Information, Knowledge and Intelligence: A General Overview

Nicolas Jéquier and Stevan Dedijer

This book seeks to explore one of the most complex issues facing the developing countries today, namely how to deal with the information revolution and the explosive growth of the knowledge industries in the Western industrialised countries. In the last forty years, practically all the world's dependent territories and colonies have achieved political independence, and the last fifteen years have witnessed innumerable attempts on the part of developing countries to acquire a greater degree of economic independence. Today, however, the sources of power are not so much control over territory, natural resources or industrial production, as control over information, technology and knowledge.

The central role played in the economies of the industrialised countries by the production and utilisation of 'knowledge' or 'information', taken in their widest sense, can now be documented with the help of a number of different indicators, such as total employment in the communications sectors, the size of research and development expenditures, enrolment in higher education, the growth of information-related services or annual investments in information hardware. These efforts to quantify and understand the knowledge industry are in some ways similar in scope and originality to the attempts made in the 1930s to measure the overall flow of goods and services in national economies and construct the first macro-economic models, and it is now conventional wisdom to view highly industrialised societies as 'information economies'.[1]

1. The pioneering studies on the knowledge industry are Fritz Machlup, *Knowledge and Knowledge Production*, Princeton University Press, Princeton, 1981, as well as his earlier book *The Production and Distribution of Knowledge in the United States*, Princeton University Press, Princeton, 1962. For an analysis of the 'information economy' see, for instance, Marc Uri Porat, *The Information Economy*, US Department of Commerce, Washington, 1977.

The knowledge industry in these countries has been growing rapidly under the combined impetus of competitive market forces, direct and indirect government support, strong social demand and constant technological innovation. Its dynamism, however, is not so much the result of deliberate policies as the manifestation of deep and still little understood changes in the values, aspirations and collective goals of advanced industrial societies.

The challenge facing developing nations is that this expansion of the knowledge industry is taking place for the most part in the highly industrialised countries. An indirect indication of this can be found in the relatively small overall size of the knowledge infrastructure in the developing countries. With over 70 per cent of the world's population, these nations, taken as a group, account today for some 20 per cent of world trade and around 11 per cent of world industrial production. However, they have less than 7 per cent of the world's telephones and other telecommunications infrastructures, less than 6 per cent of the world's computers, and account for only 5 per cent of the world's scientific publications and some 3 per cent of research and development expenditures world-wide.

Most of the world's knowledge is produced and consumed in the highly industrialised countries and plays a central role as a resource, or production factor, in their economies. However, it is also recognised as a major resource for the developing nations, and one of the problems these countries must solve is how to gain access in one way or another to the knowledge produced in the industrialised countries that is relevant to their own development objectives. The other problem is to build up their own capability to produce and especially to absorb new knowledge in an effective way. The central theme of this book is that the effective absorption and utilisation of knowledge by the developing countries can be greatly facilitated by — and is indeed dependent upon — a coherent intelligence effort or, more generally, upon a development-orientated intelligence policy. Each chapter attempts to explore a certain number of facets of intelligence in the process of socio-economic development.

Part I examines the evolution of what can be called the intelligence function and puts the task of building up a knowledge industry and gaining access to information important for develop-

JEQUIER Nicolas et DEDIJER Stevan, "Information, knowledge and intelligence: a general overview" in DEDIJER Stevan et JEQUIER Nicolas, *Intelligence for Economic Development : an Inquiry into the Role of Knowledge Industry*, Oxford, Bergamon, 1987, pp.1-23.

ment in a perspective somewhat different from that of information specialists, science-policy practitioners or development writers. Part II, which is devoted to five case-studies on the uses of intelligence, seeks to provide concrete illustrations of the general themes raised in the preceding chapters. Part III analyses some of the difficulties a developing country is likely to encounter in building up its development-orientated intelligence capability and proposes a number of guidelines for such a policy.

The Ambiguities of Intelligence

The very idea that intelligence may be an instrument for development raises a number of difficulties that cannot be dismissed out of hand. One of these is semantic: what does one mean by 'intelligence', 'intelligence policy' or 'intelligence activities'? How do these concepts relate to 'knowledge', 'information', 'data', the 'knowledge industry' or 'information systems'? This difficulty is compounded by the fact that several basic terms have various connotations: in British usage, the word 'intelligence', for instance, has a somewhat broader meaning than 'intelligence' in American usage. Translation difficulties only add to the confusion. The French word *intelligence* refers almost exclusively to the intelligence of an individual, not to the information-gathering activities of a government agency or an industrial firm, while the term *renseignement* (like *Nachrichten* in German) is applied to the intelligence-gathering activities of national security agencies, and not to those of a private corporation or a social group.

The same semantic problem comes up when trying to define a term like 'information': does it simply mean organised data, in the computer science usage of the word, or should it be defined more broadly as any form of meaningful message? The problem of terminology will be examined in some detail at the end of this introductory chapter. For the moment, we suggest that 'intelligence' can be defined as the process whereby a society or an organisation acquires information taken in the widest sense, processes and evaluates it, stores it and uses it for action.

The use of such a concept as 'intelligence for development' also raises political and cultural problems. Psychologists and other social scientists use the term 'intelligence' to describe the capacity of an individual human being to understand his environment, develop

new concepts, draw inferences, make abstractions and use in an effective way all the relevant information provided by his five senses. But when intelligence is taken in a broader sense, it all too often evokes cloak-and-dagger activities such as espionage, illegal wire-tapping and the devious acquisition of secret information. This is perhaps most obvious in American usage of the word 'intelligence', and it may be interesting to recall here that in French, the only wider usage of the term *intelligence* is to be found in the expression *intelligence avec une puissance étrangère* (conspiring with a foreign power), which is tantamount to high treason. A final difficulty stems from the very novelty of this concept of 'intelligence for development'. There is a vast amount of literature on intelligence by psychologists and other social scientists, a smaller but much faster-growing number of books, articles and reports on machine intelligence and artificial intelligence as an outgrowth of the computer sciences, mathematics and systems analysis, and several hundred, if not several thousand publications on the intelligence-gathering activities of national security agencies or the uses of intelligence in the business world.[2] By contrast, there is practically nothing on intelligence as an instrument of development, and more generally on what can be called 'social intelligence', that is, the overall intelligence-related activities of a society.[3]

Intelligence for Development: An Ongoing Activity

One of the themes running through this book is that the developing countries today are already carrying out a substantial amount of development-orientated intelligence work. In fact, while the terms

2. See, for instance, D. Blackstock, *National Intelligence: A Bibliography*, Center for Policy Studies, Washington, 1979; and W. Harris, *Intelligence and National Security: A Bibliography*, Harvard Center of International Studies, Cambridge, MA, 1979. Bibliographies on business intelligence can be found, for instance, in A. Huff, 'Business Intelligence: A Bibliography', University of Lund, Lund, 1976; L.M. Daniels, *Business Intelligence and Strategic Planning*, Harvard Business School, Cambridge, MA, 1979; and F.T. Pearce, *Intelligence*, Industrial Marketing Research Association, London, 1970.

3. See Stevan Dedijer, 'Social Intelligence for Self Reliant Development', University of Lund, Lund, March 1985. In this report, Dedijer points out that the term 'social intelligence' was first used by the psychologist E. Thorndyke in 1923, by the philosopher J. Dewey in the 1930s, by the social planner B. Gross in 1967, and by the students of enterprise strategy, H. Mendel and A. Mueller, in 1972. For a more comprehensive analysis of social intelligence as a synthesis of biological intelligence,

'intelligence for development' or 'intelligence as an instrument of development' are new, the concepts, activities, institutions and practices which underlie them are not. These activities, however, are generally not considered as a form of intelligence, even if in practice they conform rather well to what we mean by development-orientated intelligence. When a country like Jamaica, for instance, makes a consistent effort to gather all the potentially useful information about the aluminium industry, new technological developments in this sector and the history of the companies involved in bauxite mining and alumina processing, and then uses this information in its negotiations with foreign aluminium firms, it is in effect carrying out development-orientated intelligence work, even if these activities go under the name of 'market research', 'information gathering' or 'negotiation preparation'.[4] When South Korea or Taiwan scout the American scientific and technological community for highly qualified Korean and Chinese specialists who might eventually be encouraged to return home to newly established research centres or to act as consultants and advisers to local industrial firms, they are also in effect using intelligence as an instrument of development, even if these programmes are aimed primarily at reversing the brain-drain and building up an indigenous research capability. Algeria is basically doing the same sort of development intelligence work when one of its government agencies hires a large American consulting firm to look into the market prospects for natural gas in Western Europe, evaluate the effects of energy conservation programmes on the demand for oil and pick the brains of the world's leading energy experts.

The Need for Information and Knowledge

These examples suggest that the scope and volume of intelligence work carried out by the developing nations is considerably larger than one might suspect. This development instrument, however, is probably still far from being used as effectively as it might be. One of the reasons is that intelligence, which is widely acknowledged as

human intelligence, artificial intelligence and governing intelligence, see Stevan Dedijer, 'The 1984 Global System: Intelligent Systems, Development Stability and International Security', *Futures*, vol. 16, no. 1. February 1984.

4. See Chapter 8 of the present volume.

a legitimate and indeed necessary tool to maintain national security, is not yet consciously recognised as one of the means for promoting economic and social development. The importance of a development-orientated intelligence effort is amply demonstrated by a few specific examples.

Take the case of a country like Guyana, for instance, which in 1976 extended the limits of its territorial waters to the now customary 200 miles; with a stroke of the pen, the area under its sovereignty was extended by some 50 per cent. The new territory most probably harbours important natural resources: it is attracting the international shrimp-fishing industry, it borders on the oil-rich offshore areas of Venezuela, and could well be among the richest sources of polymetallic nodules. But, as the Guyanese government report to the 1979 United Nations Conference on Science and Technology for Development (UNCSTD) stated, Guyana, with a population of 800,000, had neither qualified oceanographers or specialists in marine resources, nor a single oil-industry engineer.[5] What is more, not a single Guyanese student at home or abroad was studying these disciplines at the time.

This means that for the next 10 to 15 years, Guyana will be unable to explore, let alone exploit, the new resources lying at its doorstep without foreign help. Quite clearly, the country is in need of development intelligence on offshore resources: Guyana must try to acquire at the lowest possible cost and within a reasonable time the knowledge needed to exploit these resources and to negotiate with the foreign firms that are likely to participate in the work. It is worth noting that Guyana faces similar problems with its forest resources and mineral deposits: the country's 215,000 square kilometres are covered for the most part with tropical rain forests which remain largely unexplored and unexploited, and there are most likely large mineral deposits in addition to the bauxite which is already being worked. One inexpensive means of gathering intelligence about these resources is remote sensing (i.e. photography from orbiting satellites of the Landsat type), but more important is the capacity to interpret the information thus gathered.[6] The intelligence challenge facing Guyana is fairly typical of the problems

5. *Guyana National Report*, Ministry of Science and Technology, Georgetown, 1979.

6. The development of such a capability is discussed in detail in Chapter 11 of the present volume.

encountered by developing countries when they try to mobilise the knowledge, information and know-how vital to their long-range development efforts.

Technological Intelligence

The Western industrialised countries are currently spending over 230 billion dollars a year on research and development. Many of the innovations coming out of the laboratories of American, European and Japanese corporations will most likely have a major impact on a number of key economic sectors in the developing nations. Take, for instance, optic fibres, the hair-thin glass wires that are beginning to replace copper wires and cables in telecommunications systems. This new technology has been progressing much more rapidly than anticipated by professional forecasters and could dramatically affect the export earnings of such major copper producers as Zambia, Zaïre, Peru and Chile. It is also raising serious doubts about the long-term economic viability of several large projects for the development of copper resources in a number of other countries. The intelligence problem here is not simply to monitor new technological developments taking place in the industrialised countries, but to try to evaluate their probable impact and, equally important to take the right decisions on the basis of information which is always incomplete and sometimes unreliable and which deals with future events whose probability is difficult to estimate. In other terms, what is required is a technological intelligence capability.

Another example which might be mentioned here is the potential impact on the economies of sugar-producing countries of recent developments in the field of artificial sweeteners and sugar substitutes. This problem could be illustrated with the help of a few pieces of information culled from open sources, and might serve as a way of illustrating the ways in which a development-orientated intelligence effort might function. The first of these items is the announcement by the Coca Cola Company in March 1980 that it would henceforth be using high-fructose corn syrup as a sweetening agent in all its non-diet soft drinks (low calorie drinks were sweetened with saccharin, following the banning of cyclamates). Two months later, a small article in *Business Week* magazine revealed that a recently established genetic engineering company in California had developed a process for transforming high-fructose corn syrup into

crystal sugar.[7] The third item of information, which appeared in all the major American newspapers in August 1983, was that the US Food and Drug Administration had finally approved the sale on the American market of aspartame, a sugar-like protein developed a few years earlier by Searle and Company. The fourth item was the announcement by Coca Cola that it would shortly be launching a new range of low-calorie soft drinks sweetened with aspartame. Several journalists noted that other companies, notably Pepsi Cola, would almost certainly follow suit very soon.

Civil servants in the ministry of agriculture and even the head of state in a country that is totally dependent on cane-sugar exports no doubt stay abreast of developments in the field of sugar substitutes. But what about a country that has only recently begun to develop its sugar-cane plantations for the home market or for exports? What about the local development bank which is considering a number of investment projects, one of which happens to be a new sugar-cane plantation and sugar-refining plant? What about the senior officials in a planning ministry who have to deal with dozens if not hundreds of new projects in completely different fields each year and who by definition cannot know the details of every single industry or technology in the country? These are not idle questions. Sudan, for example, is planning to become a major sugar exporter: its Kenana project is the world's largest sugar-development project, with a planned output of over 300,000 tons of sugar a year. Tanzania, too, is planning to develop its sugar-cane plantations so as to become self-sufficient in sugar.

The planning agency or the development ministry that must take decisions about expanding sugar-cane plantations or establishing new refineries needs the capability to assess the probable long-term effects of sugar substitutes on their country's projects. In this connection, it is worth noting that the World Bank, which has financed several sugar development projects over the last decades, is now aware of the fact that these new technologies may affect the viability of its sugar projects. As early as 1976, it commissioned a series of reports by independent consultants, who cautioned the Bank not to

7. High-fructose corn syrup can be extracted from the starch of a number of crops, notably wheat, maize and cassava. Two of its main drawbacks are, or rather were, (a) the fact that it comes only in liquid form, which means it can only be used in drinks and confectionery, and (b) its instability, which makes it difficult to use in canned foods, which are likely to have a long shelf-life.

become involved in further financing in this field.[8]

This story of sugar substitutes points up some of the major difficulties to be overcome in building up an intelligence capability. First, a country must be aware that a problem does in fact exist. The reports commissioned by the World Bank suggest that this was true of the Bank but the same can probably not be said of Tanzania or Sudan, and it is worth thinking about the factors that can stimulate such an awareness. Second, a country must have the ability to assemble the relevant information from a wide variety of sources, perceive that a particular item of information is important and try to get an overall picture even though some pieces of the puzzle may be missing. Third, a country has to be able to assess all the available information, evaluate its importance and reliability, and make value judgements as to the likely impact of the developments which have thus been identified. Finally, decisions have to be taken on the basis of this information. Guyana's inability to explore its new offshore resources is a typical illustration of the need for intelligence about natural resources, while the sugar industry story clearly shows the need for intelligence about new technologies. But these are only two elements, albeit important ones, in a development-orientated intelligence effort. Another potentially important element is intelligence about multinational corporations.[9]

Intelligence about Multinational Corporations

Subsidiaries of foreign multinational firms often account for a substantial proportion of industrial employment and exports in developing countries. Yet it is surprising to see how little many of these countries know about the multinationals operating on their territory. Little use is made of available sources of information on these companies, even though this information may be crucial to negotiations on such issues as future investment plans, local participation in management or equity, technology transfer, pricing policies, employment objectives or subcontracting to local firms.[10] For this, the host-country negotiators need to understand the multinational's psychology, its motivations and strategy, its attitudes towards foreign markets and its long-term plans. This information is also essential if a good working relationship is to be established between host country and foreign firm.

The penalties a developing country may have to pay as a result of poor information about multinationals is clearly illustrated by the negotiations which took place in the late 1970s between India and a number of foreign corporations. India's objective was to get all foreign firms to conform to the new legislation requiring at least 50 per cent local equity participation in the Indian subsidiaries of foreign firms, and access by the Indian partner to the technology used by that subsidiary. Negotiations on this issue with two major foreign firms, IBM and Coca Cola, were notoriously unsuccessful. Both companies discontinued their operations in India, and it would seem that this proved extremely costly to India, even if it did encourage the development of an indigenous computer industry and stimulated the sales of locally-produced soft drinks (as well as illegal imports from Coca Cola's bottling plant in Nepal!).

What is interesting here is not only the fact that India overestimated the strength of its negotiating position (for both companies, the Indian market, despite its very large population, accounted for a very small share of world-wide sales and was thus not vitally important), but also that the Indian negotiators were apparently unaware of these firms' policies, practices and traditions. Anyone who has read an official company history of Coca Cola or articles published in *Fortune*, *Forbes* or *Business Week*, or who has talked even briefly to one of its competitors, knows that Coca Cola's unpatented, most closely guarded secret is its 100-year-old formula for the concentrate which has made the company famous. Any negotiation aimed at gaining access to this specific technology was doomed to failure from the start. Similarly, the Indian negotiators could have known from reading one of the company histories of IBM, any biography of founder Thomas J. Watson, or even the firm's annual reports, that this company has always insisted on retaining full ownership of its foreign subsidiaries.

8. This analysis of prospects for high-fructose corn syrup can be found in three mimeographed documents: E.M. Brook, 'The Sugar Substitute, High Fructose Corn Syrup', The World Bank, Washington, September 1976; George T. Tsao, 'High Fructose Syrups', Purdue University, West Lafayette, IN, n.d.; Fred Gray, 'Sugar Substitutes: Their Competitive Position', US Department of Agriculture, Washington, February 1976.

9. On this point, see Stevan Dedijer, 'Multinationals, Intelligence and Development', paper presented at the International Conference on Informatics and Industrial Development, Trinity College, Dublin, March 1981.

10. See Rita Cruise O'Brien (ed.), *Information, Economics and Power. The North–South Dimension*, Hodder and Stoughton, London, 1983.

The reasons for this policy of IBM are largely managerial and technological, but probably also have much to do with the company's corporate identity, its internal value system and its history. What the Indian negotiators apparently failed to appreciate was that IBM's insistence on 100 per cent ownership of its subsidiaries was not a negotiating ploy — as it might have been with another company — but a non-negotiable issue. The intelligence problem in such a situation is to perceive which points are negotiable and which are not, and to judge whether a demand for local equity participation might reluctantly be agreed to by one foreign corporation, while for another — IBM in this instance — such a request would inevitably lead to closing down its manufacturing operations in the host country.

The example of India's negotiations with IBM and Coca Cola points to the need for intelligence about multinational corporations and for what might be called negotiation intelligence. The story of the sugar industry clearly points to the need for scientific and technological intelligence. What is also required is intelligence about foreign markets, which is vital if a developing country is to increase its exports, identify changes in consumer preferences, understand how foreign distribution systems operate and develop a network of commercial agents abroad.[11] Finally, a country also needs economic and financial intelligence to keep track of international capital flows, assess the evolution of interest rates and identify upturns and downturns in the world economy.[12] These different 'sectoral' intelligence activities can be viewed, somewhat schematically, as the building blocks of a development-orientated intelligence effort (see Figure 1.1), but it should be kept in mind that there is a considerable amount of overlapping. Effective intelligence work on multinational corporations, for instance, cannot be dissociated from intelligence on scientific and technological developments, and market intelligence depends heavily on economic and financial intelligence.

11. One of the international agencies that can help developing countries build up their foreign trade intelligence is the Geneva-based International Trade Centre (ITC), which was set up by the United Nations Conference on Trade and Development (UNCTAD) and the General Agreement on Tariffs and Trade (GATT).

12. In the same way, banks need intelligence about their borrowers. This is one of the reasons why over 100 leading international banks established the Institute of International Finance in 1983.

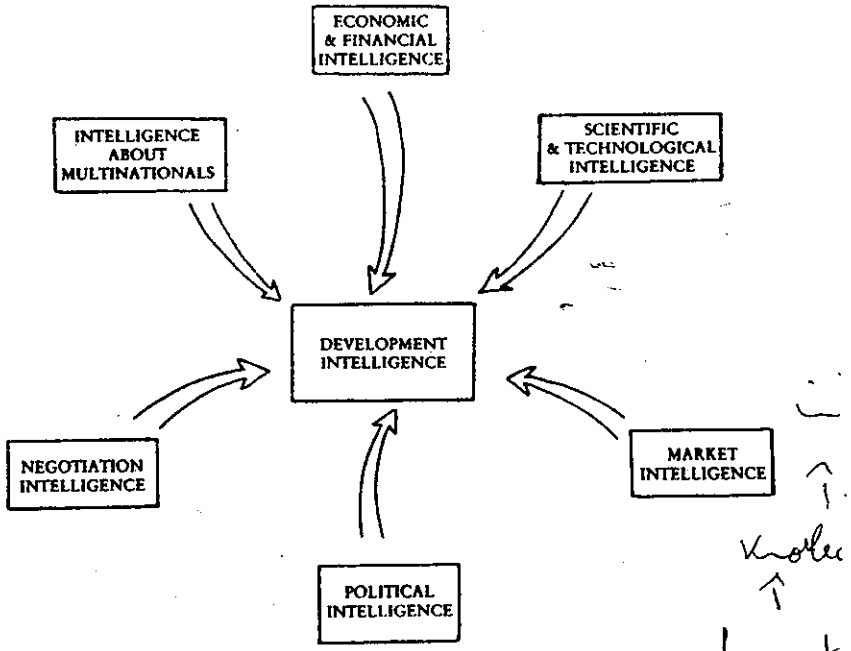

Figure 1.1. The components of a development-orientated intelligence effort

Data, Information, Knowledge and Intelligence

Any intelligence work, be it military intelligence, corporate intelligence, or what we have called development intelligence, calls for the acquisition and evaluation of very different types of information and knowledge. At the most elementary level, we find data, that is, sets of numbers, as they might appear in national statistical abstract, the balance sheet of a large corporation, the market projections made by a consulting firm, the print-outs of a computer used for seismological analysis or the electronic signals from a communications satellite. These data are often totally meaningless to the non-expert but very revealing to the specialists: the detailed accounts of an industrial firm will tell a lot to an accountant or a stockbroker, but are most likely not of much use to someone with no knowledge of accounting, finance or economics. Thus what is important is not sets of figures as such, but rather the information

content which can be extracted from them. These data can be represented in the form of 'bits' in a computer memory, sets of figures in a statistical table or the individual letters in a printed text. Their value as information, that is, as a meaningful message, depends on what can be called the absorptive and analytical capacity of the brain, the individual or the institution receiving the data. Information could thus be defined as data, taken in the widest sense, which have been received, processed and understood. This represents the next level of complexity in the 'information pyramid' shown in Figure 1.2.[13]

Several criteria can be used to evaluate the different items or pieces of information collected by an intelligence unit. One is its importance, or lack of importance, to the receiver. Another is its reliability: is it a verifiable or measurable fact, or does it deal with a probable outcome, a likely event, a possible fact? A final criterion is the distinction between quantitative and qualitative information: quantitative information may seem to be more reliable, but often the really important information is of a more qualitative nature. The next level of complexity in our information pyramid is 'knowledge'. Knowledge can be viewed as a stock of information which has been processed, analysed, evaluated and tested, and which is continually updated and enriched by the permanent confrontation between this new information and previous information stored in a 'memory' (the memory can be a computer memory, the human brain, or the experience of an institution). The final level of complexity is intelligence in the psychological sense of the term, namely the ability of an individual — and by extension of a social organisation such as an industrial firm or a country — to acquire new information and knowledge, make judgements, adapt to the environment, develop new concepts and strategies, and act in a rational and effective way on the basis of the informations thus acquired.[14]

As we noted earlier, one of the difficulties in dealing with such terms as 'intelligence', 'information' or the 'knowledge industry' is that each one can mean rather different things. 'Information', for

13. For a more elaborate version of this concept of an 'information pyramid', see F.T. Pearce's 'intelligence ladder' in Chapter 4 of the present volume.

14. This concept of 'intelligence', as applied to a country, is at the origin of the creation, in Venezuela, of the world's first and only 'Ministry for Development of Intelligence'. For a good overview of the problems and objectives of such an unusual type of government department, see the interview of Minister Luis Alberto Machado in *Science*, vol. 214, 6 November 1981.

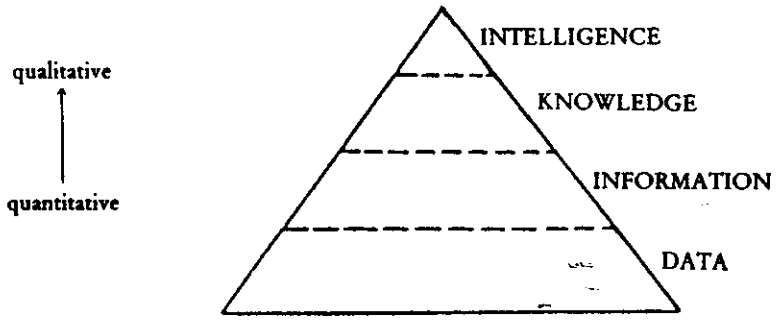

Figure 1.2. The information pyramid

instance, is often used as a synonym for 'data': computers and associated equipment, usually known as 'information systems', in effect process data rather than information. When talking about the 'knowledge industry', one is generally dealing with the whole range of activities of our information pyramid. It includes not only data processing (that is, computer systems) or the industries which serve as the basis for the transmission and diffusion of data, information and knowledge (such as telecommunications networks, the mass media or education), but also the services and industries that produce new information and new knowledge (for example, governmental and industrial research laboratories) or store knowledge and information (such as libraries or data banks).

The term 'intelligence' in turn can be understood in three different ways. It can refer exclusively to the upper layer in our information pyramid, namely the ability to make judgements and adapt to the environment in a coherent way, or it can refer to the information and data-gathering activities of a national security agency and, by extension (essentially in British usage), of an industrial firm or any other social organisation. In this second sense, intelligence is essentially a process of information acquisition, storage, analysis and evaluation. The third conception is a synthesis of the first two: it includes intelligence-gathering activities defined in the widest sense, as well as the higher level ability to make judgements, evaluations, inferences, and use this knowledge for action.

In all three conceptions, intelligence can be viewed as a set of complex processes, but it can also be understood to mean the result or product of an information-gathering activity, and is thus virtually synonymous with information. Unless otherwise specified, the term 'intelligence' in this work refers to the third definition, and not

exclusively to 'information', or to 'intelligence' in the psychological sense of the word. It is, however, important to keep in mind that the terminology in this field is still far from being fully established, a problem which, it may be noted, was also typical of the computer industry in the 1950s.

The various chapters in this book focus, directly or indirectly, on intelligence as an instrument of development, that is, the intelligence activities carried out by developing countries to mobilise and use knowledge for development purposes. However, it is important to keep in mind that, aside from these development-orientated intelligence activities, there are also more conventional intelligence activities, related as in any other country to political priorities, security objectives and social imperatives. These wider intelligence activities form what some authors call 'social intelligence' and what others, notably Harold Wilenski, term 'organisational intelligence'.[15]

The Intelligence System

The semantic and conceptual problems arising from the use of such terms as 'intelligence', 'information' or 'knowledge' are due in no small part to the frequent failure to distinguish between products and functions. Intelligence, for instance, can refer to the product of information-gathering work (as in the expression, 'We have intelligence that our competitor, company X, is planning to launch its new product on December 10') or to the information-gathering and analysis work itself ('Our intelligence about competitors is pretty strong'). In the same way, when talking about the 'knowledge industries' a distinction is not always clearly made between those sectors which produce knowledge (a research laboratory, for example), those which store knowledge (data banks, libraries, and so on), those which transfer or transmit knowledge (the educational system or a telecommunications network), those which evaluate and process knowledge (a governmental policy-analysis unit or an industrial firm's strategic planning division) and, finally, those which apply this knowledge to action. For this reason, it may be useful to look at information, knowledge and intelligence as a system, and see how its different parts fit together.

15. See Harold Wilenski, 'Organizational Intelligence', in *International Encyclopaedia of the Social Sciences*, vol. 11, McGraw-Hill, New York, 1973, as well as Dedijer, 'Social Intelligence for Self Reliant Development'.

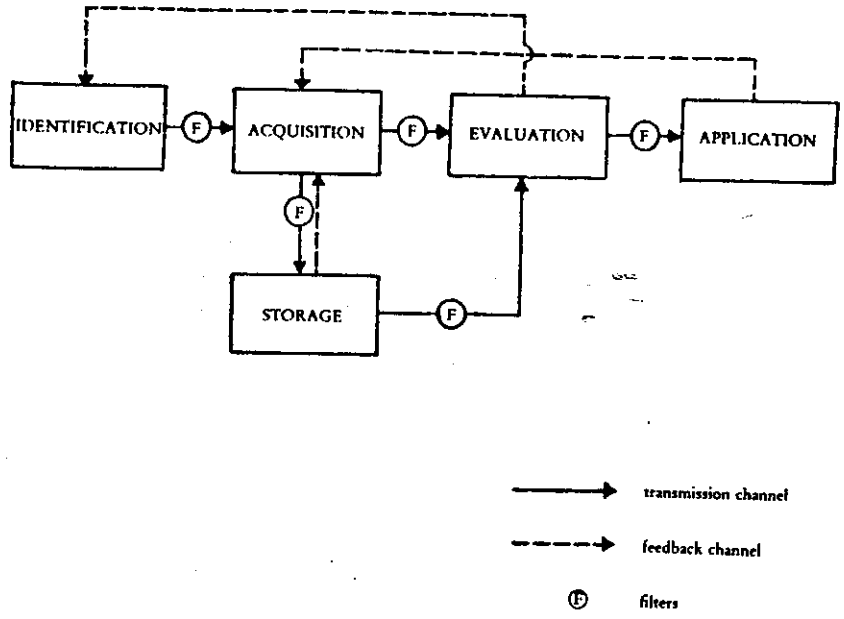

Figure 1.3. The intelligence system

A number of different models of such a system can be envisaged, since the idea is not to represent reality in all its complexity, but simply to provide a tool for understanding a particular structure or institution. The model of an 'intelligence system' shown in Figure 1.3. should be viewed with this in mind; its sole aim is to show some of the main functions or activities in the field of intelligence and to help identify some of the typical problem areas. The first of these problems is that of identification: how does an individual, an institution or a country identify the issues and trends on which its intelligence effort should focus? Much identification work is of a routine nature, in the sense that the problems to be studied are fairly obvious, the challenges familiar and the adversary well known. An industrial corporation, for example, knows who its principal competitors are and, among them, which could pose serious marketing or technological threats. In the same way, national security agencies devote most of their intelligence effort to a small number of clearly identified potential adversaries. In such cases, the problem of identification is rather minor, in the sense that it is dominated by obvious economic or geo-political constraints, and reinforced both by habit and by a long-standing familiarity with the opponent.

Problem identification may often be fairly simple, but history clearly shows that some of the biggest intelligence failures stem from failures in the identification process. Such failures tend to occur when the opponent, the threat or the challenge is totally new or unexpected, falling completely outside the normal frame of reference of the intelligence organisation or unit. Obvious examples are the failure of certain state security organisations to identify the threat presented by fundamentalist religious movements, or that of a good many firms in such mechanical industries as watch-making, sewing machines or calculating equipment, to identify the revolutionary change brought about by the advent of micro-electronics. In the political field, such failures can result in revolution and civil war; in business, they can lead to bankruptcy. Though it may be easy with hindsight to pinpoint the institutional, cultural, social or political causes of a spectacular failure to identify a challenge or threat, it is much more difficult to discern the factors that make for an effective identification capability.

Part of the difficulty stems from the fact that the process of identification is not as rational as corporate planners or heads of national security would like it to be; it is a rather intuitive, even artistic process, which calls for imagination, perceptiveness and sensitivity, as well as for an ability to sense nascent changes. Some of the largest consumer-orientated industrial firms, for example, now regularly scan the *New York Times* and other leading newspapers and magazines for the weekly list of best-selling books, or subscribe to the 'content analyses' of the national press carried out by specialised consulting firms.[16] This may seem rather irrelevant to a corporation's intelligence effort, but has in fact proved a useful if indirect way to identify some of the basic concerns of the public, which in the long run could affect the company's operations. Swings in public opinion are often captured, if not crystallised, by a best-selling book. In the 1960s the big car and chemical firms totally misjudged the new public concern for safety and environmental protection which had so aptly been captured in Ralph Naders's book *Unsafe at Any Speed* or Rachel Carsons's *Silent Spring*. This problem of identification is not, of course, specific to intelligence institutions and units alone. It can also be central to scientific research: what often distinguishes the Nobel Prize class of scientist from the more pedestrian researcher is the ability to identify an

16. See John Naisbitt, *Megatrends*, Warner Books, New York, 1982.

important research problem and make a correct evaluation of its 'solubility', to use Sir Peter Medawar's term.[17]

Open, Grey and Secret Information

Another important box or 'problem area' in the system sketched in Figure 1.3 is the acquisition or generation of data, information and knowledge. This is the activity which is most generally associated with 'intelligence' in the narrow sense of the word; it is also the one which evokes espionage. To put matters straight, it should be stressed that espionage, which can be defined as the acquisition of secret information by illegal means,[18] represents only a very small part of the total information-gathering activities of a corporation, a national intelligence agency, or a country. By far the largest part of the information-gathering activities of any intelligence organisation focuses on 'open' information, that is, information which is openly available in print or from individuals. The fact that this information is freely accessible does not, of course, mean that it is without cost: the man-years of work involved in finding relevant open information, monitoring new information and developing appropriate channels of communication can be quite expensive. Confidential or secret information, by contrast, accounts for a very small part of the data, information or knowledge collected by an intelligence unit, although the public grossly overestimates its importance.

One of the reasons for this tendency to overestimate the importance of secret or confidential information is its frequent confusion with what can be called 'grey' information, that is, information

17. Peter Medawar, *The Art of the Soluble*, Methuen, London, 1967. For a good account of problem identification in the scientific field, see, for instance, the story of the discovery of the DNA molecule's structure in James D. Watson, *The Double Helix*, Atheneum, New York, 1968. On the uses of 'lateral thinking' in the identification of problems, see notably Edward de Bono, *The Use of Lateral Thinking*, Jonathan Cape, London, 1967.

18. Putting together open pieces of information or data may, of course, result in final information which can be considered as secret, but technically speaking such an activity cannot be described as espionage. The legality or illegality of the means of acquisition often depends on technical definitions: photographing a military objective from the ground is generally recognised as espionage, but photographing the same objective in even more detail from outer space is now more or less reluctantly accepted as a legal activity. In the same way, the definition of what constitutes secret information differs considerably from one country or culture to another: statistical data on foreign trade or industrial investment are considered secret in some countries, while in others they are openly available.

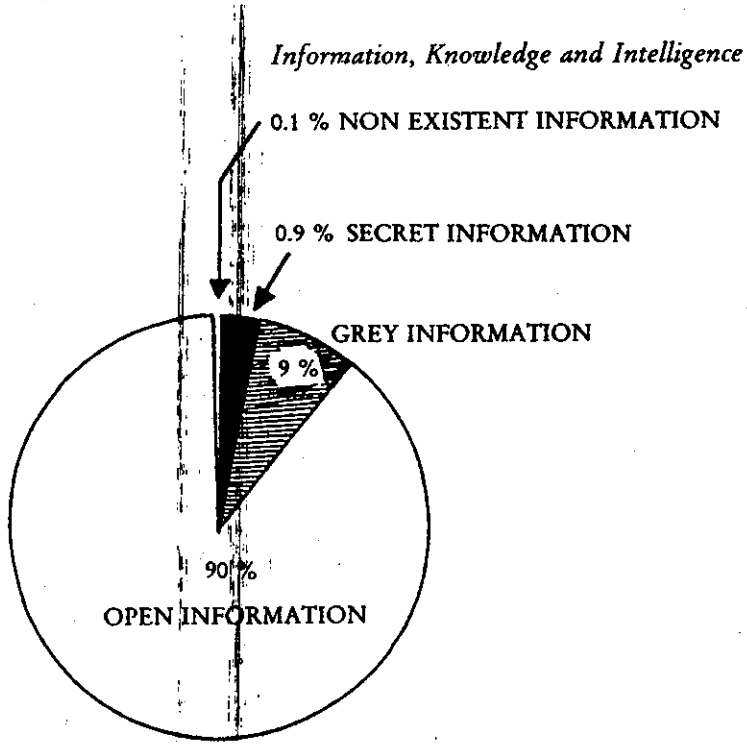

Figure 1.4. The different types of information

which is not published or widely diffused, but to which access can nevertheless be gained, provided one knows that it exists and has the adequate channels of communication. Information falling into this category includes xeroxed documents, preprints of scientific articles, rumours in business circles, project proposals submitted to a research-funding agency and discussions with well-informed specialists.[19] The balance between open, grey and secret information can be roughly broken down as follows: 90 per cent of all necessary information is open and freely accessible; 9 per cent is grey information; and 0.9 per cent is secret or confidential information (see Figure 1.4.). This is merely a rule-of-thumb indication of the relative importance of these three types of information. What should be kept in mind are the orders of magnitude: open information is at least ten times as abundant as grey information, and the latter in turn is at least ten times as abundant as secret or confidential information.

19. One interesting effort to assemble grey information in the scientific field is that of the System for Information on Grey Literature in Europe, set up in the United Kingdom in 1984. For further details, see the brochure 'Your Passport to Grey Literature', The British Library Lending Division, Boston Spa, October 1984.

Grey information is more difficult and time-consuming to find, while secret or confidential information is often totally inaccessible, and its search involves a number of risks and penalties. In Figure 1.4 we have added a fourth category which often tends to be forgotten: non-existent information. This sometimes accounts for a far from negligible information-gathering effort on the part of an intelligence unit. The reason is not necessarily poor judgement: there is often no way of knowing that a particular piece of information does not exist, or at least not exist yet.

Secret or confidential information cannot remain secret for ever. Much in the same way as radioactive material decays over time, secret information gradually passes into the category of grey information, and then into the category of open information. This is what happens, for instance, with information about a company's technological innovations or its financial troubles: first known to a limited number of higher-level executives within the firm, the information gradually percolates down to personnel, then the rumour mill of industry observers, company customers and other interested circles (this is the stage of grey information), and finally hits the news and the stock-market.

Information Overload and the Memory Function

Contrary to what is widely believed, one of the major problems facing any intelligence organisation is not the difficulty of acquiring information — be it open, grey or secret — but rather the danger of over-abundant information. The amount of information that can be amassed usually greatly exceeds the organisation's capability to process and use it, and this gap between processing ability and acquisition capacity tends to grow with time, largely as a result of the enormous increase in the volume of available information and the growing sophistication of acquisition techniques. This tendency to accumulate vast amounts of often obsolete or irrelevant information is one of the typical pathological syndromes of an intelligence organisation. In too many situations, decision-makers still find themselves without sufficiently reliable and reasonably complete information on which to base their evaluation of the problem at hand.

The process of information acquisition is closely linked with the system's storage and evaluation function. Storage is in essence the memory function of an intelligence system. It can take the form of computerised data banks, conventional libraries, the brain of an individual or the institutional experience of an organisation. The value and effectiveness of what is stored depends not so much on the quantity and the quality of information thus accumulated as on the ease and speed of retrieval: a book which has mistakenly been returned to the wrong shelf in a large library is as good as lost. This is, of course, one of the major attractions of computer systems: the storage capacity is practically unlimited, and the retrieval of information is almost instantaneous.

The quality and efficiency of an intelligence system also depends on two other elements sketched in Figure 1.3, namely the information channels, and the filters that can be found in the various channels. The faster the flow of information in the system, the more efficient the system is likely to be. This speed of transfer is conditioned both by the nature of the channel itself (transmitting information by mail for instance is much slower than its transmission by voice over the telephone, or by electronic means) and by the width or capacity of the channel. The processes of transmission, in turn, are influenced by the filters which exist at various points in the system. These filters may be 'natural': the greater the distance, the greater the amount of information that is lost or distorted. The filters may be also physical devices, as in a telecommunications network, where their function is to filter out the unwanted noises and interferences in the transmission process. But the most important filters in an intelligence system are of a social nature, as illustrated by the industrial firm that does not want to recognise the technological threat posed by a competitor, or the military intelligence unit that systematically blocks the further transmission of information about its adversary because it does not fit in with its evaluation of the enemy's capabilities or intentions.

The capacity of an intelligence system to acquire, store and transmit information is one thing. What is ultimately much more important is its capacity to evaluate the relevance and reliability of the information for decisions and action. The evaluation function is critical to the success of any intelligence effort; it is also at this stage that some of the most monumental intelligence failures tend to originate. The difficulty here, as with the identification problem mentioned earlier, is that good evaluation calls for complex skills

involving judgement, intuition and imagination. The relevance of any intelligence effort depends on its effective links with action. An industrial corporation which correctly identifies the technological threat from a competitor, which succeeds in gathering additional information and confronts this information with what it already knows (with the information stored in its institutional memory or its files), which makes the right judgement about the threat, but which ultimately fails to use this information in its long-term planning or short-term decisions, is in effect wasting its intelligence effort. The same is true of a developing nation which acquires computerised information systems, spends large amounts on education and develops its internal capacity to create new knowledge, but ultimately fails to use this knowledge to pursue its economic, social and political goals.

The Emergence of Social Intelligence

Government agencies, industrial firms, political parties, trade unions, armies and political pressure groups are all involved in intelligence work. These activities, which consist in identifying problems, threats, opportunities or challenges, gathering vast amounts of information, data and knowledge, storing and evaluating this information, and using it to achieve the organisation's goals, are seldom consciously recognised as intelligence work. In an industrial corporation, scanning the economic and political environment in order to identify emerging threats, promising market opportunities or unusual technological challenges is an activity which goes under such names as market analysis, technological forecasting or long-range planning. In the same way, when a government department tries to develop better methods for assembling and storing the increasing amounts of information it needs in its daily work, it tends to think in terms of 'information systems' rather than in terms of intelligence activities.

Intelligence work is generally assumed to be an activity performed essentially by what is known as an intelligence organisation, that is, a national security agency concerned primarily with military and strategic tasks. National security agencies, whether they are dealing with external or internal security, with intelligence in the narrow sense (the gathering of information) or with counter-intelligence (countering the information-gathering activities of

another country's security agencies), represent only the tip of the intelligence iceberg in any society. It is, however, the tip which has been the most widely studied and which tends to attract public attention. The high visibility of national security agencies has tended to divert the attention of scholars, journalists and historians from the ultimately much more important and far wider range of intelligence activities carried out by corporations, social groups, private institutions and government agencies.

What the present book tries to do is to look at intelligence activities within society and explore some of the main aspects of what might be called the intelligence function and its management. The implicit hypothesis running through the various contributions is that this intelligence function, which plays a central role in highly industrialised societies, is equally important to the developing nations and could, if properly used, help them to mobilise information and knowledge more effectively for development purposes. In this perspective, intelligence can be considered as an instrument of development.

This concern with the problems of intelligence in development should not, however, overshadow the wider problem: intelligence is not only an instrument for the world's poorer nations to master the new opportunities presented by the explosive growth of the knowledge industries, but is an important activity of any society, whatever its level of development. At the societal level, it is somewhat similar to the intelligence (in the psychological meaning of the word) of a human being. In the same way that psychologists or neurologists speak of a human intelligence, one could speak of the intelligence of a society, or 'social intelligence'.

Several authors in this book, in their investigation of the role of intelligence in the process of development, have in fact used this term of 'social intelligence'. For the moment, this is more an approach than a general theory or a complete system, and our hope is that the investigation presented in the chapters that follow will serve not only to launch the idea of 'intelligence for development', but will also pave the way for a study of 'social intelligence'.