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ABSTRACT

One of the many problems of developing nations is the scarcity of the information required for development planning, its concomitant abundance in more developed nations, and the lack of a truly viable infrastructure to achieve its economic transfer. Political and administrative structures must be created that are responsive to the new scales of social demands and a comprehensive and coherent system of rules must be established which will match and limit demands to available limited resources, assuring equity of information. In the long run, the production, gathering, and handling of information may take precedence as the only true growth industry. It has the capacity to make enjoyment of knowledge possible for all; but more importantly, it has the potential of lifting the burden of mindless toil from the shoulders of men, allowing what Norbert Wiener called "the human use of human beings." Twenty-five references are provided. (RAA)

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Plenary Session

SOME ISSUES IN INFORMATION TRANSFER: A THIRD WORLD DEVELOPMENT PERSPECTIVE

By

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SOME ISSUES IN INFORMATION TRANSFER: A THIRD WORLD DEVELOPMENT PERSPECTIVE

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INTRODUCTION

I feel greatly honoured to have been asked to make a presentation at this plenary session of the 46th IFLA General Conference in Manila. I am grateful to IFLA and the organizers of this Conference for the invitation.

As already announced, the theme of this first Plenary Meeting is "International Cooperation in the Development of Information Systems." Developing the systems and mechanisms that facilitate awareness about and access to information sources have been two of the major concerns of library and information science (1). The barriers to and problems of access to information sources, especially documents, are well recognized although the available solutions may not be perfect. International inter-governmental organizations such as UNESCO and other UN agencies and non-governmental organizations such as IFLA, FID, ICA and ICSU are grappling with transnational issues including transborder exchange and distribution of documents, universal availability of publications, on-line access to remote data bases, facsimile transmission, copyright and other legal restrictions. Other sessions of this Conference would probably discuss some of these issues in depth and detail. I shall confine myself to presenting a few issues relating to information transfer and infrastructure development from a Third World point of view -- issues that are not widely discussed in the literature of library and information science per se. A comprehensive treatment of all the issues would obviously become a voluminous treatise and presentation for several hours. I have had to select some issues; therefore, the presentation may be a bit patchy.

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Several countries that attained independence during the post-World War II period launched a series of development programmes with a view to consolidating their hard-won political freedom through economic independence and self-reliance. When they began these exercises in the late forties and early fifties the development models they had before them were mainly those of the countries of the West, some of them their erstwhile rulers moving away from the traditional agricultural to the industrial economy. After over a quarter of a century of development effort, several of the so-called developing countries find the kind of progress they have achieved less than satisfactory: No doubt GNP and even per capita income have increased, but the gap between the 'haves' and 'have-nots' in society has widened; while people are surrounded with many strappings of modernity the quality of life is deteriorating and an erosion of culture and an identity crisis are surfacing; they find themselves no nearer to the richer nations they tried to follow, and most of the time they are at the receiving or borrowing end. These are problems of development in developing countries. International concern for the situation led to the declaration and Programme of Action of the New International Economic Order at the Sixth Special Session of the United Nations in 1974. The Programme emphasized world poverty and inequality among nations, and called for North-South Dialogue, changes in the industrial trading system and transfer of resources, promotion of appropriate industries and transfer and development of appropriate technologies, and a focus on self-reliance in developing countries as well as technical cooperation among them.

One might ask, 'Well, it is all interesting but what have information systems to do with all these problems?' Our profession claims that information systems, like other social structures -- be it government policies, or educational system, or social security system, or science and technology programmes -- are intended to contribute to the socio-economic and cultural development of all individuals in the society, to enable the

nation as a whole make its distinctive contributions to world peace and prosperity, and to maintain the nation's identity and personality in the comity of nations. Therefore, the image and credibility of information systems, especially in developing countries, as essential elements of the infrastructure for development depend, in an increasing measure, on their ability to meet the demands of development, finding solutions to the problems of development. The issues are complex, no doubt. The past decade saw some commendable efforts at the national and international levels toward developing mechanisms that could facilitate information flow within and among countries. Such efforts, obviously, need to be further strenghtened and supported in the eighties and beyond for they are concerned with very practical problems of information access and utilization. However, more attention should also be paid to deeper and basic issues of the information field some of which I shall mention presently. Most of the issues are now discussions among economists and social scientists; information people are rarely in the picture or they grapple with the problems independently. There is need for joint investigations of these issues at various levels by economists, social scientists, behavioural scientists and information scientists with international funding and support.

CONCEPT OF 'INFORMATION SECTOR'

An issue I like to present is the concept of 'information sector' in development planning. Development planning, programming and momitoring entail the optimal allocation and utilization of mobilizable resources based on reliable forecasts and gainful decisions. These exercises require timely, reliable and precise data and information on the mobilizable resources, on the characteristics of and trends in the development milieu, etc. Therefore, information is not merely an input resource for effective development planning but it is essential to ensure the optimal allocation and utilization of all other resources. Despite this vital character of information vis a vis development planning, very few national development plans have a chapter on information, not even a separate budget line for it. Even within specific sectoral plans one may not find a separate

budget line for "information". And yet we reiterate that information is a national resource; that national information policy and plan should be coordinated with or be derived from national development policy and programme, and so on. National developmen planning should recognize an "Information sector" just as it does other sectors of the economy -- for instance, agriculture, industry, science and technology, education, culture, etc. This will help integrating plans for information infrastructure development into national development plans; contribute to a better understanding of the mutual influence between information and other sectors; provide data for a foundation of the emerging field of "Information economics"; help formulate guidelines and criteria for apportioning national resources among the elements of the information sector and between information sctivities (information sector) on the one hand and the other sectors of the national economy on the other; lead to a better perspective of the issue that 'the level of information handling capability is a socio-economic indicator.'

A related question is: What are the criteria and guidelines for allocation of resources -- national and international -- for the production, processing, distribution and accessing of transient but, perhaps, immediate return-producing information (for example, commercial information) vis a vis the more permanent information but that which may give only a deferred return in terms of improvement of the quality of life, preservation and promotion of culture and value systems, etc.-- for example, production of education materials, adult literature, reprinting of scholarly works, translations of classics, preservation of archival materials, oral traditions, and so on. Is it possible to develop some notion of priority among these information demands in relation to particular socio-economic and cultural contexts and developmental stages of countries?

Lamberton (2) suggests that economists can help in developing a suitable classification of information processes once the concept of an information sector is accepted. The taxonomy may be 'by type of information transferred', 'by type of participants' 'by type of response elicited', 'by type of information technology

used', etc. Such a taxonomy would be facilitated by Leontief-type input-output tables (Leontief coefficients) in the description and analysis of information flows on the analogy of product flows as Janos Kornai (3) has indicated. Message flows can be recorded and analyzed. This would help further to elucidate the structure of the information sector and its relation to the rest of the economic system. Information technologies can then be described in terms of the input-output relationships; alternative economic consequences can be exploredand, hopefully, predicted.

COMMUNICATION COST IN TECHNOLOGY TRANSFER

Let us briefly consider the communication or transfer cost of technology. About fifteen years ago, when nobel laureate Simon Kuznets wrote that economic growth was essentially the increase in the available stock of useful knowledge, he signified three aspects of economic development, namely, that (a) economic growth of all countries depended on the effective utilization of knowledge in developmental activities, (b) technical developments or innovations rarely remained within the confines of any one country, and (c) nations are interdependent in technology transfer and utilization (4). More recently, in a discussion on alternative forms of international cooperation, nobel laureate Jan Timbergen (5) pointed out that "information" and "information exchange" were among the main elements respectively in the "Objects" category and "Activities" category in such cooperation. In this context, the issue raised by Kenneth Arrow (6), yet another nobel laureate in economics, is significant: "If one nation or class has the knowledge which enables it to achieve higher productivity , why is not the others acquiring that information?... The problem turns on the differential between costs of communication within and between classes (or nations)". That means the cost of information transfer is an important factor influencing the world-wide diffusion of technological knowhow. Some elucidation of this point may be in order.

Over 90% of the capacity for generating, communicating and utilizing information and knowledge, especially in the fields of science and technology, rest with a small number of technologically and industrially advanced countries (some 30 countries

with over $800 per capita income and sharing 35% of the world population burden) and, therefore, the developing countries (about 120 countries with less than $500 per capita income and sharing over 60% of the world population burden) have either to purchase the knowledge and knowhow, for example, in the form of books, periodicals, reports, patents, specifications, blueprints, accessing remote data bases, licensing arrangements, training, expertise, and commodity import, together adding up to a sizeable amount and resulting in an unfavourable foreign exchange and balance of trade situation, or alternatively, they have to duplicate and develop such technology indigenously, again at great cost. Now, with respect to the first alternative of obtaining knowhow from abroad, the payments made by developing countries for technology import from developed countries increased from $400 million in 1965 to $1.1 billion in 1975 and is expected to reach $6 billion by 1985. With respect to the second alternative of developing everything indigenously, most of the least developed countries at their present level and rate of development, might take a few hundred years to reach even the present level industrialization and welath-producing capacity of the developed countries.

It has also been reported that in many cases, developing countries may not have information on less expensive but equally suitable technologies available in other developing countries. Therefore, international programmes, such as, Technical Cooperation among Developing Countries (TCDC) stress, among other things, the need for developing countries to widely disseminate and exchange information on technology developments in their respective countries and on their experiences with the use of particular technologies (7). Information systems -- national, regional, and global -- should be capable of capturing and inventorying technology used in developing countries, disseminate widely information about indegenous technology within and outside the country through cooperative mechanisms, identify national technology needs, alternative technologies and their sources, and provide information support for technology assessment, transfer, choice and adaptation to the application environment.

The kind of information and information support mechanisms needed for the purpose have been the subject of several national, regional and international discussions and papers. For instance, the Main Working Document of UNISIST II Intergovernmental Conference (1979), the United Nations Conference on Science and Technology for Development (1979), the UNCTAD and other UN agency conferences, just to mention a few recent international ones. We need not discuss the details here. But what is important is that the information profession must take cognizance of this facet added to their areas of concern, and the systems we design must respond to these development needs.

Reverting back to the transfer cost of technology: it is not a negligible factor. While it is widely accepted that substantial resources are required to develop a commercially feasible process or product even if the technology is available, it is often assumed that the cost of succesive transfer of knowhow from one institution to another, whether within a country or transnationally, is marginal compared to the cost of research, development, application and adaptation. Teece (8), based on his quantification studies of technology transfer costs, points out that knowhow transfer is not merely the transfer of a set of blue prints and manuals that are usable at minimal costs to all parties; that the resources required for communication of knowhow are considerable (varying from 2% to 59%, averaging 19% of total project cost), and that it is influenced by a number of factors. These findings and similar studies have important implications to the planning of national, regional and international technology information transfer mechanisms and bilateral cooperative arrangements in developing countries.

DEVELOPMENT POLICIES AND INFORMATION POLICY

Development experiences and studies indicate that as a society moves from a pre-industrial stage (that is, traditional agriculture) to industrialization and on to the post-industrial stage, it tends to utilize science and technology in an increasing measure in development activities and progressively becomes an information-intensive society -- that is a society that produces, records, handles and utilizes more and more information.

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I just mentioned about the communication cost of technology transfer. A related issue is what alternative policies and strategies can developing countries adopt which would make them less information-intensive without compromising development goals? There are not many studies in this area. Olivera (9) in his studies on the production and distribution of national statistical data in developing countries indicates that economic underdevelopment may be a cause of technical underdevelopment rather than the other way round because (a) the marginal utility of the resources devoted to the production of national statistics may drop sharply once the supply of some of the basic time series has been achieved, and (b) the marginal cost of production of national statistics may rise sharply if a complete coverage of all elements of all sectors is undertaken. Therefore, the optimum output of statistics may be much smaller in developing countries than in developed countries. That means, in developing countries it is inexpedient to allocate their scarce resources to produce a whole range of national statistical data as may be done in developed countries; they should rather concentrate on improving the quality of statistical indicators, in ensuring a greater degree of reliability, timeliness and continuity of the statistical information than by setting up new time series. In the planning of national statistical data systems this is a factor for consideration.

Would the scantiness of information disturb the stabilizing mechanisms of an information system? It depends on the extent to which the economic policies pursued are information-intensive. Olivera's study brings out the fact of the existence of a certain category of economic policies which render the stability behaviour of the economic system dependent upon the amount and quality of the information possessed by the government. These are the information intensive policies, such as monetary policies of the passive type. For a developing country, the more reliance it puts on information-intensive policies the greater the extent to which the deficiency of information supply may accentuate its structural instability. Both developed as well as developing countries have been following information-intensive economic policies. Since the information-base is narrower in developing

countries, the efficiency of their information-intensive policies is also lower as compared to those of the developed countries. Information-intensive policies without the necessary mechanisms for information supply lead to considerable wastage. What is, therefore, required is not a change of goals, but the introduction of methods with smaller information input.

MARKET-SUPPLIED INFORMATION AND INSTITUTIONAL-INFORMATION

Economists have looked upon information as a commodity and attempted to develop an "economics of information" applying the Neoclassical theories. However, certain peculiar properties of information, for instance, its non-appropriability, increasing returns in use, and indivisibility, create difficulties in applying the theories of resource allocation, demand and supply, etc. (10). Newman (11) in an attempt to bypass this problem adopts an institutional perspective of information. What we are interested in is his propositions about market-supplied information (MSI) and institutional-information (II). MSI is usually more expensive than II to obtain. And especially when an institution has been stable over a period of time information users tend to place greater credibility on II than on MSI. Institutional information covers established procedures and conventions, internally available expertise, precedence and decision records, etc.

It would be interesting to blow the picture to a national scale: internal information would be the totality of information generated within all the organizations, expertise available, conventions and procedures established, etc. If this is of a high quality, reliable and appropriate to the needs, the expenditure on external or market-supplied information can be considerably reduced. In fact when a country has top-rated expertise, research and knowledge generation capabilities, then would use them. This is also linked to the concept of developing 'centres of excellence' in particular fields in a country. Such centres can favourably affect the economics of the national information system. But the development of a centre of excellence may require substantial initial investments. International organizations and bilateral cooperation can

help in developing centres of excellence and national capacity for knowledge generation. Also support for studies into the trade-off between MSI and internal information utilization in different sectors or fields at different stages of planning and plan implementation in different development milieuxwould be good investment in the long run.

TECHNICAL PUBLICATION CAPABILITY

The issues raised in the preceding sections lead to another important facet of information transfer. A major proportion of the science and technology information sources in demand in developing countries are those generated and/or located in the developed countries of the West -- for example, periodicals, reports, and data bases. The sources are expensive to obtain or access and represent a substantial part of the foreign exchange component of the information systems in developing countries. Some countries cannot afford it. But what makes the situation ironic is that many a developing country often purchases back from abroad much of the worthwhile research information or papers generated in their own institutions, even though it may only be a small fraction of the total volume.

We are all aware of the several motivations for researchers in developing countries to publish in foreign periodicals. Experience and studies indicate that one important factor is the poor technical publication capabilities in many of the developing countries. A good technical publication capability covers a whole range of facilities: an efficient and effective editorial and publications management capability; a good referee system that assists and encourages scientists to prepare papers of high standard; efficient and high quality printing and publishing facilities; and an efficient world-wide publications distribution and marketing system. A good national technical publication system will help capture at home most of the good research papers generated in the country instead of having to pay in foreign exchange to obtain them from abroad later on; provide for better bibliographical control of the country's research efforts; enable the conservation and earning of foreign exchange through the sale and exchange of the periodicals and reports; facilitate the creation of data

bases of the nation's information sources which could become foreign exchange earning products.

Planners of national information systems do not usually consider the planning and development of national technical publication facility to be within their purview; it is often left to the scientific community, the academies and societies -- the generators and users of information -- who maynot be quite familiar with all the issues and technicalities involved. It should be the joint effort of all the parties concerned -- the scientific community, the information personnel and publishing groups. National information policy should provide guidelines on this matter. International bodies concerned with information systems development and with the promotion of science and technology in developing countries should jointly consider the means and methods of improving publication capabilities and not merely with access to information sources. Otherwise, in the long run, on the one hand the economics of national information system of developing countries will be adversely affected and, on the other, researchers in developing countries would find themselves in a disadvantageous position in getting their researches published and would learn about the researches done in their own countries through foreign sources!

EQUAL ACCESS, EQUAL BENEFITS?

Providing for awareness of and access to worlds information sources is only one, though a very important, aspect of modern information systems. 'The right to information' as a fundamental or human right and the growing creed that everyone, every class, every nation should have equal access to information are two trends that may affect information systems design in an increasing measure. However, we also must bear in mind that information processes, that is, information generation, collection, organization, recording and distribution, accessing and utilization, operate imperfectly. Therefore access to information is not equal to all classes and the capacity for effective use of information differs markedly among individuals, among classes, and among nations. The use of information is also dependent upon the appropriateness of the information accessed. Therefore providing equal access to information to everyone does not

ensure equal benefit to everyone.

Appropriateness of information may be viewed along different dimensions. For instance:

--appropriateness to the purpose because different types of information and data may be required for planning, problem solving, R and D, technology transfer, general education, etc.;

--appropriateness to user's characteristics, for example, educational background, intellectual standard, language ability, presentation format and repackaging requirements;

--appropriateness to the application environment, for instance rural vs sophisticated environment, cultural differences, information handling capability, etc.;

--appropriateness to the medium of information transfer, for instance, through person-to-person contact, mass media, documentary sources;

--appropriateness with respect to quality, that is, analytical depth, tolerance to imprecision, error, etc.;

--appropriateness with respect to time of availability of information; and

--appropriateness with respect to the economics and cost of access and usability.

Efficient and effective use of information in a system or country also depends on the level of development of the infrastructure; this may vary with the sectors within a country and among countries. Hence the differential benefit from information even if access is 'equal' to everybody.

RURAL DEVELOPMENT INFORMATION NEEDS

In recent years there has been an emerging realization in developing countries of the need to give due attention in development planning to the needs of rural population constituting over 75% of the total population in these countries. The rural society in developing countries is something quite different in many ways from that of the developed countries. Therefore, there are no suitable rural development models in the developed countries for emulation by the developing countries. Further, there are features which distinguish one rural society from another even within a developing country.

Rural development planning has additional special needs, features and problems to take into account. Such a reorientation of development foci has implications to national information policy formulation, and national information system design and implementation in developing countries. This has been discussed elsewhere (12). The issue for consideration is 'what organizational features contribute to the success of rural development programmes and what kind of information communication system can effectively promote and support them?'

One feature is that bottom-up planning and grass-root level participation in decision making are pre-requisites to success. And there should be an information system that facilitates information flow from and about the grass-root level to the development planners so that plans and programmes are relevant to and viable in, the rural context may be formulated.

Popular or grass-root level participation in decision making implies participation in the identification of situations requiring decisions, in the decision-making process itself and in the implementation of the decisions. The information system should equip the participants with appropriate information and data so that their participation leads to productive results. The manner and media for providing the information are related issues.

Rural societies have a wealth of knowledge, experiences and traditions which must be respected and utilized. Information systems should be capable of capturing, recording and disseminating such knowledge and experiences.

Multi-level linkages of local community organizations are conducive to the success of rural development programmes. Such communication networks for rural programme management should be integrated into the national information system.

Careful selection of innovative rural technology requires an appropriate information support mechanism.

These and other features of rural development programmes call for specialized information services utilizing non-conventional library methods -- for instance, extension and

contact personnel for person-to-person contact/communication, simple audiovisual technologies usable in the rural environment, community television programmes, folk arts, fairs and exhibits, demonstrations and group discussions, etc. The national information policy and administrative structure should provide for the special information needs of rural development into the national information system.

ADDITIONAL IMPLIED ISSUES

The issues presented so far have other implications. I shall merely mention them here.

*What are the consequences of making information provision an instrument of state policy?

*In the interest of maximal benefit to society, how do we distribute the rights and controls over information -- the existing stock and the new flows -- because several interests are involved: the authors, the recorders, the publishers, the distributors, the information specialists, the consumers, the State, etc.

*What is the trade-off between search in and utilization of existing stock of information and the production and utilization of the needed information? What factors affect this trade-off?

*How would one place differential weightage on the different menas of information transfer -- library and documentation services, mass media, telecommunication, etc., and what are their complementary relations in different contexts?

*Assuming that the incorporation of an 'information sector' in the national development plan would ensure better deal for national information system development, what are the returns and the social cost of the investment on information and how are these to be measured and evaluated?

CONCLUDING REMARKS

For several centuries man has been totally dependent on nature to provide for most of his needs. Therefore, the level of production determined the level of consumption. The application of science and technology to development has changed the

situation.

One characteristic of the change is the increasing proportion of returns to a given effort or investment and a subtle shift in the axis of economics from a supply-base to a demand-base. This is becoming visible in the information field as well.

A second characteristic of the change is the creation of the mass society. Developments in communication and transport have brought about a quantum jump in social interactions leading to competition as well as cooperation among the societal elements. In turn, these lead to specialization for achieving efficiency, differentiation in function, and interdependence. Man becomes a smaller and smaller part of a larger and larger whole. In a symposium edited by Dr. Boorstin, Arthur Clarke describes the change in the cultural dimension picturesquely: "Hindu mantras and tantric mandalas, Japanese prints and African sculptures, Eskimo music and Indian ragas all jostle with one another in 'real time' within the confines of western homes" (13).

A third characteristic of the change is the change of scale which involves a change in institutional forms. Technology makes available large amounts of energy at cheaper cost, more control over the circumstances of production and faster communication. A development in any one of these areas increases the efficiency of the other two; and the three together increase the efficiency of large scale operations. That is, instead of performing the same operations as before in less time, large scale operations are performed in the same time. This feature is evident in the information field as well.

The information industry absorbs large investments and involves a series of complex processes. Thus, information has a cost price and has to be delivered at a selling price corresponding to its utilization value. The impact of the changes is being felt in an increasing measure, but the interplay of elements is unclear (14).

Power is participation in decision making and the control over the range of base values via sanctions and rewards. Thus, as a society moves from a pre-industrial to an industrial and on to a post-industrial stage, material property -- for instance, land, labour and capital -- may longer be the main source of

economic power; the only unique resource input into the social-industrial process would then be human knowledge, the organized information which programmes and governs machine and human performance. Thus, those who possess this resource would have the key to economic power (15).

Many of the problems of modern society arise from its growing complexity, that is, multiple interactions and inter-dependence. The resolution of the problem is two-fold: To create political and administrative structures that are responsive to the new scales of social demands and to develop a more comprehensive and coherent creed that diverse people can share. Limits to growth arise from limits to resources. "But the expansion of knowledge or information is the type of growth that has no irreplaceable resources, squanders no energy." In the long run, the production, gathering and handling of information may be the only growth industry. And to make the enjoyment of that knowledge possible, technology must play its other great role: lifting the burden of mindless toil, and permitting what Nobert Wiener called "the human use of human beings." In that context, international organizations have important roles to play, in achieving a balanced flow of information and the goals of the New International Information and Communication Order.

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1. The term 'information' is used in a generic sense irrespective of the source, form of presentation or transfer medium used. The term 'data' when used denotes numerical and statistical data. The term 'information system' is also used in a generic sense to cover libraries, documentation and information facilities, data banks, information analysis centres, information dissemination services, etc. as well as networks of these.
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