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Distr.
RESTRICTED

UNIDO/IS/R.31
28 February 1986

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

# COUNTRY REPORT ON THE INDUSTRIAL AND TECHNOLOGICAL INFORMATION SYSTEMS IN TANZANIA*

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and
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* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

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# PREFACE

The supply of information at the country level in particular for the priority sectors identified by the Lagos Plan of Action is crucial for the success of the Industrial Development Decade for Africa. The position in this regard at present needs considerable improvement. Several African countries do not have an industrial information system themselves and in many cases where they have such facilities they are mostly in the nature of documentation services. They also suffer from lack of adequate resources to obtain on a systematic basis information from external sources.

According to the UN General Assembly Resolution 3507 the Industrial and Technological Information Bank (INTIB) was established in 1980 to facilitate and accelerate industrial and technological information flow to developing countries for the selection of alternative technologies and equipment and to reduce the preparation time of feasibility studies.

At present INTIB helps to the creation of national industrial and technological information systems and network in Tanzania, which has been selected as a part of the IDDA programme and was provided with technical assistance to strengthen its national information system.

By establishing links with INTIB selected personnel in the information systems and services could also be made familiar with the methods of collecting processes and disseminating problem-oriented information to industry. This process will also result in other advantages. The flow of information among the strengthened national information systems and services can be promoted and links also established with possible regional mechanisms, such as the African Regional Centre for Technology (ARCT).

The persons contacted (see Annex III) included officials responsible for development in the field of industrial and technological information existing and potential users of information, as well as specialists like engineers, documentalists and programmers, etc.

The mission is grateful to the UNDP officers in Dar-es-Salaam for their kind co-operation and assistance which facilitated the success of the mission. The mission is also thankful to Mr. E. Skjonsberg, UNIDO representative in Dar-es-Salaam and to Mrs. W.N.A. Nyonyi from Tanzania Industrial Research and Development Organization (TIRDO), whose briefing, reference materials and organizational efforts proved to be of great assistance to the mission.

ABSTRACT

The report is the result of a mission to information systems and services in Tanzanian organizations from 4 to 9 November 1985.

The mission was intended to assess the existing and potential information systems and services, to assess national focal points of INTIB, to assess existing and potential users of industrial and technological information based on their specific needs and priorities and also to assess the nature of information services required by the INTIB in detail and communication with INTIB headquarters.

The identification of national focal point of INTIB in Tanzania was the most important task of the mission.

The following national focal point of INTIB is proposed by mission in Tanzania - Tanzania Industrial Research and Development Organization (TIRDO).

The first part of the report presents conclusions and recommendations of the mission and the second part presents recommendations dealing with INTIB follow-up activities.

The report is supplemented by the questionnaire prepared by UNIDO Secretariat with summary information of the various information systems and services visited (see Annex II).

# I. CONCLUSIONS AND RECOMMENDATIONS

1. The recommendations with regard to the national information systems stem immediately from their basic tasks and functions. Generally, the main tasks of the national information systems consist in providing necessary industrial and technological information for specialists occupied in the spheres of management, R and D, production and operation, services and trade, i.e. practically in all branches of economy. On the basis of this main task before the national information systems, the latter's functions can amount to the following main orientations:

- preparing and assigning primary industrial information;
- stock-taking and registration of industrial and technological information via formal and non-formal channels;
- selection, systematization, storage and retrieval of primary documents (creation of information retrieval system);
- primary documents processing;
- communication of industrial and technological information to users;
- organization and functioning of the information systems;
- management of these information systems.

2. The function of preparing and assigning primary industrial information should ensure inputting the entire information into the system and selecting the most effective and economical channels for information transmission.

3. The industrial information stock-taking and registration should meet the recommendations, which provide for a strict distribution of recording registration functions between information bodies which are part of the respective systems and also carrying out the measures guaranteeing the complete accession of the recorded industrial information sources. The function of stock-taking and registration

should provide for monitoring and a maximally complete recording and co-ordination of the registration of the industrial and technological information created both within the framework of the national information systems and beyond it and transmitted via both formal and non-formal channels.

4. Selection, systematization, storage and retrieval of primary documents should meet the recommendations ensuring the creation of information retrieval systems and reference retrieval facilities for them. This function should provide for the possibility of their accurate, complete, rapid, convenient and economical retrieval for a further utilization of the respective information by users.

5. The primary documents processing should be in accord with the recommendations providing for non-recurring, analytico-synthetical processing of industrial information in terms of the latter's content. This function should provide for bibliographic processing, annotating, abstracting, indexing and extraction of factual evidence from documents with the view to the organization of data banks in various subject areas and also industrial information synthesizing.

6. In communicating the industrial and technological information to users, provision should be made for a multiple and multi-goal utilization of the results of the non-recurring information processing. This function should provide for communication, retrieval and communication in any mode of the system's work, and namely in the 'enquiry-answer' mode, in the mode of selective dissemination of information and in the information publications mode. And in case of each mode one should observe the requirement of communicating information in the form of primary documents, (abstracts, annotations, bibliographic descriptions), evidence extracted from primary documents, and also in the form of synthesized industrial and technological information (analytical and comparative reviews, references, etc.)

7. The organizational pattern and functioning of the industrial information system should ensure the improvement of the organizational principles and methodological basis of information work with a view to creating a clear-cut and impressive information system. This function should be implemented on the basis of the existing theoretical economic and juridical fundamentals, and also methodological, organizational and procedural principles involved in the functioning of the system.

8. The management of the national industrial information systems should ensure the co-ordination of information work in various areas of activity, planning of R and D on the industrial data problems, raising the qualifications, and training of workers for information bodies.

9. Main problems faced by the organization in Tanzania on information field are following:

- creation of telecommunication links between information bodies;
- acquisition of up-to-date information material;
- lack of trained manpower;
- lack of computer equipment;
- formulation of situation specific information answers;
- small collection of different databases;
- response time from some countries is very long;
- collection of information from the metal industries;
- lack of information policy in the country.

10. A preliminary study of the existing information systems and services in the organizations and institutions shows that the structure of the INTIB national network in the considered enterprises could be follows (a network pattern is given in Fig. I).

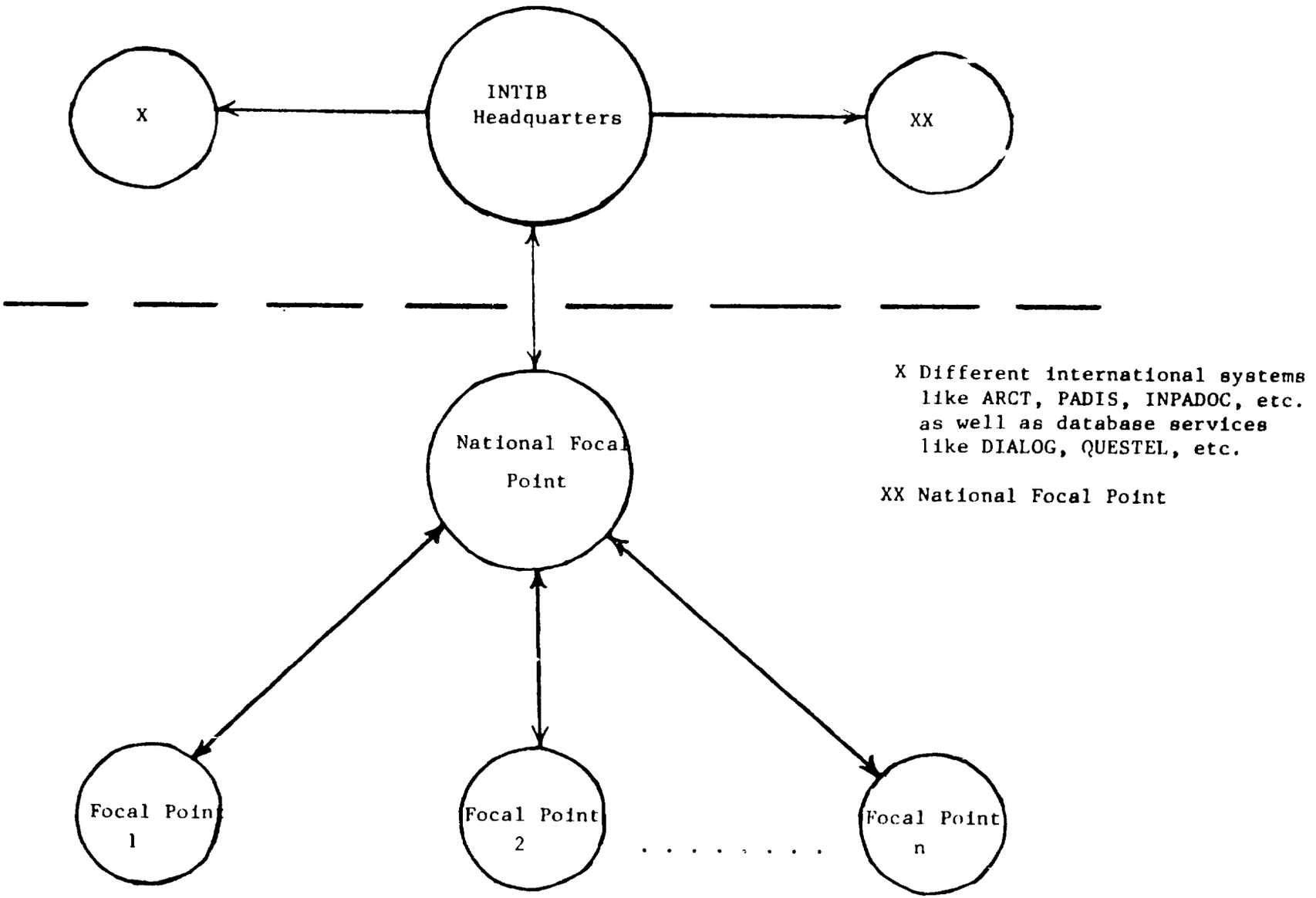


Figure 1: INTIB National Network Structure

National Focal Point:

- Tanzania Industrial Research and Development Organization (TIRDO)

Focal Points:

- Tanzania Industrial Studies and Consulting Organizations (TISCO);
- Ministry of Industries and Trade;
- Institute for Production Innovations;
- National Institute for Productivity;
- Metal Engineering Industries Development Association;
- Tanganyika Development Finance Company Ltd.;
- Small Industries Development Organization (SIDO);
- Tanzania National Scientific Research Council (TANRIS).

11. Examination of the existing information systems shows that they often have bilateral and international co-operation. Among the participants of the co-operation one can find:

- Tanzania Industrial Studies and Consulting Organization;
- Small Industries Development Organization;
- University of Dar-es-Salaam Libraries;
- Tanzania Industrial Research and Development Organization;
- Bureau of Statistics;
- National Scientific Research Council.

12. The national industrial information systems should ensure information transmission both via formal and non-formal channels. The formal channels include the organizationally formalized and constantly operating communication channels and the main kinds of documents, such as books, articles, patent descriptions, reporting and standard-type technical documentation and also documentation about industrial goods. The non-formal channels of communication include those in which the main role is played by scientists, specialists and engineers themselves, and which do not possess organizationally formalized and constantly operating interaction mechanisms: oral interventions at conferences, meetings, symposia, talks, correspondence, exchange of preprints and impressions, and also documents, such as protocols of tests, acts about reception of equipment, etc.

13. One of the recommendations with regard to the national information systems consists in putting the flows of information transmitted via formal and non-formal channels into a better order. For this purpose it is necessary to unify and standardize the forms in which information is presented with a view to its subsequent recording by machine-systems; to develop a normalized series of information carriers (including machine-carriers on punched tapes, magnetic tapes and discs, microfilms and microfiches); and also to develop a normalized series of industrial and technological information transmission methods, including the standardization of interfaces between computers and communication channels. This should make it possible to achieve a necessaryspeed, completeness and effectiveness of transmission of the entire industrial and technological information and also to achieve the inter-systems exchange of information at the computer level.

14. One of the major recommendations with regard to the national industrial information systems consists in ensuring the compatability between all the links which are part thereof. Compatability is achieved by the commoness of their organizational structures, the

uniformity of information retrieval language, the interface of technical facilities, the uniformity of mathematical support, the single procedure for industrial and technological information collection and processing and the unification of documentation and information coding.

15. The complex of technical facilities as used in the national information systems should ensure the processing of information flows on standard carries and solve the following basic tasks:

- automated input of information into computers;
- information processing with the aid of computers and calculating and punched-card equipment;
- information storage and automated retrieval;
- automated output of information from computers;
- transmission of computer information to the system's subscribers;
- information copying and duplication.

16. Taking into consideration the above-mentioned INTIB's mission could recommend using hardware of kind "IBM PC" and software of kind CDS/ISIS. In that case UNIDO in further will provide for supporting in installation of hardware suggested and dissemination CDC/ISIS among INTIB focal points of developing countries.

17. The national industrial information system in Tanzania should be based on the principle of the national combination of the centralized and decentralized approaches to the processes of collection, storage, generalization, processing, retrieval, issuing and dissemination of the industrial and technological information. The impact of the negative features of each approach can be minimized only if the advantages of both approaches are utilized in the system to a maximal extent.

18. The centralization in constructing the national industrial information systems makes it possible to pursue a single general state policy with regard to the main questions when the tasks of the developing and improving information systems are being solved; and it ensures the necessary co-ordination between the individual links of the systems and their organizational, technological (methodological), mathematical (programmatic) and technical compatability.

19. The decentralization in disseminating makes it possible to organize information provision for any categories of users in accordance with their demands and needs and to implement the principle of the direct communication between any user and any information body which is part of the national industrial and technological information system.

20. As far as a national information policy is concerned we can be said that the national authorities need to consider the establishment of national industrial and technological information system based on a network of information centres as a keystone of economic development. Since the establishment of the national information system is a long-term, complex and expensive enterprise, therefore it has to be designed and implemented under the auspices of the Government.

## II. INTRODUCTION

21. The supply of information at the country level in particular for the priority sectors identified by the Lagos Plan of Action is crucial for the success of the Industrial Development Decade for Africa.

22. The position in this regard at present needs considerable improvement. Several African countries do not have an industrial information system themselves and in many cases where they have such facilities they are mostly in the nature of documentation services.

They also suffer from lack of adequate resources to obtain on a systematic basis information from external sources. INTIB provides an international infrastructure on which they could draw upon to strengthen themselves by establishing links with INTIB selected personnel in the information systems and services could also be made familiar with the methods of collecting processes and disseminating problem-oriented information to industry. This process will also result in other advantages. The flow of information among the strengthened national systems and services can be promoted and links also established with possible regional mechanisms such as ARCT.The preparation of industrial profiles and information packages by INTIB could also be oriented towards the needs identified in Africa. UNIDO has in the past given technical assistance to national information systems or services in several countries, such as Algeria, Angola, Ivory Coast, Sudan, Kenya, Libya, Mauritania, Mozambique, Nigeria, Senegal, Togo, Tunisia, Rwanda, Burkina Faso and Zaire.

23. Since the projects in these countries have been completed there is a base that exists but nevertheless needs continuing support not so much by the provision of expert services on a medium or long-term basis but through advisory services and the establishment of adequate links with those selected primarily from the foregoing list to implement activities envisaged under this project.

## III. OBJECTIVES OF THE MISSION

24. The main objective of the expert mission under the contract RP/RAF/85/621/11-59 was to assist selected countries of Africa in the establishment of INTIB national focal points as well as in strengthening national information systems and services and carry out in these countries the following duties:

(a) assess the existing and potential information systems, services and network;

(b) assess national focal points of INTIB on their specilized field of industrial and technological information activities.

(c) assess existing and potential users of industrial and technological information based on their specific needs and priorities;

(d) assess the nature of information services required by the INTIB in detail as well as modalities of linkage and communication with INTIB headquarters; and

(e) ad-hoc advise on redesigning or expansion of the existing industrial and technological information service system including selection of software and hardware as well as assessment of manpower requirements and training needs for the informatic : systems.

## IV. OUTPUTS OF THE MISSION

25. The end-users of the industrial and technological information in tanzania in question can be classified as follows: engineers, economists, managers, project engineers, researchers, whereas institutional users are: development banks, university researchers, information services organizations, R and D centres, etc.

26. The main sources of information requested are: information of alternative technologies, project materials, marketing data, factographical data, characteristics of new materials and modern equipment, technical reports, market development trends, etc. The basic industrial and technological information expressed by users are concerned with: design of new products, manufacturing the products, development of manufacturing equipment, establishment of flow-sheets, selling and servicing the products, collection and processing of technological information of innovations and improvements, standard specification, and expert requirements.

27. Many of the industrial and technical users are vitally interested in receiving primary technical documentation, the creation of selective informationn dissemination, current awareness service and also in the establishment of local data bases in their fields of activities.

28. Estimates of information staff, technical and financial resources are as follows:

Information staff:

Professional: 20

Supporting personnel: 13

Hardware:

Texas Instrument (On-line terminal), Apple III, WANG 2200, Apple II E X 2

Software:

BASIC, COBOL, ALGOL

Yearly budget: (in US dollars)

Approximately 55,000 in all organizations visited

29. The following INTIB contributions are expected:

- acquisition of computer compatable with Apple II E;
- help in strengthening information systems;
- support of TIRDO;
- training and expertise in computer science;
- financial support of information projects;
- experts in information retrieval systems;
- computer equipment.

## V. ACTIVITIES OF THE MISSION

30. An inventory of industrial and technological information systems in Tanzania includes the information systems in the following organizations:

- Tanzania Industrial Research and Development Organization;
- National Institute for Productivity;

- Tanganyika Development Finance Company Ltd.;
- Metal Engineering Industries Development Association;
- Tanzania National Scientific Research Council;
- Tanzania Industrial Studies and Consulting Organization.

31. Shortage of co-ordination and bilateral links between the information systems presented above are recognized by officials who are responsible for industrial and technological information system. Therefore the creation of communication links between information systems is a very important task to be done.

32. Absence of national industrial and technological information policy is considered by information specialists as the main constraint which makes the information system establishment impossible.

33. While the INTIB national industrial and technological information network is being built attention should be given to the problems of creation of telecommunication links in the country, as at present, these links are very poor. The INTIB national network is proposed as a result of the mission.

34. Bilateral links between the countries' information systems and their co-ordination leave much to be desired. The importance of strengthening bilateral links and co-ordination in this area is widely recognized by the professional staff dealing with the industrial and technological information systems.

35. There is a poor statistical structure in the country. The organizations are therefore faced with collecting data for its various operations. Traditional statistics such as gross output, value added, employment, wages and salaries, production indices, etc. as well as compilation of published statistical information, such as input-output tables, industry census, annual survey of industries, etc. are often requested by industrial and technological information end-users of having information systems.

36. During the discussions according to selection of hardware and software for information systems, ad-hoc advises were given by the mission. It was recommended for the INTIB focal points to install hardware compatable with IBM PC and software of kind CDC/ISIS.

## VI. ACTION PROGRAMME (FOLLOW-UP)

37. The creation of INTIB national focal points network is co-operated with a problem of computerization of the INTIB focal points. Computerization could be started on time when not of all focal points have their computers or utilize ones. It should be rather understood as a development strategy in which each member state focal points could take part increasing its involvement according to its needs and available funds.

38. The development strategy should be a general frame of co-operation aimed at final computerization of national focal points. Taking into consideration the cost effectiveness trend of computerized information systems the computerization of INTIB focal points in African countries seems inevitable. Nevertheless in the initial stage of the development strategy the basis for information exchange and search must be established.

39. The target of the initial stage of the development strategy should solve three problems:

- What kind of classification system of industrial information must be in accordance with INTIB activities?
- What minimum set of data must be in accordance with INTIB activities?
- What will be computer format of the data according to the computer in INTIB unit in UNIDO Secretariat?

40. It is necessary to solve these three strategic problems at the international level. It should be prepared as the result of official expert group recommendations (concerning the first and second problems). The second expert group recommendations (computerspecialist group) should propose the solution for the third problem, taking into consideration ISO standards in the field of exchange data by magnetic tapes, discs and on-line access.

41. Stage one could start with one operating central computer in INTIB headquarters answering the national focal points requests and disseminating information according to the established profiles. In this case INTIB has to assist African countries in the information service manpower building.

42. Stage two begins when besides the INTIB computer there are other computers in national focal points but without on-line links between them. It is necessary to note that all other national focal point without computers, implement activities as in stage one.

43. In stage three all national focal points have computers connected on-line to the INTIB computers. As a result for the national focal point in stage three no mailing is needed and files of INTIB and focal point computer could be reached and exchanged. It should be noted that other national focal point could work at the same time in stage two or one.

44. It is necessary to note that computerization of national focal points is last step in the process of ordering the flow of information because before purchasing of a computer system, a detailed study should be undertaken to determine its configuration and software requirements.

ANNEX I

Documents Used During the Mission

I. General Documents

1. A Programme for the Industrial Development Decade for Africa, Prepared Jointly by the Economic Commission for Africa, the Organization of African Unity and the United Nations Industrial Development Organization, New York, 1982.

2. Lagos Plan of Action for the Economic Development of Africa 1980-2000, International Institute for Labour Studies, Geneva, 1981.

3. Role of INTIB (ID/WG.450/13), 20 September 1985, UNIDO Secretariat. Round Table Discussion of an Advisory Group of INTIB Users, Vienna, Austria, 23-27 September 1985.

4. Sung Jin Choi, Guidelines for the Formulation of National Industrial and Technological Information Policy, INTIB Secretariat.

5. Ching Chich Chen, Microcomputer Use in Libraries in the U.S.: Current and Future Trends, UNESCO - Upils Asian Regional Seminar/Workshop on the Application of Microcomputers to Library and in Information Management, Dillman, Quezon City, 29 October - 2 November 1984.

6. Bankowski J., Wysocki A., Guidelines for the Establishment or Redesign of Industrial and Technological Information Service System, including Selection of Software and Hardware, Warsaw, September 1985, INTIB Secretariat.

7. Industrial and Technological Information Bank - Questionnaire, IDDA Project RP/RAF/85/621.

II. Tanzania

1. Metal Engineering Industries Development Association, Dar-es-Salaam (MFEIDA), Habari, July 1985.

2. Tanzania Industrial Research and Development Organization (TIRDO), Dar-es-Salaam, Newsletter, September 1985.

3. The Institute of Production Innovation (IPI) a link between the Faculty of Engineering and Tanzanian Industry (FOE).

4. Institute of Production Innovation, University of Dar-es-Salaam.

5. Directory of Technical Information Resources in Tanzania, 2nd Edition, December 1983.

6. Sadcc Industrial Development Activity, Annual Conference Mbabane, Swaziland, 31 January to 1 February 1985.

ANNEX II

Industrial and Technological Information Bank
IDDA Project (RP/RAF/85/621)

Questionnaire

Objective: Assess existing/potential information service institutions/organizations and their activities

Name of Institute/Organization: Country:

Address of Institution/Organization: Telex/Cable:

Telephone/Telefax:

Nature of Institution/Organization: Public/Private/Semi-private

Name of Director/Interviewee:

Year of Establishment:

Objectives/Functions of Institution/Organization:

Number of Information staff:

Professional:

Supporting personnel:

Information Service Activities:

List of Publications: Quarterly/Yearly Publications:

Industrial Inquiry Service (Sectors/Inquirers/Source of Answers/ Number of Inquiries/Character):

Extension Services:

Selective Information Dissemination/Current Awareness Service:

Ad-hoc Advisory Services:

Source of Fund: Government/Private Budget for Information Activities:

List of Hardware/Software:

Main Problems Faced by the Organization on Information Field:

Contents of Advice Given by UNIDO Experts:

Comments to be as INTIB Nodes by Institution/Organization:

Linkage with Other Information Institutions/Organizations:

List of Demand/Needs of Information Users:

Linkage with INTIB:

Industrial Inquiry Service

Possible Areas:

Ways and Means:

Trainings/Seminars/Workshops Conducted by the Institution/Organization

Expectation from INTIB:

Ad-hoc Service Request and Project Documents:

Industrial Information Policy:

Non-Focal Points for Co-ordination Request:

Recommendations to Government:

ANNEX III

List of Specialists Consulted

| | |
|---|---|
| Mr. J. Harbison | Chief Technical Advisor<br>Tanzania Industrial Research and Development Organization |
| Mr. A.J. Chillumanga | Director<br>Planning and Research Section<br>Ministry of Industries and Trade |
| Mr. E.Th. Protzen | Technical Manager<br>Institute of Production Innovation |
| Mr. K.Y. Dachi | Managing Director<br>National Institute for Productivity |
| Mr. A.U. Kibona | Studies and Research Manager<br>Tanzania Investment Bank |
| Mr. Ake Schilstrom | Chief Consultant<br>Metal Engineering Industries Development Association |
| Mr. D.G. Mbaya | Director<br>Project Appraisal, Tanganyika Development Finance Company Ltd. |
| Mr. L. Magai | Training Officer<br>Small Industries Development Organization |
| Mr. H.M. Nguli | Senior Scientific Officer<br>Tanzania National Scientific Research Council |
| Mrs. W.N. Nyonyi | Head<br>Information Department, TIRDO |
| Ms. M. Mingi | Documentation Officer, TIRDO |
| Mr. C. Mandara | Head<br>Information Centre, TISCO |

ANNEX IV

Abbreviations and Addresses

| | |
|---|---|
| TIRDO | Tanzania Industrial Research and Development Organization<br>P.O. Box 23235, Dar-es-Salaam |
| TISCO | Tanzania Industrial Studies and Consulting Organization<br>P.O. Box 2650, Dar-es-Salaam |
| UTAFITI | Tanzania National Scientific Research Council<br>P.O. Box 4302, Dar-es-Salaam |
| MEIDA | Metal Engineering Industries Development Association<br>P.O. Box 5891, Dar-es-Salaam |
| IPI | Institute of Production Innovation<br>University of Dar-es-Salaam,<br>P.O. Box 35075 |
| SIDO | Small Industries Development Organization, P.O. Box 2476, Dar-es-Salaam |
| NIP | National Institute for Productivity<br>Ohio Shee, P.O. Box 2021 |
| TIB | Tanzania Investment Bank<br>Samora Avenue<br>P.O. Box 9373, Dar-es-Salaam |
| TDFL | Tanganyika Development Finance Company Ltd.<br>TDFL Building, Ohio/Uponga Road<br>P.O. Box 2478 |

ANNEX V

## Schedule for UNIDO INTIB Field Mission Visit to Tanzania 4 to 10 November 1985

| | |
|---|---|
| 4 November 1985 | Arrival by KA480 |
| 5 November 1985 | |
| 8.30 a.m. | Mr. Ouattara, Resident Representative, UNDP |
| 9.30 a.m. | Mr. E.L. Kamuzora, Director-General, TISCO |
| 11.30 a.m. | Mr. J. Harbison, Chief Technical Adviser, TIRDO |
| 14.00 p.m. | Mr. W.E. Kasenga, Executive Director, Dar-es-Salaam Chamber of Commerce |
| 6 November 1985 | |
| 9.00 a.m. | Mr. A.J. Chillumanga, Director, Planning and Research, Ministry of Industries and Trade |
| 14.30 p.m. | Mr. E. Th. Protzen, Technical Manager, IPI |
| 7 November 1985 | |
| 9.00 a.m. | Mr. K.Y.A. Dachi, Acting. Managing Director, National Institute for Productivity |
| 11.30 a.m. | Mr. A.U. Kibona, Studies and Research Manager, Tanzania Investment Bank |
| 14.30 p.m. | Mr. Ake Schilstrom, Chief Consultant, MEIDA |

8November 1985

| | |
|---|---|
| 8.30 a.m. | Mr. D.G. Mbaya, Director, Projects Appraisal, TDPL |
| 11.00 a.m. | Mr. L. Magai, Ag. Director, Training and Ext. Services, SIDO |

9 November 1985

| | |
|---|---|
| 10.30 a.m. | Mr. Mieleka, Deputy Head, Science and Technology Department, Ministry of Planning and Economic Affairs |