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IN-DEPTH EVALUATION OF SELECTED UNIDO ACTIVITIES ON
DEVELOPMENT AND TRANSFER OF TECHNOLOGY

Component 5

Information Services in Support of Development and Transfer of Technology

Prepared by*

United Nations Industrial Development Organization

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Abstract

Making use of advances in information and communication technology, UNIDO has made more and more information products developed by HQs accessible on-line via Internet. From the information available on-line, the demand for and use of business information are higher than the use of technical information.

Technical cooperation in developing/strengthening information services for SMEs in the countries and regions have followed different approaches. All types of capacity-building projects in information services support the following conclusions:

- S** While information is as an important ingredient of doing business, demand by SMEs for information services alone is low and needs to be enhanced by awareness raising, direct contacts or packaging with other services. Particularly low is the demand for technical information (demand for business information being higher). Thus, as a result, the technical information, which has the potential to support transfer and development of technology, represents a smaller segment in information services supported by UNIDO. Ultimately, however, also the business information, if transformed into business deals, can lead to technology transfer.

- S** Information systems alone, without matching facilities and abilities to transform data and information into locally available knowledge, are not sufficient and can not be sustainable. Information services for SMEs need to be complemented by other services (advisory services, training, etc.).

Networking is one of the modalities how to complement services to SMEs. However, networking among sources of information, information services and sources of expertise, while highly desirable, proved very difficult to implement and sustain. Support to establishing networks of organizations/sources of information needs to focus on elaboration of and mutual agreement among potential partners on terms under which sharing of information would be considered beneficial for each partner.

The principle of complementarity in providing services to SMEs requires similar complementarity of UNIDO services when strengthening local organizations in charge of those services to SMEs.

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Acronyms

| | | |
|--------|---|---|
| BI | - | Business information |
| ETAS | - | Environment Technology Assessment System |
| IRMS | - | Information Resources Management System |
| IRS | - | International Referral System |
| ITMIN | - | Industrial Technology and Market Information Network |
| NCPC | - | National Cleaner Production Centre |
| NFP | - | National Focal Point |
| STI | - | Science and Technology Information |
| UNFCCC | - | United Nations Framework Convention on Climate Change |

1. BACKGROUND INFORMATION

1.1 Concept of information

1. Information science recognizes *science and technology information* (STI) and *business information* (BI). Sometimes *media information* is also considered as a separate category. Neither STI nor BI is clearly defined. As a rule, the former is understood to include a wide range of scientific, technical, technological, and innovation subjects, whereas the latter encompasses economic, company, business transaction, and financial information. STI itself can be broken down into science information which results from basic research and is usually freely available, and technology information which results from applied research and development works and is often protected by property rights or kept confidential.

2. Out of the three categories (STI, BI, media), STI is the least money generating¹. In the information market, the sales and the related volume of use increases from STI to Business to Media Information. In business terms, most of STI will always be in the red. Hence it is difficult to collect, process, and disseminate STI unless this is a subsidized operation.

3. The role of information in development and transfer of technology stems from the fact that technology can be defined as technical information relevant to production. Thus, information can be viewed as the very substance of technology. Apparently, this is a very broad concept of technical information which includes know-how of processes, human skills, physical assets, organizational and industrial settings needed for industrial production.²

4. In this broad concept the “technical information relevant to production” would include both STI and business information but STI would prevail. Therefore the characteristic features of STI as described above (lower share in the total information market, need for subsidy in dissemination) would also apply to technical information.

5. Within STI the technology information would be dominant since science information is rarely directly applied to production. It is normally used as an input by applied research and development activities.

6. Information services usually conceive technical information as information on production (raw materials, manufacturing process, machinery, equipment, engineering, products, costs, standards, maintenance, etc.) and related information (owners of know-how, manufacturers of equipment, experts, other sources of information such as publications, databases, seminars, trade fairs, etc.)³. The very core of the technical information is the know-how of technology processes the sources of which are usually in R&D institutes, large companies, university departments, small progressive SMEs, individual inventors, etc. Information on such know-how can be obtained either directly from the source or from patent offices, or from intermediaries, such as information centres, consultants, trade dealers, or from publications, databases on the Internet, etc.

¹ Stefec, R.: Technology-related Industrial Information Activities of UNIDO, March 1995

² see Conceptual Framework, Annex 1 to the first report of this evaluation

³ World Directory of Industrial and Technological Information Sources, UNIDO 1995

7. The current trends have been marked by an ever growing volume of new information and revolutionary advances in information technology. Both of these trends resulted in increasing resort to networking as a means of using the mass of available information instead of building up extensive new systems to manage information resources. Networking has become a salient feature of both the national and global information infrastructures.

8. Technical information is an important resource for doing business in industry. However, due to different densities of sources of technical information and different application levels of information technology there are significant differences in access to technical information among categories of companies and categories of countries. The higher the density of sources of information and the broader the application of information technology in a country, the easier it is for end users to access technical information. It is a general understanding that availability of (access to) technical information is constrained particularly for the SMEs in the developing countries.

1.2 UNIDO Information Services

9. UNIDO, in order to address the above mentioned market failure in access to technical information:

a) produces its own information products and tools at the Headquarters and provides information services directly to end-users,

b) designs and implements technical cooperation programmes to strengthen or develop capacities in the developing countries to provide information services to end users, particularly SMEs.

10. The two categories of UNIDO activities are related; some information products and tools developed at the HQs are applied in the field when implementing technical cooperation programmes. On the other hand, some institutions developed or strengthened by UNIDO in the field may become a part of a network or source of information marketed by UNIDO HQs.

11. Emphasis given to the two components has been changing in the course of time. With the advancement of information technology UNIDO has been focusing more and more on building or strengthening capabilities to provide information services in the developing countries themselves. The in-house services and tools have been shifting from direct inquiry services to referral services and to making information available on-line on the websites.

12. The following overview of UNIDO activities confines itself to technical information services as defined above; it, therefore, does not include industrial statistics.

1.2.1 UNIDO HQs products and services

1.2.1.1 UNIDO information products

13. This category comprises information products resulting from UNIDO activities (both research and technical cooperation activities) as well as products which package and complement UNIDO experience with other sources of information and/or expertise. The most prominent products are marketed on UNIDO websites⁴:

S Industrial Development Abstracts (IDA)

Since 1967 the Industrial Development Abstracts have accumulated approximately 22,000 records. Records from 1981 onwards are accessible on the Internet. This set contains over 11,000 fully indexed abstracts of UNIDO documentation and includes descriptions of major studies and reports, reports resulting from UNIDO's technical cooperation activities, reports and proceedings of expert working groups, workshops and seminars, and publications in series. New entries are added each month but in recent years the number of new entries dropped, due *i.a.* to fewer technical cooperation projects. (The number of new entries dropped from 750 in 1990 to 460 in 1995 down to less than 100 in 1998). In spite of that IDA continues to represent a vast mass of information on industry in the developing countries generated by UNIDO. A great deal of the reports describe technical cooperation activities of UNIDO in the field of transfer and development of technology.

S Sales Publications (approximately 40 sales publications)

A great number of these publications deal with sectoral, thematic or methodological issues directly related to development and transfer of technology. However, no new sales publications have been added to the list for more than two years.

S Reports and documents (approximately 80)

Most of these non-sale publications deal with generic issues of industrial development cooperation but some documents on industrial sectors or investment are prominent examples of technical information. (How to Start Manufacturing Industries; Processing Technologies and Good Manufacturing Practices in some sub-sectors, etc.) Up to 10 new reports and documents are added to the list annually.

S Databases (3) and software tools (7)

Only just a few of these tools are technology related, most of the databases contain statistical data. The software tools support general or financial management decision making.

S Videos (27)

A great number of the videos raise awareness of technological advances or modern concepts applied in UNIDO technical cooperation activities (such as cleaner production, combining economic, environmental and social objectives, build-operate-transfer, etc.).

⁴ www.unido.org/doc/online

S Investment opportunities and business events

These websites present information on investment and technology transfer opportunities identified by UNIDO in the course of its investment and technology promotion (implemented usually in the form of investment promotion meetings). The opportunities are backed by preparatory and verification field work, the quality of which is supervised by UNIDO. Thus, these websites represent a valuable source of information on prospective partnerships, the use of which may result in business deals with transfer of technology.

S Energy and Environment Subsite

This site and the attached pages cover techno-economic aspects of industrial activities resulting from the work of UNIDO with industry in both developed and especially developing countries concentrating on energy efficiency & climate-related issues; cleaner production, and general environmental management. This subsite contains among others “Industrial Sector and Technology Profiles”. The profiles are perhaps the most interesting for those looking for techno-economic information on industrial sectors, sub-sectors and related technologies, as this brings together a range of UNIDO-generated material. The subsite also contains the software tool IDENTIFY which is designed to assist in selecting energy efficient technology options.

S Networks (14 Investment and Technology Promotion Offices [ITPO] and Focal Points, 37 Industrial Information Centres, 43 SPX - some of them not updated, 7 International Technology Centres).

14. The principal functions of ITPO are to identify foreign partners for sponsors of investment projects in developing countries, and whenever required, to assist potential partners in the negotiations and finalization of agreements and the implementation of investment and technology transfer projects.

15. The National Information Centres listed in the on-line directory are known to UNIDO as focal points for information and investment resources. The services of some of these centres have been categorized and stored in a database, the International Referral System (IRS), administered by the Industrial Inquiry Service (see below).

16. Subcontracting and Partnership Exchanges (SPX) are technical information, promotion and match-making centers for industrial subcontracting and partnership between main contractors, suppliers and subcontractors aiming at optimal utilization of the manufacturing capacities of the affiliated industries. Sometimes sub-contracting involves transfer of technology (see report on Component 4).

17. International Technology Centres and their networks focus on industrial application and commercialization of new technologies and innovations. The original purpose of the centres was to increase awareness of new technology in the developing countries and to allow access to applied research and development and training in these new technologies for participants from developing countries. Within the new context the technology centres and their networks should, in addition, become an important bridge between the research community and the commercialization of technologies at the industrial scale (see annex 2 to the report on Component 2).

18. After a radical reorganization of the UNIDO homepage and websites, the above listed websites are easier to find and work with. Updating information on some websites requires more intense attention.

1.2.1.2 International Referral Service (IRS)

19. IRS is a transparent, conventional service whereby clients are referred to primary sources of

industrial information. The backbone of the service are 169 organizations in 43 countries for technology information and 75 organizations in 57 countries for investment information. It has taken a massive organizational and networking effort to bring all these sources together. The database is updated annually, with modest increase of total number of sources (less than 5% annually).

20. There have been some technical problems concerning the transfer of IRS on the Internet with direct access of the inquirer to the source of information. When an inquiry is received UNIDO still does the search of potential sources and transfers the inquiry to the selected sources (up to 20) for further processing. There is no system of continuous monitoring whether the inquiry was answered, a special effort must be undertaken for this purpose, if required.

1.2.2 *Building/strengthening information services in the field*

21. In response to advances in information and communication technology the approaches applied by UNIDO have changed considerably: from building up and strengthening focal points in the countries and regions as intermediaries between end-users (SMEs) and UNIDO HQs as source of information to building up or strengthening information services in the countries themselves, with access to and networking with other sources of information in the country and abroad. The different approaches are described below.

1.2.2.1 INTIB focal points

22. INTIB, originally the *Industrial and Technological Information Bank*, was the umbrella concept of all industrial information activities of UNIDO. (To indicate a change in focus, INTIB now is the UNIDO program on *Information and Networking for Technology, Investment and Business*.) Under the original concept more than 80 national focal points (NFPs) were established in the developing countries and countries in transition. Their original function was to liaise the end users in the host countries with information resources available at UNIDO. The focal points were provided with some information readily available at UNIDO. Some of them were supported by office equipment and training. Later the concept was broadened and the national focal points were encouraged to act as reference service using not only UNIDO information resources but also local information resources. However, only two of them signed a contract which committed them to act as Referral points in the International Referral System.

23. Many of the NFPs were dormant from the very beginning and with the spread of Internet and improved access to on-line information resources their functions had become more and more redundant and the system was abandoned. The only exception are NFPs in a few countries in Africa which are supported through the IRMS Plus projects (see below).

1.2.2.2 Information Resources Management System (IRMS Plus)

24. IRMS is an information management system supported by a software developed by UNIDO which is expected to be installed and operated by trained personnel at national focal points (NFPs) in selected countries in Africa. In the course of time IRMS was considerably amended in order to make use of Internet (IRMS Plus). For the same reason the original idea of supervising the operations of the system from UNIDO Headquarters has also been modified but current actual UNIDO control of the system is still considerable. For the future the strategy is for the countries to fill out the questionnaires themselves and eventually to fully own their respective websites (and bear responsibility). This will discount any future responsibility of UNIDO for the type, quality and quantity of data.

25. IRMS Plus collects data on:

- S organizations (identification and business data of companies, institutions, etc.);
- S databases (available at/operated by these organizations);
- S technologies licenced or owned by these organizations, with great number of entries on processes, inputs, outputs, etc.;
- S experts;
- S R&D results (process description, patent data, investment, operation costs, input requirements, etc.);
- S training programmes organized by the organizations in the database.

26. The database of organizations is the hub to which all other databases are linked. The whole system is rather complex and still marked by some design flaws⁵. It is very demanding as regards collection and updating of data and assurance of their reliability.

27. A great deal of the data is technology-related. It is hoped that provision of such information may help foreign investors to identify partners and, thus, contribute to establishing business contacts. Business contacts may involve transfer of technology.

1.2.2.3 Industrial Technology and Market Information Network (ITMIN)

28. The core idea of ITMIN is a network of nodes (local organizations with information resources) organized around a focal point (a publicly owned and privately managed company - ITMIN Ltd.). Networking and cooperation among businesses and organizations is a desirable mode of operating and is advocated by management scientists, development workers and practitioners and businesses alike. The basic arguments for networking are:

- S Benefits will accrue to the parties by specialization in their own fields,
- S Cost advantages will be gained with proper “make or buy” decisions of networked organizations,
- S Operational efficiencies will be achieved by smaller organizations functioning within “large” organization settings of a network and benefitting from these linkages.

29. In the concept, ITMIN is institutionally (through cooperative agreements) and physically networked through proper means of telecommunications, hardware and software that enables the network partners (nodes and the focal point) to share databases of information, and other resources of the network. As a result, ITMIN partners offer a portfolio of information services to their end users by utilizing their own and newly built databases, other capabilities built within ITMIN Ltd. as well as exploiting synergies between network partners. To strengthen the network partners, local databases are to be established, information specialists trained and computer and communication facilities installed at the nodes. Capabilities built within the focal point (ITMIN Ltd.) are expected to provide Inquiry Services to *end users*, Extension Services in information to *end users* (information consultancy, customized research for information on markets and technologies, business opportunities, company matching services, seminars and workshops) and Network Services (for database access and electronic mail) to *nodes*.

1.2.2.4 Other projects

30. There have been other UNIDO projects pursuing similar objectives but such projects were much smaller in terms of budget and much more modest as regards the scope of services. There have also been “information services components” integrated in other projects, such as projects developing or strengthening business development services for SMEs, which include information services, or National Cleaner

⁵ Stefec, R.: Review of IRMS Plus, UNIDO, 1999

Production Centres (see report on Component 1). Access to information for SMEs and micro-enterprises is among the objectives also of projects operating at grass-root level, such as projects supporting rural development.

31. All technology and investment promotion projects (investment and technology promotion meetings, strengthening of investment promotion agencies, etc.) generate and disseminate business information which may result in business deals with transfer of technology. Most of the institution strengthening projects in the field of international partnerships (Investment Promotion Agencies, etc.) include capabilities to process and disseminate information on business opportunities they themselves (and their partners in the UNIDO network) generate but only in some cases they provide technical information services to SMEs or public in general. For example, the Technology Bureau for International Industrial Partnership project in India uses information technology for easy communication and networking among the stakeholders and the network has established access to a number of technology-related databases on the Internet. This information is used in support of partnership development among the clients but the service does not provide technical information to general public. The newly established Asia-Africa Investment and Technology Centre in Malaysia is also expected to disseminate primarily business information (and provide other services in support of international partnerships with transfer of technology).

32. An effort to integrate information as one of the elements of advisory services in transfer of environmentally sound technologies is demonstrated in the concept of an Environment Technology Assessment System (ETAS) as elaborated on the basis of some preparatory and verification work carried out by UNIDO in the Philippines. The concept integrates various information and related technical advisory services for SMEs into a package. The concept is very similar to the NCPC programme but it has a broader coverage (including end-of-pipe technologies) and a rather ambitious objective of advising on the choice of technology. As it has not been implemented so far, the experience can not be evaluated but some of the principles it pursues (integrating information with advisory services) concur with the recommendations of this evaluation.

2. RESULTS

2.1 Use of UNIDO information products and services

33. As a result of extending and streamlining the main external UNIDO website, which is now dynamically generated on the basis of a sophisticated relational database management software linked directly to the website, the amount of information easily accessible via the Internet has increased considerably. The most important products and services on UNIDO homepage that can directly or indirectly support transfer and development of technology are the International Referral System (IRS), Investment Opportunities, Industrial Development Abstracts (IDA), Sales Publications, and Energy and Environment. The numbers of hits in the period March-June 1999 were as follows:

| <i>1 9 9 9</i> | <i>March</i> | <i>April</i> | <i>May</i> | <i>June</i> |
|---------------------------------|--------------|--------------|------------|-------------|
| <i>IDA</i> | 802 | 861 | 647 | 845 |
| <i>Publications</i> | 1587 | 1923 | 1428 | 1540 |
| <i>IRS</i> | 165 | 176 | 129 | 101 |
| <i>Investment Opportunities</i> | 647 | 934 | 592 | 318 |
| <i>Energy and Environment</i> | 297 | 356 | 238 | 161 |

Direct accesses to the above pages (including those via bookmarking, linkages, etc.) result in higher numbers of total accesses and visits (hits of at least one of the products or services at a time). They are available (monitored) for Investment Opportunities and Energy and Environment. Records of use of these two products also include numbers of unique URLs (proxy for users) and documents actually retrieved. For the period under review (March-June 1999) the average monthly hits are as follows:

| | <i>Users</i> | <i>Visits</i> | <i>Accesses</i> | <i>Documents</i> |
|---------------------------------|--------------|---------------|-----------------|------------------|
| <i>Investment Opportunities</i> | 844 | 1740 | 5342 | 1348 |
| <i>Energy and Environment</i> | 395 | 988 | 5072 | 1043 |

The trend has been increasing particularly for Investment Opportunities. Considering the whole website, the Investment Opportunities rank in terms of number of visits relatively high (with statistical databases being at the top). This fact also illustrates primary interest of users for business information rather than for technical (STI) information.

34. While the number of visits and accesses indicates some interest in the subject, it is not identical with the actual use of/demand for the service. In the case of Investment Opportunities the UNIDO contact persons indicated on the website confirm that they receive inquiries on investment projects initiated by a visit to the website. They can be estimated at 30-40 per month for the whole Investment Opportunities subsite, which seems to be quite satisfactory, but this is a rough estimate. Given the importance of this subsite and the frequency of inquiries a systematic monitoring by the contact persons would provide a useful feedback about the trends to the service managers. In some cases, however, an increase in effective demand can be documented. This is primarily the case for IDA reports. Monthly there are now approximately 800 hits on the IDA database resulting in an increased number of inquiries (on average 20 per month since February 1999 compared to 11 during 1998) and copies of IDA reports actually sent out (7 per month compared to 2,5 in 1998). Very often even old reports or guidelines are requested which are

out of stock so that copying costs are charged in addition to postage and handling. The value of monthly invoices for copying and mailing has thus also increased (USD 300 compared to less than USD 100 during 1998). The users of this UNIDO information service are mainly academic staff, consultants and libraries (including those of other development agencies). Occasionally there are also requests coming from industry or industry associations, banks, and laboratories. Approximately 70-80% of the users are from developed countries.

35. The number of readily available non-sales publications (reports and documents in print) sent out monthly also increased from an average of 18 in 1998 to 25 in 1999. (For this service only mailing costs are charged.) However, a very important source of information - sales publications - remained stagnant. The number of publications sold monthly even decreased slightly (from 98 to 88 copies) and so did the monthly value of sales (from USD 3,100 to USD 2,800). This reflects the fact that no new publication has been added to the catalogue for more than two years. The best-sellers of the UNIDO publications have been the Manual for the Preparation of Feasibility Studies (1527 copies, more than 20% of all sale income during 1996-99) and the Manual on BOT (961 copies, 36% of sale income). Then comes the Manual on Technology Transfer Negotiations (350 copies) and other manuals for project evaluation. Surprisingly low has been the demand for sectoral manuals and publications on environment (10-50 copies). Only a few copies of videos have been sold (on subcontracting and BOT).

36. Very attentive treatment of the inquiries by the service personnel is documented in the correspondence with inquirers by their frequent appreciation of the responsiveness of the UNIDO staff.

37. In spite of the above mentioned increase of processed requests for reports and publications per month, the numbers of clients and documents/publications distributed/sold are still rather modest. In 1999, on average 120 documents or publications were provided monthly to clients upon their request (7 IDA reports, 25 non-sales and 88 sales publications). However, this service, which is operated with modest resources, provides access to UNIDO information that is unique in the sense that it is generated and possessed only by UNIDO. Thus it contributes to UNIDO image building among professional circles, in the development cooperation community and in the developing countries themselves. (Unfortunately not all UFR offices are adequately endowed with UNIDO publications and documents.) Support to the global function of UNIDO through revitalization of the research function, as announced on the 21st IDB, may increase the supply of UNIDO-originated papers, documents and publications accessible to the general public.

38. Some UNIDO publications are sold by co-publishers and by the UN offices in New York and Geneva. However, while the records on sales by UNIDO are well documented, there is no central overview of the sales by the co-publishers. The available information about sales by co-publishers (1226 copies of the English version of the Industrial Development Global Report 1997, 1273 copies of the Guide to Biosafety, 51 copies of the Fertilizer Manual) also seems to confirm that more generic development issues and manuals are more in demand than specific sectoral publications. The UN offices do not provide information on actual sales but from repeated orders for some publications one can infer that the pattern of demand is similar (hundreds of repeatedly ordered copies of the Manuals on Project Evaluation, Feasibility Studies, Transfer of Technology Negotiations and BOT).

39. Use of IRS by external users has not been significant and its increase after reorganization of the website has been modest. When comparing the last 6 months of 1998 with 6 months after changing the website the total number of inquiries increased from 30 to 34. After their review and sorting out, 11 inquiries were dispatched to members of IRS (compared to 6 in the previous period) and 9 inquirers were provided with a list of suitable IRS members (compared to 7 in the previous period). The remaining inquiries were answered either by providing them with free documents or external addresses. Thus the number of inquiries handled with the use of IRS members (20 within the first 6 months of 1999) remains low. As the system is operated with minimal resources, its short-term efficiency does not seem to be the main problem. The main problem may be gradual weakening of established linkages with the sources of information resulting

from their low utilization and questionable efficiency of any resources deployed to update a database that is used so little. Allowing for direct access of the inquirers to the IRS information sources via the Web may increase its use but given the current low level of visits (100-200 per months) it is difficult to expect reaching significant use of the IRS.

2.2 Results of technical cooperation projects strengthening information services for SMEs

2.2.1 IRMS

40. IRMS Plus has been under preparation and implementation since 1994, with total expenditures (without RB resources) amounting to approximately USD 700,000, approximately half of it financed by a donor country, half of it financed by UNIDO (IDDA). In addition to a system development project (USD 121,000), implementation of IRMS was subject of two technical cooperation projects, each operating in five African countries.

41. The purpose of the projects was to “*strengthen the capabilities of INTIB NFPs.... in acquiring, processing, packaging and delivering useful industrial and technological information ... to support industrial efforts in these countries*” and, specifically, to:

- S establish adequate information systems and inquiry services in each NFP;
- S improve the database management, networking and industrial information promotion skills of NFPs’ staff;
- S produce national industrial databases; and
- S launch national marketing campaigns.

42. In most countries supported by the two projects the NFPs are staffed, equipped and connected by e-mail. The staff was trained on how to collect and enter the IRMS data and how to administer websites. The software was installed and workshops on marketing strategies held. However, so far none of the countries addressed by the projects actually has a database of industrial information operational under the IRMS^{PLUS} software, the website “worldbusiness.unido.org” is hollow. Listings of the project countries’ companies and institutions exist (made available by pertinent government institutions or compiled by an external expert from their data) but they are yet to be converted to the IRMS^{PLUS} format. Given the number of entities (more than 2500 organizations in 5 countries visited by a project expert) the task is huge. The present IRMS data gathering strategy is that UNIDO will enter only some data to test the system and provide “seed data” for the IRMS^{PLUS} but the burden of really filling up and continuously updating the databases is to be borne by the National Focal Points.

43. In view of the complexity of the system and many uncertainties as regards collection and use of data it seems rational at this point not to continue the programme in its full breadth but rather to narrow down the scope by focusing, for a period of no more than about one year, on just a single project country. This project country to be selected should be the one where conditions appear to be most favorable. That is where a determined effort should be made to advance the project to a stage where at least one NFP would be sufficiently stocked with data and will be up and running. Then this experience could be used to modify strategy on the other NFPs/nodes. Should the selected NFP fail to be at least reasonably successful in terms of pre-determined success criteria, the programme should be abandoned.

2.2.2 ITMIN

44. ITMIN was implemented with UNIDO/UNDP support in one country in South-East Asia. Successful delivery of project inputs and services within the relatively short project cycle (two years), the ownership expressed by the partners with the legal establishment of the focal point, ITMIN Ltd., and appointment of dynamic managing agents and staff made available by them has encouraged UNIDO to consider the concept for replication elsewhere. However, assessment of the situation of ITMIN two and a half years after project completion identified deviations from the original concept and suggested that any emulation of the project should be carried out with due consideration of the acquired experience. In brief: ITMIN as a network of a number of partners/nodal points envisaged in the original project design has not come into life. Two and a half years after the completion of the project, ITMIN Ltd., the focal point, is operating and providing a wide scope of services without Government subsidy. However, ITMIN Ltd. had to start as an Internet Service Provider and an Information Skills Trainer to become established and known. Information services proper - the original objective - represented only small portion of total turnover and in spite of extending them gradually their share is at present in the range of approx. 10 percent of the total turnover, with most of the information sold being business information and a very small portion being STI. For a number of years ITMIN Ltd. had to be supported financially by one of its private shareholders. It is only recently that it reports to fully recover costs.

2.2.3 *Other UNIDO Projects*

45. INFOBUSINESS hosted by INVERSIONES COFIDE A.S., a public investment company in Peru, was established through a self-financed project executed by UNIDO within two years (1996-97). As the INFOBUSINESS was hosted by a financial institution, the type of services were linked to the clients of the host organization. The services consisted mainly of market research, sectoral studies, opportunity and feasibility studies and COMFAR applications. The unit employing 5 professionals (and the national coordinator) was able at times to generate income up to USD 20,000 - 30,000 per month, which is quite impressive. The largest share of income was generated by sales of feasibility and opportunity studies and market research. Hardly any information was provided on technology.

46. Information services developed in the context of other technical cooperation projects establishing or strengthening business development services for SMEs usually include building up a library, establishing Internet connection and training in searching on Internet, etc. The number of such projects is rather limited. They seem to confirm much of the experience of the information-alone projects (low effective demand by SMEs for information in general and for technology-related information in particular, difficulties in networking, etc.). Compared to other business development services promoted under the SME project in Vietnam (training, business planning) the information services showed the lowest cost recovery.

47. There are also information activities within projects creating or strengthening local capacity to support transfer of technology through various forms of partnership arrangements, such as the project strengthening the Technology Bureau in India. As explained above, these projects do not provide general information services for SMEs but they disseminate business opportunities they themselves identify or generate. If they access technical information from databases on the Internet they do it as part of their internal operations to formulate better the business opportunity or to support the matchmaking process. Efficiency of such internal information activities (as distinct from information services for external clients) may be one of the factors influencing success of such projects (measured, for example, in terms of concluded contracts) but such a complex evaluation is well beyond the scope of this report.

48. In projects supporting rural development the experience indicates very little use of Internet. Formal and informal linkages to all kinds of economic and trade agents in the area proved to be the most effective source of technical and business information for the SMEs.

49. Some of these projects were subject of in-depth evaluation (such as US/VIE/95/004) and lessons learned from their experience are also reflected in this evaluation.

3. SELECTED ISSUES

3.1 The role of information in transfer of technology by SMEs

50. Small businesses function in a world of complex relationships and make their choices accordingly. They build on what they have learned (not only by themselves, but also by their competitors, suppliers and consumers). This implies that small businesses would seek demonstrated successes when they search for new technologies, especially when they were out to acquire the technology and were not in the process of developing it themselves. Therefore, the domestic market, however underdeveloped it may be due, is the major source of information for SMEs.

51. In the case of the small entrepreneur, information on available technologies is gathered by attending trade fairs, visiting other enterprises, or is brought in by suppliers of technologies, equipment and input materials, customers and technical staff of the enterprise, if they have any. The small entrepreneurs seldom go after technology related information that may be too technical, too scientific or in foreign languages. Once the small entrepreneur is aware of a technology that may make business sense, in most cases, his/her discussants become the suppliers of the technologies, better able to provide specific and applications-oriented information and not information intermediaries, who may not have had any practical experience with that technology.

52. Additional points to remember in the case of small manufacturing businesses is that they seldom purchase licenses, are seldom a party to foreign investment projects or they are seldom financially, managerially and organizationally capable of becoming direct exporters. They would usually seek to purchase one or two pieces of machinery at a time introduced to them by suppliers, competitors or by their own observations at a trade fair. They may attend seminars and short term training courses where they hope to obtain practical, immediately applicable managerial skills. For instance, learning about how to sell better through disseminating their own information within the market place, how to organize internal information to manage their customer and supplier bases better, how to comply with regulations, etc.

53. To understand why the small entrepreneurs behave as they do, one can perceive technology transfer to occur through stages of awareness, interest, evaluation, trial and adoption, which are also intellectual processes utilized by all persons and not only specific to the small enterprise managers. Awareness is triggered by coming upon a signal for a new product characteristic from a customer, or observing a competitor's product or production process, or information provided by a supplier, or obtained at a trade fair. The entrepreneur will become most interested if he is going to lose his customers to the competitors, or if he senses there could be some cost savings involved. In both the awareness and interest stages, the entrepreneur will seek information about the technology through the most easily available channels. If the signals that have kept his/her interest are persistent, s/he will seek more in-depth information on costs, technical characteristics, skills requirements, etc. that enable him/her to make a serious evaluation on what to do. If the evaluation is positive, the entrepreneur may opt for a trial where s/he would obtain primary information by personal experience. At the adoption stage, the entrepreneur utilizes his own information, at least to make full use of the technology, if not to start making adaptations to make the technology more suitable to the local conditions within that production situation (the workshop). However, the evaluation stage may result in taking a different approach altogether due to financial constraints, higher than available skills requirements, etc.

54. As can be seen above, the small entrepreneur does not only need information contained on a database, but he/she may need to attend a short training program, consult with technical and industry experts, seek for alternative suppliers, observe the technology in action, discuss with a banker, a legal expert, a skills training provider, etc. All of these services can hardly be provided through a single information service, but have to be accessed through a host of organizations, firms and individuals from diverse sectors.

55. It is quite justifiable to allege that an information rich environment will support the development and

transfer of technologies by increasing the chances of entrepreneurs to come upon them with ease and at least cost. The deeper penetration of information technologies to the businesses, easy and inexpensive access to Internet and e-mail, lower transportation and communication costs due to increased competition in the related services and industries have helped and will continue to help technologies to diffuse.

3.2 Forging partnerships in information and related services for SMEs

56. Partnerships between organizations are desirable, because these types of arrangements may offer opportunities for specialization in core competencies, cost advantages and operational efficiencies. Partnerships should, therefore, be based on specialization, when the parties are able to see a higher value in the combined product than its stand alone alternative. Despite their advantages, partnerships are difficult to forge and sustain. The difficulties start with the sharing of information between to be partners on why they “really” intend to go into a partnership, the benefits each side perceives from joint actions and continue on to issues such as the management of jointly created value as a result of the partnership. Partnerships between organizations are particularly difficult due to complexities in decision-making processes and in the larger number of factors that come into play. These difficulties are well documented in the management literature on interdepartmental conflicts even within one organization.

57. In spite of the difficulties mentioned above, projects that aim to support technology transfer through provision of information services could help in establishing networks of the above mentioned diverse organizations as well as assist specialized organizations Technology Centres capable of providing technical advisory services to improve their marketing, to become more business like in their handling of the demand and to improve their customer orientation to better serve the businesses.

58. A critical issue complicating external assistance in building partnerships is the distribution of the external (project) resources among the potential partners. Perceived and real inequalities in sharing project resources are factors that influence the willingness to enter into partnerships supported by the project. Potential partners that believe that they could have benefitted more from the (financial) resources of donor assisted projects to build up physical and human resource bases are usually more vocal about these issues.

59. A potential remedy to this problem may be to design projects that do not have one focal partner, but a number of partners. The project can enter into support arrangements with potential parties based on their capabilities as well as their willingness to commit own resources in line with the shared objective of a host of partnerships. Under such an arrangement the project could also enhance its position as the honest/independent broker identifying and coaching parties into cooperative arrangements during the project cycle.

60. These types of project designs necessitate open planning approaches, longer durations and project management, administration, monitoring and evaluation systems that are suitable to pick, and if necessary, to drop counterparts from the portfolio with relative flexibility. Contractual relationships tied to mutually agreed performance criteria and provision of financial support based on achieved outcomes could enhance the business like attitude of the partners and enable the project management to exercise some flexibility. These arrangements do not resolve the problem of sustainability after project completion but they could lay grounds for structures which - if operational long enough - would tend to sustain.

3.3 Private versus public sector in information services and sustainability issues

61. Especially over the last 15 years, donors have come to advocate providing assistance to and through non-governmental organizations and the private sector rather than through State sponsored agencies. This preference has emerged through a learning process over the previous thirty plus years. Bureaucratic management practices, difficulties in retaining high quality staff at low salary levels of civil servants in the developing countries, political pressures that may be influencing decision making processes in government agencies have encouraged the donor community to change course.

62. A similar evolution towards privatization of the delivery of non-financial services (information, training, advice, etc.) for SMEs has occurred earlier in the developed world. Although the principle of higher efficiency and effectiveness experienced in the developed world with private sector organizations in the provision of non financial services to the business community is valid, the model must be carefully analyzed and understood before it is transplanted into developing countries.

63. The European Union (EU) and its member countries provide good examples how to understand the above point. Almost all national Governments of the EU, both at the central and regional levels, allocate funds for consultancy and training services for SMEs. Public and private sector providers of these services compete for funds and deliver the required services. These providers may be chambers and federations of commerce and industry, private consultancies or even public agencies. SMEs have access to services of higher quality and professional nature through private sector providers thanks to public subsidies.

64. The same situation is true in the United States, Japan and the newly industrialized countries. Demand for business services (training, consultancy, information, etc.) from SMEs in the developed economies are still encouraged/subsidized by Governments. Privatizing delivery has strengthened a business services provider sector in these countries, however, it has not made the services themselves fully marketable to the SMEs.

65. When this is the situation in the developed economies with more resources available for industrial development compared to the developing countries, it seems quite unrealistic to expect similar services to be kept afloat by demand from domestic industries that are at much lower levels of maturity. In developing countries selection of the private sector as a preferred legal status for the entity that will deliver yet “unmarketable” services to SMEs should not be considered sufficient to ensure financial sustainability. Some level of support by the public sector is needed in order to carry out awareness raising, inquiry and other information services which are pre-requisites for more sophisticated marketable services.

4. CONCLUSIONS AND LESSONS LEARNED

Changes in Strategy

66. UNIDO has been moving away from providing information directly to end users ("inquiry service") to:

- S referral services
- S networking
- S development of information capabilities in the regions and countries.

More and more information products developed by the HQs are accessible on-line via Internet.

The above changes correspond to and are supported by development in information and communication technology.

Capacity building in information services for SMEs

67. As described in 1.2.2, there are three different approaches represented by IRMS Plus, ITMIN and information components integrated within other projects/programmes. IRMS Plus, while introduced in 10 countries in Africa, has not yielded any tangible results so far: none of the countries addressed by the projects actually has a database of industrial information operational under the IRMS^{PLUS} software.

68. ITMIN has not succeeded as a network but its focal point keeps on operating as a service organization which includes information services, though their share in total turnover is rather low.

69. Information services developed or strengthened within other business development services have been rather limited and as far as they sustain, they sustain on subsidies.

70. All types of capacity-building projects in information services support the following conclusions:

- S While information is as an important ingredient of doing business, effective demand by SMEs for information services alone (demonstrated by willingness to pay) is low and needs to be enhanced by awareness raising, direct contacts or packaging with other services.
- S Particularly low is the effective demand for technical information (demand for trade-related business information being higher). Thus, as a result, the technical information, which has the potential to support transfer and development of technology, represents a smaller segment in all information services supported by UNIDO. Ultimately, however, also the business information, if transformed into business deals, can lead to technology transfer.
- S There is very limited chance to establish and operate information-alone services for SMEs, and in particular technical information services, as a profit making or at least cost recovering commercial business.
- S Networking among sources of information, information services and sources of expertise is highly desirable but very difficult to implement and sustain.

Integrating information services for SMEs with other UNIDO services

71. As explained above and highlighted in other UNIDO papers⁶, information systems alone, without matching facilities and abilities to transform data and information into locally available knowledge, are not sufficient. Information services for SMEs need to be complemented by other services (advisory services, training, etc.). There are various modalities for such an arrangement: Information services may be one of the functions of a business development service organization (such as Small and Medium Industries Development Organizations, Business Development Centres, etc.). Or they may be one of the functions of a Technology Centre or a consulting organization, of an investment promotion office, etc. Or they may be part of a network of organizations providing different complementary services.

72. Support to establishing networks of organizations/sources of information needs to focus on elaboration of and mutual agreement among potential partners on terms under which sharing of information would be considered beneficial for each partner. Preferably such terms should be agreed upon as much as possible prior to launching the project. When selecting the network partners preference should be given to organizations which can demonstrate some level of sustainability irrespective of project support.

73. The principle of complementarity in providing services to SMEs may require similar complementarity of UNIDO services when strengthening local organizations in charge of those complementary services to SMEs. In other words, to achieve synergy effects in the field, the UNIDO information services provided under the module “Statistics and Information Networks” may need to be complemented by/integrated with services provided under other UNIDO service modules, in particular with business advisory services under the “Entrepreneurship Development” service module and with the “Investment and Technology Promotion” module. There are, however, other service modules which could be considered for coordination or integration with information services, such as “Upgrading agro-industries and related technical skills”.

74. Outside of the services for SMEs (which, in this evaluation, have been looked at with special attention to transfer and development of technology) there is a clear need for intense integration of information services with other modules aiming at industrial governance, such as “Industrial Policy Formulation and Implementation” or “SME Policy Framework”.

⁶Technology Transfer: from Data to Knowledge; UNIDO Background Paper prepared for UNFCCC ‘African Regional Workshop on Transfer of Technology’, Arusha, August 1999