unit initiates and carries out basic research on information science, as well as development that more directly support the missions of various information services within the national information network (4.6.3).

(5) A research and development unit initiates and carries out comprehensive analyses of the functioning of the parts of the national information network as well as of the network as a whole (4.6.3).

(6) A research and development unit plans a unified programme of critical experiments in information transfer, and finds, guides, and supports contractors in the conduct of these experiments. It should closely cooperate with schools of library and information studies, where research related to their educational programmes is carried out (4.6.3).

(7) Most of the basic research on the development of information
science and of the large-scale experiments should be supported by the government grant and contract assistance (4.6.3).

(8) A research and development unit might be conveniently placed within the framework of the national information centre (4.6.3).

(9) A central depository collection surveys the holdings of the other units within the network, and supplements the lacunae in their collections by acquiring them, and making them available (4.6.4).

(10) A central depository collection pays special attention to the information needs of special communities which by their nature would otherwise not be the concern of any particular unit, and to the subject areas of importance for national economic growth that are the specific responsibility of no one unit of the network (4.6.4).

(11) A central depository collection acquires and preserves discards from other units for which there is a continuing need elsewhere (4.6.4).

(12) A central depository collection compiles national union catalogues and keeps them up-to-date by incorporating the catalogue entries forwarded by the regional coordinating centres and other units of the network (4.6.4).

(13) A central depository collection might be functionally part of a national library. In such case, the national library will need to take a series of decisions as to the nature of its holdings, particularly with regard to the holdings of the national (or general) information centre. The degree of duplication of stock between the two institutions should be kept to an absolute minimum. The best way of ensuring the required degree of coordination between the two would be to integrate them into one administrative unit (4.6.4).

(14) An operational coordinating unit supervises implementation of the national information network, and takes charge of the day-to-day integration and coordination of all activities of the network under the supervision of the central information coordinating body (4.6.5).
(15) An operational coordinating unit ensures the availability of technical advice and assistance to the organisations wishing to create or improve their information units (4.6.5).

(16) An operational coordinating unit links the central coordinating body and the network units, and helps translate the policies and plans of the former into the daily activities of the latter (4.6.5).

(17) An operational coordinating unit might be conveniently placed within the framework of a national information centre (4.6.5).

Figure 4.4 can now be redrawn (Figure 4.16) to show the constituent units of "the group of units serving general network needs".

4.7 International Links and Cooperation

4.7.1 Introductory Comments

The growth of publications and information needs is forcing librarians and information workers to realise that the national information network on its own is inadequate for future needs and that they must begin to forge further operational links between information institutions on an international basis. A fairly simple kind of international network already exist in the form of international loans and exchanges of publications between information institutions. In certain multinational regions, such as Scandinavia, the international library network includes arrangements for the cooperative acquisition of foreign publications. In general, however, international links of information institutions are relatively undeveloped. International endeavours to facilitate and coordinate the exchange of information generally have been sponsored by various governmental and non-governmental international organisations, frequently as joint efforts. The International Federation of Library Associations is currently concerned to improve arrangements for international loans and exchanges between libraries. Unesco has long been concerned with the international exchange of publications and is currently concerned through the General Information Programme.
Figure 4.16 The group of units serving general network needs within a national information network
to promote the elements of an international network to make available to all countries the rapidly expanding body of recorded information (135).

It is axiomatic that no nation, even the wealthiest and most powerful, can attain complete self-sufficiency in the field of information, and most countries recognise their dependence on their neighbours. Australia, for example, noted for its independence and by no means a developing country industrially, has publicly proclaimed that it produced only two per cent of the total world output of information in science and technology for its annual research and development expenditure of A$ 300 million, and "therefore, like most countries, is vitally dependent on outside sources of information" (128, p. 12). This is why the research community, and librarians and information specialists who serve it have been pioneers in international cooperation. So that a national information network can operate efficiently, its constant and close contacts with similar services abroad seem to be essential. In the case of the ADC, this international dimension ought to be included in any plan for the development of information services. As the national information networks in the ADC cannot be self-sufficient, they have to be extended over a large region for common utilisation of the resources of international networks. The benefits from what Tornudd (179) calls "network parasitology" are well set out in his paper presented at a Stockholm seminar in 1974.

4.7.2 International Transfer of Technology

If we consider the problem of international information exchange from the viewpoint of developing countries, it can be viewed as a two-way process:

(a) To have access to international pool of information and utilise it for supporting developmental activities in a country.

(b) To provide information from each country for building up this international pool.

An important part of international exchange between countries of
different levels of development is concerned with science and technology, comprising the international exchange of scientific and technical knowledge and experience, together with technical assistance. In this, effective information relations and the exchange of scientific, technical and economic information play an outstanding role.

The ADC are in a position to turn to the industrialised countries to obtain much of the currently available scientific knowledge and technical know-how, as embodied in literature and other forms of information storage, needed for development. The social, scientific and economic development of the ADC would therefore be accelerated and influenced by the latest advances in science and technology in the industrialised countries. Two distinct conceptions of the international technology transfer process exist and Figure 4.17 will assist in the discussion of these. We may start with a hypothetical situation where "Technology A" is already being applied to "Problem A" in an industrialised "Country Y". The technology transfer involving the licensing process occurs when the same "Technology A" is applied to the same "Problem A" but in a developing "Country X". One of the major implements for effecting this type of transfer is the licensing process and supporting information services are likely to be concerned primarily with the efficient handling of patents and associated documentation. The other type of technology transfer involves the application of an existing "Technology A" to the solution of a new "Problem B" in "Country X". Here supporting information services are more likely to require the attributes of the specialised information centre, in which scientists and engineers work cooperatively with the information specialists in conducting the necessary analyses of the information to bring it to bear on the solution of the new problem.

The climate has never been more favourable for international cooperation in the information field, both multilateral and bilateral. Signs abound of the world-wide interest in scientific and technological
information services as an essential component of the growth in developing
countries. The United Nations Industrial Development Organization has
decided that priority should be assigned to the development of information
networks needed in developing countries (160), and has provided experts,
fellowships, and, in some cases, equipment in order to accelerate the
development of information networks. The Scientific and Technical Informa-
tion Policy Group of the Organization for Economic Cooperation and
Development has become particularly concerned with information services in
developing countries (208).

4.7.3 Forms of International Cooperation

International cooperation commonly covers the areas of (a) acquisition
(b) exchange of information, (c) standardisation, and (d) sharing of work.

A. Acquisition

Several small countries may join together to organise a joint
purchase centre and to conclude exchange agreements. This involves conclud-
ing the agreements in succession, the first regionally based among
participating countries and the second between the regional centre and foreign agencies. This kind of cooperative acquisition will save time and money.

B. Exchange of Information

Previous discussions (4.6.4) have shown the importance of central depository collections to which the user can confidently apply for a copy of any document he may require. At the national level such collections are an invaluable means of obtaining full information on a given subject. However, despite their efforts, they do not have everything. They make up for what they lack by means of exchange among themselves and by regularly giving one another the fullest particulars of their holdings.

C. Standardisation

It is most desirable that the cataloguing rules and bibliographical records used by the various units in a country which belong to a national information network are standardised. This is difficult in the old nations, but relatively easy to achieve in new countries where there has been little previous investment. However, in view of the volume of exchange expected between neighbouring countries, or between nations with close ties, it is essential to ensure that the cataloguing rules and bibliographical records to be used on either side are coordinated. Failing such precautions, communication will become very difficult or too expensive, and much of the benefit of computerisation will be lost.

D. Sharing of Work

Work can be shared among countries belonging to a multinational regional organisation. This can be done at the stages of acquisition, processing, storage, and dissemination. Allotment of these tasks, with specialised dates and deadlines, can only be effected by the multinational regional authority. In addition, it makes sense economically if the bulk of computer processing is also carried out by this authority with a computer of its choice. Its services may of course extend further than that,
especially where there are small participating countries, but these are special cases which will vary according to the type of organisation concerned.

4.7.4 National Foci for Information Services

The adherence to the concepts of UNISIST, NATIS and CIP means an increasing reliance on and strengthening of international cooperation as a means for using the world's store of knowledge more efficiently. This presupposes the designation of a clearly recognisable and accepted national focus for information services to promote international exchange of information and international interloan.

A. Establishment

In an earlier section of this chapter, the tasks and functions of a central information coordinating body, a bureaucracy, were discussed. In developing countries a bureaucracy is often taken as a sign of reform and planning. But the hiring of bureaucrats does not raise the qualitative standards of the existing national network unless they are given the opportunity to exchange views with their counterparts in other countries. Nor does the paper work for launching the plan for the national information network produce results of compatible nature, as long as the execution of the plan is not given over completely to the operational units which should also be given the means to compare their standards internationally. There is thus a necessity for any country which wants to see its information efforts become part of a broader context, to interact on two levels: the policy level and the operational level. If bureaucrats from a country are sent to take part in technical discussions on operations in international context, the final results will never be implemented in the country because the information will never sift down to those who should do the implementing task. The government should, therefore, designate as the national focus for information services two network units: the central information coordinating body for policy discussions, and the operational coordinating
unit for technical deliberations and day-to-day coordination.

B. Tasks and Functions

The central information coordinating body cooperates with international bodies in working out policy and organisation in the field of information and in drafting joint international projects. The operational coordinating unit acts as the network's access point to the international pool of information. To contribute to the international pool of information, it ensures organisation of the national output of literature and bibliographical control of this output. Such tasks are usually carried out through the routine work of the units of the group primarily collecting and processing information (4.4), which organise systematically publications brought out in the country and bring out bibliographical tools to locate them. The international secondary periodicals in various subject fields could make use of such national tools as input for their publications.

4.7.5 Conclusions

When international collaboration of information activities is planned it is essential within each participating country to have a clearly recognisable and accepted national focus for information services. As an access point to, and contributing agency for, the international pool of information, the national focus interacts with those in other countries on two levels: the policy level and the operational level.

(1) The government should, therefore, designate as the national focus for information services two network units: the central information coordinating body for policy discussions, and the operational coordinating unit for day-to-day coordination (4.7.4).

(2) The central information coordinating body cooperates with international bodies in working out policies in the field of information and in drafting joint international projects (4.7.4).

(3) The operational coordinating unit acts as the national network's access point to the resources of international networks (4.7.4).
(4) In order to contribute to the resources of international networks, the operational coordinating unit ensures organisation of the national output of literature and bibliographical control of this output through its coordinating function (4.7.4).

4.8 Some Final Observations

4.8.1 Legislative Frameworks

Legislative action is one of the prerequisites for ensuring the development of a strong national information network. A NATIS document proposes that "legislative action should be taken at the earliest possible stage in support of the planning and implementation of the national information system (NATIS). This legislation should cover the conceptual basis of the system, and of its constituent elements including all specialised subsystems" (82, p. 29). Each government will have to frame its legislation in the light of its own circumstances, and it is up to the planner to propose legislative action. There is a large body of literature including several model acts which might serve the planner as guidelines. A legislative framework laying down the policy in broad terms is certainly needed in most countries, but there are examples of the contrary. For instance, the entire development of public libraries operates without any government legislation in Sweden (177). Generally, and particularly in the ADC, the establishment of the network and its financing, the organisational framework such as the central information coordinating body and its responsibilities, as well as the setting up of key national institutions need to be authorised by a government decree.

Because the benefits of information services are not easily identified, though none the less very real, individual units of the national information network which is not based on a secure legal foundation may on occasion become vulnerable targets for reductions in the budget. In such a case, a vital contribution of information to the national
development plan will be lost. The right legislation made with full knowledge of the part that each unit of the national information network has to play in national development will guard against this end safeguard future progress. To this end, the national information plan should provide for the drafting and adoption of any additional legislation required to reinforce the philosophical basis of the network, its relations with all relevant authorities, manpower, professional status, structure and financing, internal and international relations.

Copyright, privacy and the right to equal access to information are other areas to be defined by legislators. The adherence to international agreements facilitating the free flow of information, e.g., the "Florence Agreement" or the "Beyrut Agreement" needs to be codified as well. There may further be legal structure which have already been set up in the country and could as a consequence of a new national information policy, require changing. For the further execution of the national information policy, the ADC need to change, wherever it is possible, from direct and individualised legislative action for each information facility or project to a management properly adjusted to give inducements in line with the goals of the national information network.

4.8.2 Political Considerations

What is involved in shaping the organisational structure of a national information network has been discussed in the preceding sections of this chapter. The ultimate determination of policy is usually allied to financial control, and although public funds provide the basis for a national information network, such funds may derive from different departments of the central government, provincial governments, local authorities or from a combination of these. Central government funds may be routed via an independent national body such as an academy of sciences or a university grants committee. Services may be funded from these sources and supplemented with funds from international aid, private donations or voluntary
bodies. In these circumstances, national planning calls for the attainment of consensus on objectives, and this requires consultation in finalising them and public relations in maintaining a cooperative attitude among relevant authorities.

There are a variety of organisational patterns available for national information networks. The pattern to be adopted by the ADC will naturally relate to existing ones, but a reappraisal is normally needed. In such a reappraisal, the danger of attempting to create an artificial division between library services of the more traditional type and the more mechanised information services should be avoided. As Shera (165) concludes, there are no rigid division in the professional disciplines needed for the provision and exploitation of library, documentation and information services. Artificial division should therefore be avoided, though proper specialisation of personnel will be needed.

4.8.3 Financial Considerations

As a NATIS document states, "the expenditure required for the operation of all the elements of the national information system pertains to an ever greater degree to the State and the national budget will therefore be the main source of funds for its financial support" (62, p. 29). These funds could be supplemented from other sources: provincial and municipal contributions, etc. (depending on the political and administrative organisation of the country), and help from private institutions and outside resources.

A point of some controversy is how far a national information network should be supported by public funds. There are good reasons against free information services, especially those provided for industry. Free information is often not criticised but accepted, even when it proves valueless and inaccurate (184). There are some who claim that the most reliable measure of overt need is demand, and the most reliable measure of demand is willingness to pay for services rendered. It must, however, be
understood that "industrial information services will hardly ever become self-supporting through the collection of fees" (69, p. 64). On the other hand, a study of the practice of most countries shows a widespread acceptance by central governments of the need for substantial support of national information networks (82, p. 30). In socialist countries, as a matter of principle the operation of the national information network is fully supported from State funds. Even where such networks function largely outside the governmental organisation, it would seem that the government has the task of supporting and encouragement.

4.8.4 Technological Considerations

Trezza (180), in his recent paper, states that within the national information network "there is no mandate that all activity must be computer-based, nor do we see any need to issue such a mandate. Information is, and can be transmitted in many ways, via computer is but one option" (p. 85).

It seems, however, that a nation's future capability to handle information effectively will, to a large extent, depend on how well and how rapidly the nation is able to integrate new technological methods and devices into the mainstream of its information activities. Advances in technology and in information practice are certain to continue, and each nation will need to decide whether or not to further its national information development in a coherent way that optimises the use of evolving technology.

Levai (107) recommends that greater use be made of the possibilities of "setting up information services on a more advanced technical level ... If so ... information services could be organised with computerization" (p. 15). It is also interesting to note the explicit recommendation of the Scientific and Technological Information Services Enquiry Committee in Australia, which reported in May 1973: "the national authority should give maximum consideration to the introduction of those services which utilise modern computer and telecommunication techniques" (128, vol. 1, p. vii).

Computer installations in the national network would carry out these three
functions: the first, dedicated to bibliographical production (the processing of machine-readable tapes produced by the central institutions primarily collecting and processing information, into by-products required by the local institutions); the second, devoted to service uses (recording holdings, making referrals, managing interloans, searching data bases, performing interactive searches of bibliographical and abstract files, etc.) and the third, related to the management and accounting function of network operation.

Without a postal and telecommunications service, information work becomes impossible. If the postal service is slow, and especially if it is somewhat unreliable, the network's organisation should be more decentralised than when it is swift and sure. It is true that the shortcomings of the postal service may be offset in part by a good telecommunications network, provided that its charges are reasonable. Telecommunications are obviously essential for the use of resource centres at a distance. A future telecommunications network used for a national information network will eventually need to integrate teletype, audio, digital, and video signals into a single network. This concept is an important aspect of a design of a modern communications network for information exchange. Integrated telecommunications networks have already become practical, and commercial and governmental efforts are under way to provide these unified facilities on a large scale (195). Rapid and inexpensive telecommunication among members of the national network could turn out to be the great benefit to the national distribution of information. For this reason the central information coordinating body would be directed to explore all possible avenue leading to reasonable communication rates for information networking purposes. The government may be in a position to give the national information network an initial impetus by subsidising low-cost rates till the entire scheme reaches a level of usage that ensures its economic viability.
4.8.5 Private Sectors*

The private sector is defined as libraries and information centres outside of the government which are not directly tax supported. Some of these are commercial, while others are not-for-profit scientific and professional societies.

Publishing and abstracting and indexing organisations have long produced and sold printed materials and bibliographical access tools to individuals, libraries, and other institutions. These organisations continue to perform vital functions in information transfer. However, with new developments in computers, telecommunications, and image technology, and with the growing importance of nonprint materials, new commercial companies have begun to contribute to the flow of information materials and services.

The increased pace of technological change, the growth in media, the computer, and advancements in communications and micrographics have all combined to produce vast amounts of information at an unprecedented rate. Some of the information is available from public sources and other information is not. However, the information itself knows no jurisdictional boundaries and to the user, information is information. He or she is hardly concerned with the distinction between a public or a private source. It is therefore crucial that information activities in the public and private sectors operate in harmony with one another and in consonance with the national interest. Precedent already exists for incorporating private sector resources and services into the functional information network of a country. For example, the U.S. National library of Medicine has developed a nation-wide biomedical information network which not only includes, but is also dependent upon, the private sector for its successful implementation (26).

Success of a national information network in the free enterprise society depends on the degree to which the private sector of the country
carries out its responsibilities toward the growth and coordination of library and information services. As a major producer of cultural, scientific, technical and industrial information in most of the non-socialist countries the private sector must take on great responsibility toward developing the information resources of the nation. The private sector should work closely with the public one in order to produce materials and provide services which will make the national network both useful and cost-effective. Facilitating the active participation of the private sector in the development of a national information network may require legislative action.

4.8.6 Information Policies

A central information coordinating body would operate most efficiently within the framework of a stated national information policy, in which the government recognises the importance of information to the national good, and the consequent necessity for its effective management. The government at the highest level should give priority to the development of a policy for information, and the development of information for policy. But of course in a democratic state, policy is not decided upon in the abstract. It emerges from a subtle interplay of ideas and force. For this, it is necessary to create a national focal point for policy concern, which is ideally the central information coordinating body, both for coordinating national activities and for keeping contact with international developments. Furthermore, information must be seen in a larger context, embracing not only natural sciences and technology but also social sciences and humanities. The problems of modern society have made the needs for a national information network a matter of total concern—not merely the concern of science and technology.

In seeking to define a policy we must remember that organisations and institutions of various types and fields will be involved. The ultimate policy must be one to which all who are involved in information activities...
can subscribe. It must be remembered that we are concerned not with today but tomorrow. We need to avoid merely straight forward projections of today's trend into the future as these may dangerously underestimate the effects of innovation and creativity. We are concerned with a field which may anticipate significant innovation in the future. Moving from long term objectives to shorter term goals we need to consider guidelines for future action and establish priorities -- the first priority being of course to establish a national network plan that will translate policy objectives into short goals or programmes which are technologically and financially achievable. We must also note the likely impediments to the development of the information network such as technological incompatibility in local situations, and administrative incompatibilities which may be expressed in jurisdictional issues or in such problems as data privacy and copyright. In its broadest interpretation the policy will enable all members of the nation to make the fullest use of the wide spectrum of information available and becoming available from world sources. Its primary purpose will be to make information available to users, including the public at large and to such groups as, for example:

(a) All levels of governments
(b) All levels of the teaching profession
(c) Research workers
(d) Industry in general, including trade unions
(e) Handicapped and underprivileged groups

As information becomes more accessible it will encourage people to seek it and thus contribute to education and the enrichment of personal and community life.

4.8.7 Conclusions

(1) Because benefits of information services are not easily identified individual units of the national information network may become vulnerable targets for reductions in the budget. The right legislation
made with full knowledge of the part that each unit of the national network has to play in national development will guard against this and safeguard future progress (4.8.1).

(2) There are no rigid division in the professional disciplines needed for the provision and exploitation of library, documentation and information services. The danger of attempting to create an artificial division between library services of the more traditional type and the more mechanised information services should be avoided, though proper specialisation of personnel will be needed (4.8.2).

(3) The main source of funds for the operation of the national information network as a whole should be the national budget, which could be supplemented from other sources: provincial and municipal contributions, help from private institutions and outside resources (4.8.3).

(4) In the rapidly shifting world of information it is necessary for the nation-wide provision of accurate, reliable and up-to-date services to draw upon the aid of modern technology in the fields of telecommunication, data-processing, and reprography (4.8.4).

(5) The private sector should work closely with the public sector in order to produce materials and provide services which will make the national network both useful and cost-effective. Facilitating the active participation of the private sector in the development of a national network will require legislative action (4.8.5).

(6) The government should give priority to the development of a policy for information. A central information coordinating body would operate effectively within the framework of such a policy (4.8.6).

4.9 Conclusions—A Generalised Structure for National Information Networks for the Advanced Developing Countries

The present chapter has been an attempt to verify the second hypothesis of the study—"Identical information needs and desires lead
to identical objectives, functions and configurations of a national information network." To verify it, the investigator has tried to design a generalised structure for national information networks to suit the ADC, in which information needs and desires are identical or nearly identical (3.5). The network designed is of a rather different genre than what is usually discussed. The investigator has attempted to view the network as an arrangement of different functional units working together to accomplish the purpose of the whole, rather than an integrated set of discrete information networks serving different fields in the nation such as those in agriculture, chemistry, industry, economics, etc.

Identical building blocks (the three groups of units) for a national information network for the ADC became apparent in the conclusions made at the end of each section of this chapter. There is no use in repeating them here. Instead, the building blocks will be put together to form a national information network for the ADC. The three main groups of units in Figure 4.12, 4.15, and 4.16 are thus incorporated in a complete generalised structure for national information networks for the ADC, as shown in Figure 4.18. In Figure 4.18, the concepts of the units such as operational coordinating units, training units, data centres, referral centres, etc. are not necessarily organisational entities but functions. Obviously in real world situations, certain units may perform a combination of two or more functions specified in Figure 4.18. A local library, for instance, not only provides information but also collects and processes materials frequently used by its immediate users, and sometimes provides referral and translation services.

In some cases a function specified in Figure 4.18 may be performed by two or more information units. Local conditions such as political traditions, current practices in information provision, population size, etc. greatly influence actual organisation of information services in individual countries. A national information network must, in any case,
Figure 4.18 A generalised structure for national information networks for the ADC
have all these functions for its effective performance. Their structural positions have been suggested throughout the chapter, but that is beyond the primary concern of the present study and shall be covered in depth by a future study. Suffice it to say here that planning at national level does not mean centralised control of all the information institutions, but rather planning for the coordination of existing resources and activities, and planning for the cooperation between the nation's existing libraries and information centres. Planners in the ADC should accept the fact that there are differing circumstances and traditions in each country, and therefore no one administrative pattern could be put forward as universally appropriate. This being the case, each country by examining its own traditions and assessing what has been attempted and achieved by others can then best formulate its own organisational structure.

The generalised structure for national information networks for the ADC shown in Figure 4.18 still lacks one element, namely, the international linkage. The final model completed with this element is shown in Figure 4.19.

4.10 Summary—Tasks and Functions of the Component Units of the Network

The major tasks and functions of each component unit of the national information network designed have been set out in the conclusions made at the end of each section of this chapter. These are summarised in Tabular form in Table 4.1.
Figure 4.19 A generalized structure for national information networks with the element of international linkage
Table 4.1 Major tasks and functions of component units of a national information network

<table>
<thead>
<tr>
<th>Group</th>
<th>Unit</th>
<th>Tasks and Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. Proposes national policy.</td>
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<td></td>
<td></td>
<td>2. Develops a national network.</td>
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<td></td>
<td></td>
<td>3. Coordinates network activities.</td>
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<td></td>
<td></td>
<td>4. Controls national programmes.</td>
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<td></td>
<td></td>
<td>5. Makes grants and contracts.</td>
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<tr>
<td></td>
<td></td>
<td>6. Acts as the national focus (at policy level)</td>
</tr>
<tr>
<td>Group of units primarily collecting and processing information</td>
<td>Central information coordinating body</td>
<td>1. Collects all information produced in the country.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Collects the world's literature in all fields.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Provides secondary information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Disseminates information collected (SDI, etc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Reprographic services.</td>
</tr>
<tr>
<td></td>
<td>General information centre</td>
<td>1. Collects information in a field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Analyses and evaluates information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Produces descriptive reviews and data compilations.</td>
</tr>
<tr>
<td></td>
<td>Data centre</td>
<td>1. Collects, processes, and disseminates data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Produces charts, atlases, models, handbooks, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Provides data directories.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Analyses data to meet individual requests.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Publishes patent journals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Prints patent specifications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Provides patent abstracting services (Derwent, Chemical Abstracts, INSPEC, etc.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Publishes information on standards.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Publishes information on standardization problems.</td>
</tr>
<tr>
<td></td>
<td>Archives service</td>
<td>1. Collects, organises and conserves the nation's historical source material.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Publishes information on the contents of documents.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Publishes directories, catalogues, and reviews of archives.</td>
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<tr>
<td></td>
<td>Referral centre</td>
<td>1. Inventories all information resources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Publishes directories of information sources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Provides responses to requests for referral information.</td>
</tr>
<tr>
<td>Group of units primarily providing information</td>
<td>Unit</td>
<td>Tasks and functions</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
2. Maintains a catalogue of the collection  
4. Provides translating service.  
5. Controls the nation's translation activities. |
| Terminal                                    |                                        | 1. Provides information from its own collection.  
2. Forwards unsatisfied requests to the regional coordinating centre. |
| Regional coordinating centre                |                                        | 1. Controls interlending within the region.  
2. Acquires materials to meet the regional needs.  
3. Forwards unsatisfied requests to other regions or the central collections.  
4. Maintains a regional union catalogue.  
5. Contributes entries to national union catalogues.  
6. Surveys information needs of the region. |
| Group of units serving general network needs | Training unit                          | 1. Coordinates training of information specialists.  
2. Elaborates training programmes.  
3. Coordinates and organises continued training programmes for specialists.  
4. Coordinates and organises training programmes for users. |
| Research and development unit               |                                        | 1. Carries out analyses of network functioning.  
2. Carries out basic and applied research.  
3. Plans a unified programme of critical experiments.  
4. Supports contractors in the experiments. |
| Central depository collection               |                                        | 1. Acts as a central lending library.  
2. Supplements the lacunae in major collections.  
3. Preserves discards from other units.  
4. Covers important areas for which no unit is responsible.  
5. Maintains national union catalogues. |
| Operational coordinating unit               |                                        | 1. Technically supervises implementation of the network.  
2. Takes charge of day-to-day integration and coordination of activities of the network.  
3. Gives advice and assistance in information methods and techniques.  
4. Helps establish new services.  
5. Acts as the national focus at operational level. |
5.1 Introduction

The present study has not attempted to analyse in detail all the technical problems which might arise in connection with activities of the various component units of the national information network. Indeed, the examination of technical problems has been deliberately avoided in order to concentrate on what might be termed the environmental and functional problems of a national information network and to identify common characteristics of the information needs and desires in the ADC and the present situation of information services to meet them. Throughout this thesis the investigator has drawn specific conclusions from the analyses of the data he has collected. In this chapter he summarises the work of the present study, repeats the principal conclusions and makes some recommendations for further study.

5.2 Summary

The present study has accomplished the following objectives which are outlined in 1.2.1:

(a) To elicit and describe common information needs, desires, and value of the people using information, and other common factors which are responsible for the present information services in the ADC and which have implications for the basic structure of the national information network.

(b) To design a generalised structure of national information networks based on those common factors existing in the ADC.

To accomplish these objectives, the following hypotheses have been developed for testing by gathering relevant data (2.1):

(a) Common information needs and desires exist in a group of countries with an identical level of development, for instance, in the ADC
chosen for this study.

(b) Identical information needs and desires lead to identical objectives, functions and configurations of a national information network.

The two preceding chapters have tested the hypotheses with the evidence and opinions gathered by questionnaire and interview, and with the previous experiences accumulated in the literature. The ensuing presentation gives a brief review of what has transpired in these preceding chapters with emphasis on the procedure used to arrive at the results discussed in the chapters.

The methodology utilised for collecting the required data in this study largely consists of the three techniques: literature review, questionnaire, and interview. Background information on the individual ADC has been gathered from monographic and periodical literature, and country reports presented at various international conferences have been analysed for other relevant data. The literature of information science and its application has been carefully studied to assemble theoretical alternatives needed for the design of a generalised network structure. For most of the data needed for the present study, a "Questionnaire on Library and Information Services as They Are Available in the Selected Countries" has been formulated to be sent to the experts who are well-informed of the library and information services in their countries. The questionnaire has been intended to look in details at what information services in the ADC are now doing--whom they are serving, in what way, and how well-- and establish to what extent they are meeting the nation's information requirements.

Similar data on the demands for information and the use of libraries and information centres in the ADC have been gathered by interview with a number of students from the ADC studying in the Department of Library and Information Studies at Loughborough University of Technology in order to supplement the data obtained from the questionnaire responses.

The data gathered by questionnaire and interview have been
arranged in the form of fifteen country reports to be summarised later by cross-section characteristics, requirements, and constraints. By choosing between alternative network models and configurations assembled through literature review, a generalised structure of national information networks based on the common characteristics of the information needs and desires existing in the ADC, has been designed.

The generalised structure has been examined to learn what specific functions the network components need to perform to achieve the purpose of the whole. Then the functions have been assigned to various information units which would best perform them in the present and future ADC situations and the productive working relations among the units have been defined. The objectives, functions and working relations of all the units within the network have been determined according to the results of evaluation of the relevant theoretical alternatives in the literature and examples of the existing networks in relation to the common information needs and desires in the ADC.

5.3 Conclusions

The conclusions listed below have arisen out of the information contained in the preceding chapters of the present thesis with respect to the information needs and services in the ADC and the functional organisation of national information networks suited for the ADC. Each conclusion is followed by the appropriate section or subsection number for ease of reference to the main body of the thesis.

5.3.1 Information Needs and Services in the ADC

The following conclusions are basically a general synopsis of the common characteristics of the information needs, desires and services analysed and discussed in Chapter 3.

A. General Situation

(1) The governments of the ADC believe in the need for
development of a national information network as an indispensable tool for their countries' economic, cultural and social well-being (3.3.14).

(2) The governments of the ADC consider the establishment and operation of such a network an important function of the State. The ADC have established governmental authorities responsible for at least part of their information and library services (3.3.1).

(3) In the ADC, information services are commonly administered by the authorities which cover the domain of science and technology, and the authorities responsible for the administration of library services are usually those covering the domain of education and culture (3.3.1).

(4) Most of the ADC have recently established their central coordinating bodies to promote the orderly development of information services, but their mandates are not yet fully carried out because of the lack of experience of using them and the will to make available the resources to back them up (3.3.2).

(5) Most (80%) of the researchers, who form the largest information user group in the ADC (3.3.9), work in the fields of science and technology, and the rest (20%) in the fields of the humanities and social sciences (3.3.10).

(6) The current levels of cooperation among information institutions in the ADC are nearly identical, that is, from the late stage of what might be called the second generation to the early stage of the third generation (3.3.13).

(7) In many ADC information networks do not yet exist. In some others they are too embryonic to function effectively (3.3.14).

(8) The ADC rely largely on the achievements in the industrialized countries for basic research on the development of information science. In most of the ADC schools of library and information studies carry out research related to their educational programmes. There is as yet no central research and development institute with grant allocation.
powers in the ADC (3.3.15).

(9) Institutions dealing with the training of information specialists are developing from library schools and courses in the ADC. At present information subjects are in many cases taught only in library schools (3.3.16).

B. Information Needs and Desires for Information Services

(10) There is an urgent need for the formulation of national information policy in each of the ADC (3.3.17).

(11) There is no single comprehensive collection in all fields and of all types, in most of the ADC. Every ADC needs to build at least one rich collection that may serve adequately as a national lending library (3.3.4).

(12) Most of the national archives operating in the ADC are mere documentary depositories, playing only in part the role of a true national archives centre. The documents housed need to be effectively organised so as to make them readily available to information users (3.3.3).

(13) Although interlending in the ADC represents a major cooperative effort, there seem to be long delays in obtaining wanted material because of the exclusive use of the postal service in communication. Improvements are required to guarantee fast document supply (3.3.13).

(14) The ADC need to establish data centres which concentrate on the collection, processing, and provision of scientific, engineering, industrial, and socio-economic data (3.3.6).

(15) A translation centre with the responsibility for the nation's overall financial control of translation programmes is needed in each of the ADC (3.3.6).

(16) Although information is often urgently required, most industrial companies or firms lack adequate information resources of their own. The needs of industry require special attention (3.3.6).

(17) There should be at least one clearing-house in each of
the ADC for the national exchange of books and periodicals including duplicates (3.3.8).

(18) Demand for information services in the ADC arises, for the most part, out of the workers in research and development institutes, higher educational institutions, and industrial organisations (3.3.9).

(19) Although patent and standard specifications are indispensable to any modern industrial activity, they are not widely available or used in most of the ADC. Special attention should be given to these serious deficiencies (3.3.8).

(20) The training of additional information specialists and librarians, and of scientists, engineers, and others in the use of information is of fundamental importance and should form a permanent element in the network for information services in the ADC (3.3.16).

C. Resources and Services Currently Available in the ADC

(21) Most of the national libraries in the ADC perform the two vital functions of a central library, namely, receiving books under legal deposit and publication of national bibliographies, both of which are fundamental to national bibliographical control (3.3.3).

(22) Bibliographies of special subjects, abstracts, indexes, and union catalogues are available in most of the ADC, although they are as yet too embryonic to meet the growing needs. Their coverage is often incomprehensive (3.3.5).

(23) Most of the ADC have established their general information centres which cover most of the domains of the natural and social sciences, technology, and humanities (3.3.6).

(24) Most of the ADC have established various specialised information centres. The subject fields commonly covered by them are: natural sciences, technology, agriculture, and social sciences (3.3.6).

(25) Limited data service is provided by information centres, governmental offices of statistics, and other institutions and agencies in
the ADC (3.3.6).

(26) Limited referral services are provided in most of the ADC by general and specialised information centres largely through publication of their directories of research institutes, research in progress, scientists and experts in various fields, special libraries and information facilities, etc. (3.3.6).

(27) Translation service is provided in most of the ADC by general and specialised information centres, commonly through panels of extramural translators with specialist knowledge as well as linguistic qualifications (3.3.6).

(28) The information services currently available in most of the ADC are: reprographic services, reference service, international exchange of information, national union catalogues, translation service, referral services, current awareness services, and literature searches (3.3.8).

(29) Cooperation among information institutions in the ADC for the most part takes the form of interlending. Participation in formal schemes of cooperation is minimal but there is considerable involvement in informal, reciprocal sharing of materials in providing information and library services (3.3.13).

D. Requirements and Constraints

(3) There is no functional relations among national libraries, national archives, and national information centres in most of the ADC (3.3.3).

(31) The central coordinating bodies in the ADC very often emphasise on the scientific and technical information. About half of them confine their activities strictly to scientific and technical information matters. The other half of them embrace the humanities and social sciences but their priorities are low (3.3.2).

(32) There is no institution in most of the ADC responsible for the fullest coverage of foreign literature or the planned acquisition of foreign materials based on a policy of national coordination (3.3.3).
The postal service is almost exclusively used in inter-institutional lending in the ADC (3.3.12).

Lack of usable union catalogues often hampers wide participation in inter-institutional cooperative ventures in the provision of information services in the ADC (3.3.13).

Shortage of qualified information specialists, lack of a national information policy, and insufficient funds are among the main problems in common which hamper the development of information services in most of the ADC (3.3.17).

5.3.2 National Information Networks for the ADC

A national information network is a linkage of information institutions in a country. Three distinct groups of functional units and one coordinating body constituting a national information network have been identified. They are:

(a) The central information coordinating body
(b) The group of units primarily collecting and processing information
(c) The group of units primarily providing information
(d) The group of units serving general network needs

For the three groups of a national information network listed above to perform their functions efficiently in the ADC situation, the following functional units need to be created within each group:

(a) The group of units primarily collecting and processing information
   (i) General information centres
   (ii) Specialised information centres
   (iii) Data centres
   (iv) Collections of patents
   (v) Collections of standards
   (vi) Archives services
(vii) Archives services
(viii) Translation centres

(b) The group of units primarily providing information
(i) Terminals
(ii) Regional coordinating centres

(c) The group of units serving general network needs
(i) Operational coordinating units
(ii) Training units
(iii) Research and development units
(iv) Central depository collections

The following conclusions define the major tasks and functions of the central coordinating body and the other units of the network listed above. They also define the productive working relations among the units and some other functional and structural aspects of the network.

A. Central Information Coordinating Body

(1) The central information coordinating body should be a central government agency to which the national library, national information centre and other national information institutions are subordinate. It should not carry out operational activities but rather initiate activities by delegating them to operational agents (4.3.3).

(2) The central coordinating body should be organised in two levels in the ADC: a large representative assembly to act as an advisory council, made up of a large number of representatives of interested organisations; and a small coordinating unit responsible for detailed planning and implementation (4.3.2).

(3) The central coordinating body should have a permanent secretariat to ensure its functionings, to execute its decisions, and to handle its administrative work. It is undesirable to incorporate it into the national library or national information centre (4.3.2).

(4) The central coordinating body should be given control
of finance to increase the effectiveness of its policy-making function and to support for more important elements of the information development plan (4.3.3).

(5) The major tasks and functions of a central coordinating body are: to develop and activate a national information network; to coordinate the activities of its component units; to formulate national information policies; to control the realisation of objectives laid down in the various national information programmes and plans including research and training; and to make grants and contracts for activities having regard to the national interest, carried on by other organisations (4.3.3).

B. The Group of Units Primarily Collecting and Processing Information

General Information Centres

(6) A general information centre collects domestic and foreign information sources of all kinds and in all fields; processes them with the output in the form of abstract journals, information bulletins, indexes and printed cards distributed among the various research institutes, industrial enterprises, institutions of higher learning and individuals; and on request from these institutions and individuals furnishes copies of the original documents announced in its secondary publications (4.4.2).

(7) Although it is necessary to finance a general information centre from State funds at the initial stage, the activities of a centre in the ADC should be organised with a view to economic efficiency, that is, there should be a maximum degree of self-financing (4.4.2).

Specialised Information Centres

(8) A specialised information centre collects, processes, stores and disseminates a body of information and data in a clearly defined subject field or pertaining to a specified mission (4.4.3).

(9) Ideally, there may be a dozen specialised information centres in a country which would cover information sources in all fields
while remaining in close contact with one another (4.4.3).

(10) The assignments of a specialised information centre should be closely linked with those of the general information centres and data centres within the same network (4.4.3).

Data Centres

(11) A data centre collects, processes, and disseminates data. When appropriate, a data centre should develop a strong capability for analysis to meet the user needs for various data products (4.4.4).

(12) The effectiveness of data services in the ADC largely depends on the continuing government support to data centres (4.4.4).

Collections of Patents

(13) A collection of patents acquires, processes, stores and disseminates domestic and foreign patent documents for use by the examining staff of the patent office, the scientific community, the legal profession, and the public in general (4.4.5).

Collections of Standards

(14) A collection of standards acquires and processes comprehensive sets of domestic and foreign standard specifications, keep them up-to-date, and make them available to the scientific, technical and industrial communities as well as to the research staff of the office of standards (4.4.6).

Archives Services

(15) An archives service as an information facility acquires, organises, and conserves a major part of the nation's historical source material (4.4.7).

(16) An archives service informs research organisations and government departments of previously unknown documents, and publishes directories, catalogues and reviews of important categories of documents to facilitate the user's search for needed information (4.4.7).
A referral centre inventories all information resources in the country, publishes general and special book-form directories of information sources, and provides, in-house and by post, responses to requests for referral information (4.4.7).

Translation Centres

A translation centre builds a comprehensive collection of translations in all subject fields and from all languages, maintains a catalogue of the collection, issues periodical announcements of new translations, and provides translating service for foreign articles and books. Such a centre is normally responsible for the overall control of translation activities in the country (4.4.9).

Now that the translation rates are high for the means of the potential customers in the ADC, the government should subsidise part of the cost of translation to ensure the maximum utilisation of the service of translation centres (4.4.9).

B. The Group of Units Primarily Providing Information

Terminals

A terminal provides accurate and timely information to its immediate users. If the needed information is not available in its own collection, the unsatisfied request is routed to the regional centre, which is supported by the central collections such as general information centres, specialised information centres, etc. (4.5.2).

If the majority of users are homogeneous, a terminal could well be located within the department requiring the major needs. If the user community is heterogeneous, then an autonomous organisational structure might be advisable (4.5.2).

Regional Coordinating Centres

A regional coordinating centre acts as an agency for the loan of materials among its participating terminals and for the loan of materials in its own collection and in the participating terminals to other
regions (4.5.3).

(23) A regional coordinating centre acquires the secondary publications produced by the general information centres, specialised information centres, data centres, referral centres, etc., and the primary information which would meet the particular information needs of the region, in order to provide them directly or through terminals to the qualified users within the region (4.5.3).

(24) A regional coordinating centre acts as a bibliographical information centre to the participating terminals and maintains union lists of their holdings. Such a centre also forwards details of materials added or withdrawn from the region, to national union catalogues (4.5.3).

(25) A regional coordinating centre should be financed from membership fees collected from its constituent terminals (4.5.3).

Regional Service Subnetworks

(26) Although a regional service subnetwork is primarily designed to be an output device of the national information network, it should supply the most-used items and those to meet the region's particular information needs. In order to acquire and preserve such material efficiently, each regional service subnetwork might be advised to devise a subject specialisation scheme (4.5.4).

C. The Group of Units Serving General Network Needs

Operational Coordinating Units

(27) An operational coordinating unit supervises implementation of the national information network, and takes charge of day-to-day integration and coordination of all activities of the network, under the supervision of the central information coordinating body (4.6.5).

(28) An operational coordinating unit ensures availability of sound, technical advice and assistance to the organisations wishing to create or improve their information units (4.6.5).

Training Units
(29) A training unit coordinates, guides, and sometimes organises the training of information specialists and scientists, continued training of those working in various information units, and training of information users, in cooperation with the ministry of education, universities, colleges and other educational facilities (4.6.2).

(30) A training unit undertakes elaboration of training programmes in cooperation with other educational facilities. In the ADC it should make the fullest possible utilisation of existing training facilities for librarians, for such programmes (4.6.2).

Research and Development Units

(31) A research and development unit initiates and carries out basic research on information science, as well as development that more directly supports missions of various information services within the national information network (4.6.3).

(32) A research and development unit plans a unified programme of critical experiments in information transfer, and finds, guides and supports contractors in the conduct of those experiments. Such a unit should closely cooperate with schools of library and information studies, where research related to their educational programmes is carried out (4.6.3).

Central Depository Collections

(33) A central depository collection surveys the holdings of the other units within the network, and supplements the lacunae in their collections by acquiring them, and making them available (4.6.4).

(34) A central depository collection pays special attention to the information needs of special communities which by their nature would otherwise not be the concern of any particular unit, and to the subject areas of importance for national development that are the specific responsibility of no one unit of the network (4.6.4).

(35) A central depository collection acquires and preserves
discards from other units for which there is a continuing need elsewhere (4.6.4).

D. International links

(36) As an access point to, and contributing agency for, the international pool of information, the national focus interacts with those in other countries. It is advisable in the ADC to designate as such a national focus two network units: the central information coordinating body at the policy level, and the operational coordinating unit at the operational level (4.7.4).

5.4 Recommendations for Further Study

A number of issues evolve from the present study, an exploration of which will contribute to a further understanding of the conclusions and observations made during the course of this study. These issues are presented below as recommendations for further study:

(a) A study designed to identify institutional variables—such as social, psychological—which hinder cooperative activities in the ADC.

(b) A study designed to test validity of the generalised structure presented in this study, in an application to a real world situation.

(c) A study designed to explore the capabilities of communications and computer technology to meet the requirements for efficient operation of national information networks in the ADC.

(d) A study designed to explore the information services that have the greatest potential for networking in the ADC situation.

(e) A study designed to determine how all existing cooperatives of libraries and information centres in the ADC will be affected by the national network concept.

(f) A study designed to identify specific operational areas of national information networks for the ADC which need legal clarification or codification.
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107. LEVAI, S. Establishment of Industrial Information Services in the Developing Countries: A Paper Presented at the United Nations Industrial


136. ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT. AD HOC GROUP ON SCIENTIFIC AND TECHNICAL INFORMATION. Information for a Changing


168. SLOAN COMMISSION ON CABLE COMMUNICATIONS. On the Cable: the


Appendix 1
DATA SHEET ON LIBRARY AND INFORMATION SERVICES
AS THEY ARE AVAILABLE IN THE SELECTED COUNTRIES

Please use the following notation where appropriate:
1 = Yes   3 = Partially
2 = No    4 = Not applicable to our nation

Data Relative to the Library Services

1. Government authorities responsible for the nation's library services:
   a. Prime Minister's Office
   b. Ministry of Education
   c. Ministry of Cultural Affairs
   d. Ministry of Industry
   e. Others (Please specify: )

2. Functions of national libraries:
   a. Central collection of the nation's literature
   b. Receiving books under legal deposit
   c. Fullest coverage of foreign literature
   d. National bibliographical information centre
   e. Initiation of research on librarianship
   f. Centre of the nation's international exchange service
   g. Centre for the distribution of duplicate material
   h. Centre for professional training in librarianship
   i. Centre for bibliographical advice and assistance to the nation's libraries of all kinds
   j. Planning centre for the nation's library services
   k. Others (Please specify)
      i.
      ii.
      iii.

3. Depository libraries for copyright copies
   
   Name of library                  Publications
   a.                                      
   b.                                      
   c.                                      

4. Total number of libraries in the nation:

5. Total number of government-run libraries (i.e., public funded libraries) in the nation:
6. Institutions publishing national bibliographies

<table>
<thead>
<tr>
<th>Name of institution</th>
<th>Titles of bibliographies</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>b.</td>
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</tbody>
</table>

7. Number of libraries of institutions of higher education:

8. Research and special libraries in the field of science and technology

   a. Number of libraries : 
   b. Total collection
      - Books (volumes) : 
      - Serials (titles) :
   c. Total number of the professional staff members:

9. Public libraries

   a. Number of municipal and city libraries: 
   b. Number of rural libraries :

10. Secondary and primary school libraries

    a. Number of secondary school libraries: 
    b. Number of primary school libraries :

11. Library services and publications available in the nation:

    a. National union catalogues ( )
    b. Reference service ( )
    c. National exchange of documents ( )
    d. International exchange of documents ( )
    e. Translation service ( )
    f. Register of translators ( )
    g. Register of translations ( )
    h. Reprographic services ( )
    i. Collection of standards ( )
    j. Collection of patents ( )

12. Names of libraries using mechanised methods in their work

    a. 
    b. 
    c. 

13. Current planning and important projects for the extension of library services (e.g. establishing of a national library or of more local libraries, improvement of school library service, introducing of computers, teletypes, etc.)

    a. 
    b. 

- 392 -
14. Kinds of cooperation among libraries (e.g. interlibrary lending, cooperative acquisition, cooperative processing, cooperative storage)
   a.
   b.
   c.

15. Kinds of cooperation among libraries and information centres (e.g. interlibrary lending, compilation of union lists of serials, allocation of subject collection and expertise, cooperative processing, cooperative storage, sharing of services as well as equipment, standardisation or quality control, exchange of staff)
   a.
   b.
   c.

16. Important bibliographical publications by libraries and professional associations (excluding those of the national library and those which have already been listed in this data sheet)

<table>
<thead>
<tr>
<th>Title of publication</th>
<th>Library or association</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>b.</td>
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<td>c.</td>
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</table>

17. Users of libraries (Please rank the following user groups according to their demand for library services):
   Government departments and agencies (  )
   Research institutes (  )
   Higher educational institutions (  )
   Industry (  )
   General public (  )
   Secondary schools (  )

18. Main difficulties with respect to the development of library services (e.g. insufficient funds, shortage of qualified librarians, lack of coordination and cooperation of library services at a regional or national level)
   a.
   b.
   c.
   d.
   e.
Data Relative to the Information Services

1. Government authorities responsible for the nation's information services (or documentation services):
   a. Prime Minister's Office
   b. Ministry of Education
   c. Ministry of Cultural Affairs
   d. Ministry of Industry
   e. Others (Please specify:)

2. National information centres
   2.1. Name (in your language):
        Name (in English):
   2.2. Year of establishment:
   2.3. Number of the professional staff members:

2.4. Important publications
   a.
   b.
   c.

2.5. Functions
   a. Registering of domestic R. and D. results
   b. Processing of the world's information material
   c. Publication of abstracts
   d. Publication of indexes
   e. Reprographic services
   f. Referral services
   g. Translation service
   h. Publication of collections of digests of articles of topical interest
   i. Research in information work
   j. Organisation of advanced training courses for specialists
   k. Others (Please specify)
      i.
      ii.
      iii.

3. General information centres (covering disciplines in the natural sciences, technology, agriculture, public health, medicine, social sciences, education, law, etc.) serving users at a national level

<table>
<thead>
<tr>
<th>Name of centre</th>
<th>Year of establishment</th>
<th>Coverage</th>
<th>Publications</th>
</tr>
</thead>
</table>

- 394 -
4. Specialised information centres (such as those in the fields of nuclear energy, economics and rubber) serving users at a national level

<table>
<thead>
<tr>
<th>Name of centre</th>
<th>Year of establishment</th>
<th>Coverage</th>
<th>Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>b.</td>
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</tbody>
</table>

5. Data centres (which concentrate on the collection and processing of data)

<table>
<thead>
<tr>
<th>Name of centre</th>
<th>Year of establishment</th>
<th>Coverage</th>
<th>Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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</table>

6. Referral centres (which direct inquirers to specialised sources in scientific, industrial and other disciplines or fields)

<table>
<thead>
<tr>
<th>Name of centre</th>
<th>Year of establishment</th>
<th>Coverage</th>
<th>Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>c.</td>
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</tbody>
</table>

7. Number of the local information departments in scientific, industrial and other institutions and enterprises:

8. Nation-wide mechanised information services

<table>
<thead>
<tr>
<th>Kind of service</th>
<th>User group</th>
<th>Data base being used</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<tr>
<td>b.</td>
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<tr>
<td>c.</td>
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</tbody>
</table>

9. National council or national committee for information services, with the responsibility to develop and activate a national information network and to coordinate the activities of the component centres of the network, consists of members representing:

a. National R. and D. organisations
b. Ministries of Government
c. Industry
d. Libraries
e. Information centres
f. Users of services
g. Higher educational institutions
h. Publishing organisations
i. Others (Please specify)
   i.
   ii.
   iii.

10. Tasks of the national council for information services include:
   a. Development of national information networks ( )
   b. Coordination of the national information network ( )
   c. Promotion of user education ( )
   d. Promotion of information specialist training ( )
   e. Promotion of R. and D. in information work ( )
   f. Functioning as a national focus for international cooperation ( )
   g. Long-range planning functions in information services ( )
   h. Monitoring and control of objectives of information services ( )
   i. Development of national information policies ( )
   j. Involvement in information services at operational levels ( )
   k. Promotion of standardisation ( )

11. Networks of the information centres and libraries that have evolved in the nation (Please introduce each of them briefly in your own language)
   a.
   b.
   c.

12. Union catalogues of journal holdings of the libraries and information centres in the nation

<table>
<thead>
<tr>
<th>Title of catalogue</th>
<th>Fr. of revision</th>
<th>Coverage</th>
<th>Publishing body</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<tr>
<td>c.</td>
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</tbody>
</table>

13. Research and development in information work

<table>
<thead>
<tr>
<th>Name of institute</th>
<th>Financial source</th>
<th>No. of full-time staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>c.</td>
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</tbody>
</table>

14. Information services available in the nation:
   a. Reference service ( )
   b. National exchange of documents ( )
   c. International exchange of documents ( )
   d. Translation service ( )
e. Register of translators
f. Register of translations
g. Reprographic services
h. Organised standards
i. Scientific, industrial and socio-economic data
j. Organised patents
k. Referral services

15. Names of information centres using mechanised methods in their work
a.
b.
c.

16. Current planning and important projects for the near future in information services
a.
b.
c.

17. Information users (Please rank the following user groups according to their demand for information services)
   Government departments and agencies
   Research institutes
   Higher educational institutions
   Industrial organisations
   Mass communications
   General public

18. Main difficulties with respect to the development of information services
a.
b.
c.

19. I should be grateful for any other helpful and/or critical comments you could make on the present status of your library and information services below.

Thank you very much for your cooperation.

Name: 
Address:
Appendix 2

LIST OF THE SOURCES OF DATA USED IN COMPILING THE COUNTRY REPORTS

1. General Works


2. Middle East

2.1 General Works


2.2 Iran


2.3 Iraq


2.4 Kuwait


3. East Asia

3.1 General Works


3.2 Hong Kong


3.3 Korea


3.4 Malaysia


3.5 Taiwan


4. Kenya


5. Southern Europe

5.1 Malta

5.2 Turkey


5.3 Yugoslavia


6. Latin America

6.1 General Works


6.2 Brazil


6.3 Colombia


6.4 Mexico


6.5 Venezuela

This Glossary defines the principal technical terms used by the investigator in preparing this thesis.

**Access:** the knowledge of existing books and information and the ability to get hold of them.

**Bibliographical control:** the uniform identification of items of recorded information in various media and the availability of a mechanism for gaining subsequent access to such information.

**Coding:** translation of the names of specific subjects or of recorded information into written symbols according to a pre-arranged system or code, which may if necessary be presented in the form of perforations.

**Constraint:** the state of being checked or restricted to perform some action.

**Cost-effectiveness:** By altering the configuration of a network we may affect both its effectiveness and its efficiency. For a series of configurations, the effectiveness and the efficiency can be related—this is a study of cost-effectiveness. An example of a cost-effectiveness measure is "the cost per relevant reference retrieved", and the preferred network would be one that minimises this.

**Data:** a general term used to denote any or all facts, numbers, letters and symbols, or facts that refer to an object, idea, condition, situation or other factors. Sometimes data is considered to be expressible only in numerical form, but information is not so limited.

**Data bank:** synonymous with data base.

**Data base:** a file of bibliographical or other information recorded on magnetic tape or disk for computer processing.

**Data centre:** an organisation primarily for acquiring, processing, storing, retrieving and disseminating data. The data processing done at a data centre does not include evaluation: this is done at a specialised information centre.

**Deposit copy:** a copy of a newly published book, pamphlet or periodical, etc., which is sent to one or more libraries, as required by law.

**Depository collection:** a library which is entitled by law to receive a free copy of every book published in the country.

**Developing countries:** The term was established when the United Nations classified all the nations of the world into two categories: the developed and the underdeveloped. Later, this term "underdeveloped" was dropped in favour of "developing".

**Effectiveness:** Effectiveness is assessed by examining the input and output...
of the network, its interaction with its environment, consequently there will be a different measure of effectiveness for each type of network.

Efficiency: This is expressed in terms of cost and sometimes called economic or operating efficiency.

Facsimile: the electronic transmission of an exact duplicate of a page, a graphic, or a film image.

Function: an individualised set of operations, such as cataloguing, abstracting, translating, etc.

General information centre: A general information centre covers most of the domains of the natural and social sciences, technology, and the humanities and the services of which are available to the whole country.

Government agency: a component of government in the executive or legislative branch.

Humanities: The humanities comprise philosophy, religion, linguistics and philology, literature, the fine arts, applied arts, theatre arts and music.

Indexing: the representation of document content through special symbols belonging either to the original text ("extracted" keywords or sentences) or to a distinct indexing on "information language".

Information centre: The term "information centre" in this thesis is not differentiated from "documentation centre"; it refers to a facility that emphasises the analysis, evaluation and synthesis of information.

Information expert: see Information specialist.

Information handling: the storing, processing and retrieval of information from acquisition to users.

Information resources: an organisation, facility, or individual willing and able to give authoritative responses to scientific or technical inquiries out of an existing store of knowledge or expertise.

Information scientist: a specialist in systems analysis, computers, communications, micrographics, and other technology based means for processing information.

Information sharing: the distribution of responsibilities and products of information transfer among a plurality of organisations, for purposes of integration.

Information specialist: one of the various professions partaking in the switching of information from producers to users including documentalists, librarians, system engineers, etc.

Information transfer: the set of operations by which information is made available to different categories of users, after its initial generation by producers.
Information unit: A distinction between an information centre and an information unit is administrative in character. The former is an autonomous institution, whereas the latter is merely an organ or part of an institution concerned with a wider field.

Integration: the process and result of reallocating tasks between information services, with a view to reducing duplications, optimising cost-effectiveness ratios, etc.

National: Refers to interests that transcend local and regional concerns. The term is also used to refer to organisations whose operations embody or serve these broader interests.

National bibliographical center: a place where the basic record for each bibliographical item is created (or verified) and held to serve the full range of needs of libraries, information centres, abstracting and indexing services, and national and trade bibliographies.

National information centre: an institution whose tasks and services cover the whole country and normally comprise all branches of science, social sciences, and the humanities, or at least a selected number of important areas according to the national priorities. A national information centre is differentiated from a State-run information centre operated and financed directly by the government. It is not to be excluded, however, that a national information centre may not be a State institution.

National lending library: a central library, within a country, responsible for acquiring at least one copy of a prescribed class of material and making it available to other libraries by loan or photocopying service.

National library: an institution whose tasks and services cover the whole country. A national library is differentiated from a State-run library operated and financed directly by the government.

National plan: the phased schedule by which the national programme is implemented to meet its programme objectives.

Networking: integrating information activities in a region or a country into a network.

Private sector: organisations not directly tax supported. Includes organisations outside of government such as profit making companies and not-for-profit institutions, which produce, process, store or disseminate information.

Process: A process can be encoding, transmitting, writing, publishing, translating, abstracting, lending, searching, reading or the like.

Public sector: organisations directly tax supported.

Referral: the indication of sources (persons, institutions, publications, etc.) from which information may be obtained on a given subject; mechanisms for switching users to such sources.
Regional bureaux: the offices which act as clearinghouse for requests for particular items which are not in stock where asked for, and pass on the requests to other libraries in their own regional areas.

Register: Cumulative record of data on information resources, collected, undated and distributed on a permanent basis through a specialised unit.

Repackaging: the provision of information services or products tailored to the requirements of special need-groups, through a rearrangement or merging of materials obtained from different organisations.

Reprography: the techniques and problems of document duplication, in a variety of forms.

Review: elicitation of the substance and significance of several documents in relation to a wider body of knowledge. "Reviewing", in this sense, is a form of "consolidation", involving not only compression but also critical evaluation of information.

Selective dissemination of information: the regular provision of scientific information to individual or corporate users, on predetermined subjects.

Simulation: the representation of one system by means of another.

Social sciences: The social sciences deal with the institutions and functioning of human society and with the interpersonal relationships of individuals as members of society.

Specialised information centre: an information centre which attempts to meet as many as possible of the needs for information on a particular specialised topic of the workers interested in that topic, regardless of their location.

Technology: Technology as used here includes a broad range of techniques by which information is recorded, stored, processed, retrieved, transmitted and displayed. These techniques include design alternatives that various writers have put forth to integrate these components in a network context, as well as pertinent hardware, software and communications technologies.

Telecommunication: the exchange of information by electrical transmission.

Telefacsimile: see Facsimile.

Trade catalogue: a publication containing particulars of books published or sold by a company, containing prices.

User: any individual or group with a desire, no matter how casual or how serious, to use information facilities.