HIGH POINTS

IN

DEVELOPMENT

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20 RESEARCH, DOCUMENTATION AND DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION FOR INDUSTRIAL DEVELOPMENT IN NIGERIA

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ABSTRACT

Industrial development depends to a large extent on the rapid application of existing research findings and technologies. Nigeria is endowed with abundant indigenous literature resources in the form of primary literature: journal articles, research reports, conference papers, grey literature, thesis, market surveys an feasibility reports. These come from the different research institutes, academic institutions and industries in the country. The information resources are however scattered and unco-ordinated, and therefore not accessible to many industries for use in industrial productivity. This unco-ordinated effort of the nation's information structure has contributed to Nigeria's slow pace of industrial development. The need for scientific and technical research has been stressed.The problems of coordination of industrial information and bibliographic control has been highlighted. A model of STI flow for idustrial development has also been proposed.

RESEARCH,DOCUMENTATION AND DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION FOR INDUSTRIAL DEVELOPMENT IN NIGERIA

INTRODUCTION

It is common knowledge, even without empirical data, that the role of Science and Technology, as well of Scientific and Technical Information (STI) for development has not only gained increasing recognition in developing African countries, but had actually taken on a new significance. This is partly due to the multiplicity and intensity of awareness creating activities (especially conference, seminars, research studies etc) that are being organised with external support. Also, the fact that fellow developing countries which have embraced Science and Technology as a major engine of growth (e.g Korea, Brazil, Singapore, Indonesia) have generally faired much better in their development efforts has helped to show the significance of STI. A majority of African countries, due to a lack of

policy and direction for the organisation and use of science and technology, have remaianed stagnant in their social development and have deteriorated in their economic well-being.

Nigeria spends a considerable amount of money in research and development through investment in Universities and other research institutes which are supposed to conduct research and develop relevant STI for the advancement of industries. Unfortunately, however, Nigeria still imports most of its manufactured goods. Not only is Nigeria still far from the realization of a self-sustaining industrial base,the fact remains that its minimum industrial base is itself impaired by chronic structural deficiences (Oragwu, 1979. It has been established that one of the factors contributing to rapid industrialization is the dissemination of usable resarch findings to industrialists in the language and format they understand (Etim,1992). It is assumed therefore that inadequate or ineffective dissemination of scientific and technical information and the subsequent lack of use, must be one of the key factors responsible for slow pace of industrial development in Nigeria. The Inability of government to set goals to assist the publication and utilization of research findings results in a considerable proportion of researchers carrying out activities which have very little or no relevance to science, technology and industrial development. (Amoda and Tyson, 1979).

There is need therefore, to increase relevant and valuable information production for development. It must be stressed that the extent of use of information sources is influenced by the extent the sources provide the information required for problem solving activities.

The objectives of this paper therefore are:
- to highlight the need for scientific and technical research in Nigeria.
- to stress the need for co-ordination of information resources and bibliographic control for industrial development in Nigeria.
- to propose a model of STI flow for industrial development.

THE VALUE OF SCIENTIFIC AND TECHNICAL RESEARCH

The evolution and orientation of Scientific and Technical research seem to have been determined at different times and places by the need for a strategy which will meet two major needs of the nation concerned. First, is an entirely new and perhaps much more powerful method of gaining a deeper insight into the scientific disciplines that will permit the nation to innovate science. Second, is the need to develop and acquire technology or know-how or adapt existing technologies for improving the nation's life style, and for solving problems encountered in self-sustainng economic and social development. This is the value of scientific research.

Odeinde and Alabi argued that the advancement of science depends on the accumulation of data and every scienctist stands on the shoulders of hundreds of other scienctists. Industrial productivity, according to Alabi (1990) could be achieved by the rapid application of existing research find-

ings and technologies. Technology, which is one of the outcomes of scienctific research, has become a comodity which can be developed in one country and made to wok in another country to which, after suitable modifications, is subsequently transfered. If the modifications take place, then scientific reesearch is essential.

Research, according to Oragwu (1979) is an area in which there has been, from historic time, an interdependence of nations, reflected in substantial contributions over time to the pool of international scientific and technical knowledge and skills. Information derived from these activities has been published in the literature, disseminated and shared as part and parcel of the universal human heritage. Alabi (1990) emphasized the technical cooperation of Africa in all fields through the establishment of the commission for technical cooperation in Africa (CTCA) in the 1950s. The functions of the CTCT consisted of coordination of scientific activities and encouragement of cooperation and exchanges between African nations. Nigeria and other countries have been interacting on many planes to their mutual advantages in economics, education and training, collaborative research, technology transfer, investments and business. Evaluation and strengthening of this collaborative effort, particularly in scientific research and training activities, exchange of essential scientific information in the context of self-sustaining mutual economic and social development should therefore be encouraged.

Nigeria's early development plans, unlike those from 1975, did not explicitly mention technology or specific R & D policies. They did however, provide funds for agricultural and industrial research. In examining the progress of these early plans, it was discovered that some of the major problems encountered in the achievement of some targets were poor local technological capacity and technical know-how, low managerial capacity and the poor linkage patterns among R & D, imported technology and production activities in the country. To find answers to these shortcomings, it become necessary to re-examine the R & D system in the context of the cultural, educatioal and economic objectives of Nigeria, as a developing country. In addition to research in government owned research institutes and centres, various forms of basic and applied research also go on within the walls of the universities and polytechnics.

The number of universities in Nigeria has increased from thirteen during the 1977/78 academic session to thirty-one during the 1991/91 academic session. (Joint Admissions and matriulations Board, 1991). In the actual production sectors no local/internal R & D established within the private organisations has made major break-throughs. All the requiremets have been met from the home base of the companies. Nevertheless, Nigeria has by all standards made massive investments in scientific technical education and research. Some questions then arise. Why does Nigeria still export primary raw materials? Why is the economy still import dominated with almost all technologies used in production being imported from abroad?

Some of the criticisms of scientific research and inovation in Nige-

ria are that science education lacks an empirical base and the linkage pattern with economic, social and cultural activities is poor and tenuous. It is also stated that the quantitative and qualitative aspects of scientific research and training and innovative attempts for alternative technologies are confined within the walls of the universities. Limited use is also made of the opportunities for direct experience and observation within the country (Amoda and Tyson,1979).

At present, one of the national objectives in R & D strategy for correcting the situations described above is to forge an interrelationship of technology, research and development, engineering activities and capital goods production in order to induce local technological change. In the industrial sector, it is observed from the nature of Nigeria's major exports that, at present, few manufactured products are exported (Central Bank of Nigeria, 1990). The little manufacture taking place locally cannot keep pace with population growth and demands, if all the intermediates continue to come from outside. For instance, over 50 percent of school science-teaching equipment and teaching aids are imported from aboard. (Federal Ministry of Education, 1988). Research and development for alternative materials and production of local science equipment will reduce not only the massive expenditure of foreign exchange but also will, above all, relate the local instrument manufacture to the dynamics of the science and technology curriculum , orientation and change in Nigeria.

DOCUMENTATION AND CO-ORDINATION OF SCIENTIFIC AND TECHNICAL RESEARCH IN NIGERIA

In spite of the availability of STI in published form, there is the problem of duplication of research. The United States president's Science Advisory Committee (1963) while investigating many of the problems affecting the successful exploitation of available STI noted:

" Taking into account the fact that every branch of science interacts with other branches,   science must remain unified, if it is to remain effective. Since literature is the embodiment of ideas and data, that literature must also remain a unity, if science itself is to be unified and viable. Yet because of the tremendous growth of the literature, there is a danger of science fragmenting into a mass of repetitious findings, or worse, into conflicting specialitis that are not recognised as being mutablly consistent".

This is the justification for the existence and expansion of library and information services. Documentation involves:-

(a)   Compilation o informative abstracts on endogenous literature in key subject areas related to national development.

(b)   Repackaging of these abstracts into national subject biblographies and indexes for publication. Several sectoral efforts have been made by several univeristies in Nigeria (31), polytechics (26), colleges of education, (54) and Research Institutes (54) libraries and

documentation centres at collating information resources for dissemination to user groups.

Existing dates bases in Nigeria which provide active and dynamic information retrieval,current awareness services and selective dissemination of information (SDI) to Nigerian industries are the Federal Institute of Industrial Research, Oshodi (fiiro), and the National Information and Documentation Centre (NIDOC) under the National Library of Nigeria Lagos. Existing data bases for industrial development and their services are shown in Table 1.

Information services are also offered to industries in Nigeria by government institutions like FIIRO. The Industrial Information Centre and Extention Services of the Federal Institute of Industrial Research (FIIRO INDICES) is the national focal point for the International Technology Information Bureau (INTIB) In Nigeria (Glover, 1989). Since inception, the library in FIIRO has provided only for the information needs of its research staff. FIIRO was mandated to carry out research into Nigerian raw materials for industrial utilization; upgrade indigenous technology and adapt imported ones; and offer routine technical and consultancy services to industries, government establishments, private organizations and individuals.

With this mandate, the library had to interact with industrialists, entrepreneurs, consultants and research and development organisations, thereby changing the role of the library from serving only the research personnel of the institute.

In 1976, the Federal Ministry of Industries, acting on behalf of the Federal Government of Nigeria, signed an agreement with the United Nations Development Programme (UNDP) on a country project to cooperate in establishing and operating a national industrial information centre at FIIRO. The United Nations Industrial Development Organisation (UNIDO), also a signatory to the agreement, was the executing agency This project was implemented in two phases. The first phase commenced in March 1978 and ended in 1979. After several years of assessment, the second phase commenced in October 1986 and ended in February 1989 The acronym INDICES, meaning Industrial Information Centre and Extension Services, was coined for the information bureau during the second phase. INDICES was proposed to be a national information centre designed to acquire and disseminate industrial and technological information to the various sectors of the Nigerian economy. Its immediate objectives were to:-

1. Establish an industrial information service tailored to the information needs of real and potential industries and industrialists
2. Establish and operate industrial extension information services
3. Set up a training unit for the development of manpower in industrial information work;
4. Establish computerized information facilities;
5. Advise and assist industrial establishments and enterprises in set-

ting up their in-house information outfits, and

6. Establish links with sectoral, national, regional and international information networks for purpose of cooperation and resource sharing.

During the implementation of both phases of the project, various international experts recruited by UNIDO came at different times and carried out different assignments. Preparatory to the take-off of the centre, both the International experts and the national staff carried out the following activities:-

(a) Information needs of real and potential users (industries) were ascertained by paying visits to the industries.

(b) Questionnaires were designed and distributed to R & D organisations and industrial establishments to gather data for inputs into the data bases.

(c) The national staff were trained in various aspects of informaation work both locally and abroad in similar organisations.

(d) Microcomputers, audio-visual aids and accessories were identified, acquired and installed.

(e) National, International, public and Private sector organisations concerned with the promotion of industrial production were identified with a view to developing active linkages with item.

With the identification ofinformation needs of the users, it was realized that the resources of the information centre, as well as those of similar international centres which the information bureau used, were insufficient to satisfy the needs of users. The local data bases shown in Table 1 were therefore designed and created.

The National Information and Documentation Centre (NIDOC) was also established by the National Library of Nigeria to serve as a focal point for information for Nigeria. Backed with Decree No. 29 of 1970, the National Library of Nigeria in 1983 was designated the National Focal point in the Pan Afrian Documentation and Information Systems(PADIS) network in Africa. It was also to serve as the regional centre for the information and documentation system serving the West African sub-region. As a result of this, NIDOC was concieved by the National Library of Nigeria in order:-

(a) to provide an active computerised information retrieval, analysis and consultancy services.

(b) to provide an active referral service whereby information resources, whenever they are in the country are mobilised for use.

(c) to effectively document and disseminate locally generated information in all subject areas for use in timely deceision making.

(d) to provide a national access point to selected international information sources and data bases.

NIDOC is also to serve as the nucleus of the West African Documentation and Information System (WADIS) within the pan African Documentation and Information System (PADIS)

The impact of research and training in Science and Technology can only be maximized if research findings and technologies derived thereby are made available in forms suitable for absorption and used by those who need the information. The problem of co-ordination of information resources and bibliographic control for industrial development in Nigeria is enormous, costly and time consuming. In order to achieve this, it requires team spirit and a systems approach. It requires the active participation and commitment of STI users, STI producers, STI disseminaters, government policy makers and the assistance of international organisations. The need for a focal point for STI dissemination for industrial development is necessary.

THE PRESENT FRAMEWORK FOR STI DISSEMINATION FOR INDUSTIAL DEVELOPMENT IN NIGERIA.

The present framework for the dissemination and use of STI for industrial development in Nigeria is represented in Figure 1.

The 45 research institutes in Nigeria generate STI and the message is encoded in the journals, reports and news bulletins of the research institutes. This message is expected to be received by the ten industrial sectors.

But there is a gap between the message and the receiver (STI flow) explained by the two Commonities Theory (Etim, 1992). Lack of suitable information systems to receive, process and perform selective dissemination of information to the different industrial sectors could impede the ultimate goal of enchanced industrial development. Lack of a feedback mechanism to assess the relevance of information from producers could also deter Industrial Development.

The forty-five research institutes are under the supervision of the Federal Ministry of Science and Technology (FMST). The FMST has set up the National Consultative Committee on Industrial Research and development (NCCIRD)

TABLE 1

EXISTING DATA BASES FOR INDUSTRIAL DEVELOPMENT IN NIGERIA AND THEIR SERVICES

Organisation	Available Information Sources	Target Population
1 Federal Institute of Industrial Research, Oshodi (FIIRO).	**Data Bases:** STEP; Scientific,Technical and Economic Puplications	Researchers
	RADIO:Research & Development Information On-line	Nigerian Industries
	CASE: Current Awareness Services on the economy	General Public
	DANTE:Data on Available Nigerian Technologies	Nigerian Industries
	PIPE: Product and Industry Profile Extract	Nigerian and International trade market
	CD-ROM data bases on Commerce and Industry	General Public
	LATIN: Latest Technology Index	Nigerian Industries
2 NIDOC National Library of Nigeria Lagos	UNESCO CD-ROM data bases	Researchers General Public Nigerian Industries

as a forum to encourage a healthy exchange of views between the public and private sectors and to facilitate feedbacks from the end users of science and technology research. Membership is made up of representative of banks, manufacturer's associations and research institutions. The Science and Technology Documentation Centre (STDC) at Abuja is set up as a data base centre on various aspects of research in science and technology. The state technology demonstration centres are proposed to be established in each state with direct links with FMST and industrial organisations. All these agencies set up by government have very weak links with the end users (industries). Direct links are still at the proposal stage.

In the same vein, the Federal Ministry of Industries (FMI) has set up the Industrial Development Coordinating Committee (IDCC): The National Council for Industrial Development (NCID) and the Strategic Consultative Groups (SCGs) to liaise with the industrialists. Again these are very weak links. There is also a proposed link between the Federal Ministry of Industries through the state industrial development centres.

A NORMATIVE MODEL OF STI FLOW FOR INDUSTRIAL DEVELOPMENT

Figure 2 shows a model proposed for maximal utilization of STI for industrial development. The model is based on the S-M-C-R-E communication model (Rogers & Shoemaker, 1971).
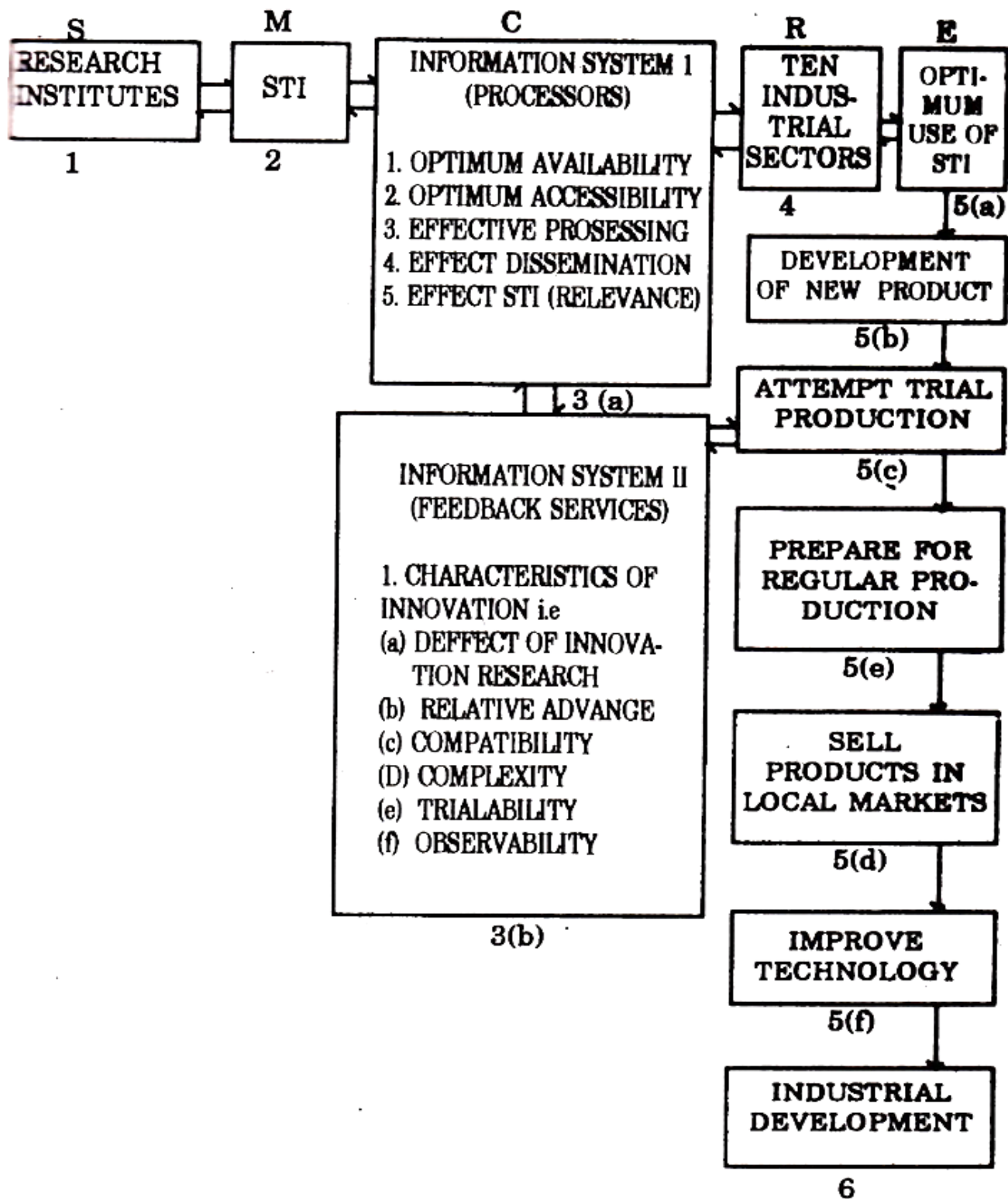
Fig.1

EXISTING INSTITUTION FRAMEWORK FOR STI UTILIZATION FOR INDUSTRIAL DEVELOPMENT SHOWING GAPS WHICH OUGHT TO BE FILLED.
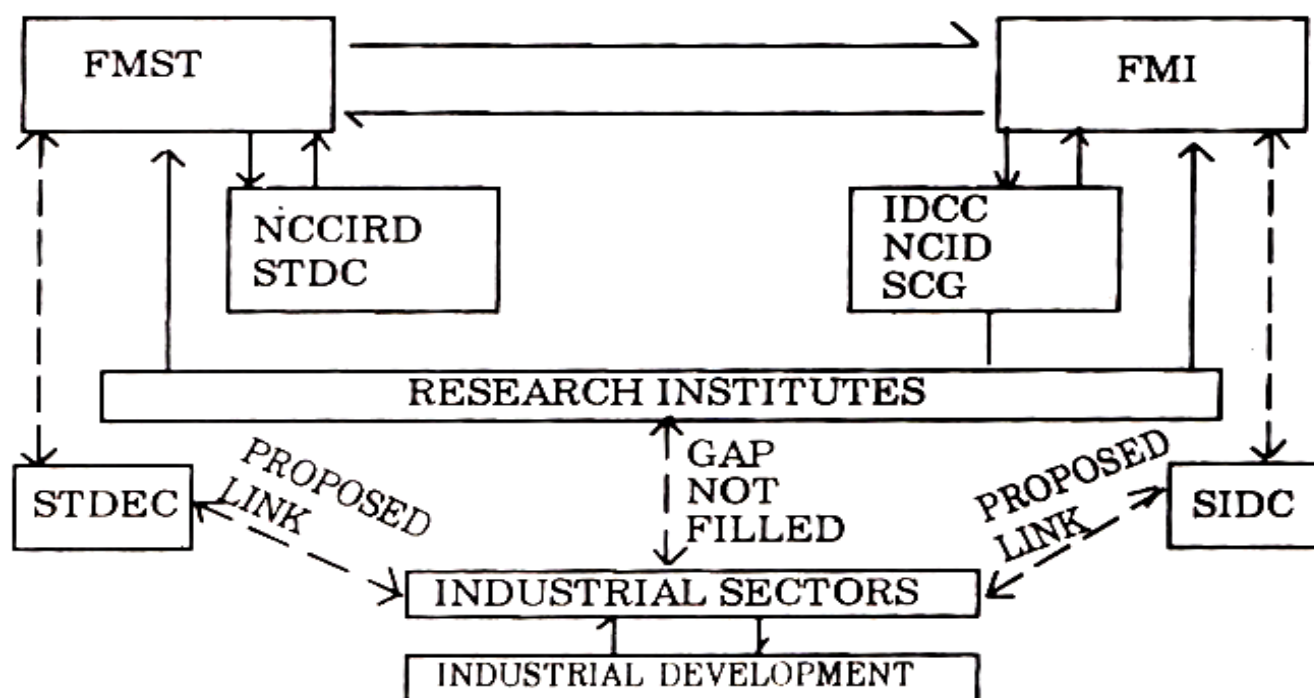
Source: Nigeria (1988): Industrial Policy of Nigeria, Policy Incentives, Guidelines and Institutional Framework Lagos: FMI p.

Fig. 2   284

A NORMATIVE MODEL OF STI FLOW FOR INDUSTRIAL DEVELOPMENT

S	M	C	R	E
RESEARCH INSTITUTES	**STI**	**INFORMATION SYSTEM 1 (PROCESSORS)**	**TEN INDUSTRIAL SECTORS**	**OPTIMUM USE OF STI**

INFORMATION SYSTEM 1 (PROCESSORS)

1. OPTIMUM AVAILABILITY
2. OPTIMUM ACCESSIBILITY
3. EFFECTIVE PROSESSING
4. EFFECT DISSEMINATION
5. EFFECT STI (RELEVANCE)

1   2   4   5(a)

3 (a)

INFORMATION SYSTEM II (FEEDBACK SERVICES)

1. CHARACTERISTICS OF INNOVATION i.e
(a) DEFFECT OF INNOVATION RESEARCH
(b) RELATIVE ADVANGE
(c) COMPATIBILITY
(D) COMPLEXITY
(e) TRIALABILITY
(f) OBSERVABILITY

3(b)

DEVELOPMENT OF NEW PRODUCT

5(b)

ATTEMPT TRIAL PRODUCTION

5(c)

PREPARE FOR REGULAR PRODUCTION

5(e)

SELL PRODUCTS IN LOCAL MARKETS

5(d)

IMPROVE TECHNOLOGY

5(f)

INDUSTRIAL DEVELOPMENT

6

Source: Etim, F. E. (1992) The use of Scientific and Technical Information (STI) for industrial development in Nigeria. Unpublished Ph D thesis. University of Ibadan.

Module 1 is the STI source - the twenty-six research institutes under the Federal Ministry of Science and Technology and in collaboration with the Federal Ministry of Industries. Module 2 is the message - Scientific and Technical Information (STI). Module 3 is the channel, the information system is divided into 3(a), the information processing system and 3(b), the feedback services system. Module 3(a) deals with the characteristics of the STI sources, i.e. availability, accessibility, relevance (i.e) effective processing, dissemination (i.e effective selective dissemination of information (SDI), preferred packages and structures. Module 3(b) deals with the characteristics of the products of the utilized STI, system which interprets the information user to the information producers. Module 3(a) and 3(b) are thus, in combination, an industrial information system.

Module 4 is the receiver, i.e. industrialists and production managers in the ten inustriual sectors. It deals with the demoraphic variables of the STI users and their perception of STI received from the processing information system, 3(a). Interaction between module 3(a) and module 4 makes information dissemination by profiles, i.e SDI, meaningful and effective. Module 5 is a chain of reaction of effects from optimus utilization of STI module 6, that is industrial development.

The proposed model is supported by the information theory which recommends the use of various communication systems as best methods for separating the wanted information (signal) from extraneous information (noise). The model also takes care of the personality variables of users which the information theory suggests may affect the managers' perception and utilization.

The Knowledge Specific Theory stresses the concept of relevance and the fact that the information producers and users often live in different worlds which need to be bridged through interpersonal relations. This explains the necessity for the feedback system module 3 (b)

The necessity of module 5(a - f) is supported by the information diffusion theory which argues that research alone is not enough to solve most problems, the results must be disseminated, diffused and utilized before the advantage of the research can be realised. Modules 5(a - f) also give the opportunity to the STI users to test compatibility, complexibility. trialability and observability of the innovation resulting from the application of STI. Module 6 is the consequence of the desired effect over time, i.e. industrial development.

CONCLUSION

The need for research and the provision of valid, non-contradictory and accessible STI to help in industrial development has been highlighted. Present government efforts at coordination and bibliographic contrtol of STI for industial development are grossly inadequate. Consequently, a model of STI flow for optimum industrial development has been proposed. The proposed model is a specialised industrial information system geared at reaching all the industrial sectors of Nigeria's manufactur-

ng industry. Efforts of any researcher or information resource manager cannot be appreciated unless the literature is made accessible to a wide variety of user groups. The establishment of such as industrial information system will therefore enable specialists undertaking research on particular patents to have valuable access to the materials stored in the system. Important discoveries and innovations arising from the research work would be deposited at the system's data base. The importance of the feedback services system cannot be over emphasised. The uniqueness of the industrial information system is that it gives the industries a chance to test their products within the industrial information system.

There is no doubt that Nigeria will continue to import most of its manufactured good, if it cannot pull together its endogenous information resources for sustable industrial development.

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