OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

14929

United Nations Industrial Development Organization

Distr.
LIMITED

ID/WG.450/3
16 October 1985

ENGLISH

Round Table Discussion of an
Advisory Group of INTIB Users

Vienna, Austria, 23-27 September 1985

THE DEMAND AND TRENDS OF INDUSTRIAL AND TECHNOLOGICAL INFORMATION IN CHINA*

Prepared by

Rui Guozhang**

UNIDO Consultant

---

* The views expressed in this document are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. Mention of firm names and commercial products does not imply the endorsement of UNIDO. This document has been reproduced without formal editing.

** Engineer, the Institute of Scientific and Technical Information of China, Beijing, China.

V.85-32211

CONTENTS

Abstract: This paper describes the importance of industrial and technological information in the development of economy and society under the conditions of the world new technological revolution and the rapid development of information technology. Outlines the great demand for industrial and technological information in China at present, particularly the urgency of information needs of various categories of users and developing trends in China's new situation of the reform of economic, scientific and technological management system. Analyses and studies the information needs of managers and decision-makers; the information needs of coastal cities; the information needs of large-scale factories, mines and enterprises; the information needs of small and medium-sized enterprises; the information needs of the rural specialized households and township enterprises. Briefly explains the new forms of industrial and technological information dissemination, for example, the technology market; new emerging information consultation services. The information institutions at various levels should strengthen the survey of information users' needs, adjust its information policy, the direction and content of services, so as to meet the needs of new situation.

I. Introduction

In the late of 1970s, the rapid development of new technology revolution makes a notable impact on industrial and technological information service, economy and society. Undoubtedly, the development of economy and society mainly relys on the production, dissemination and utilization of industrial and technological information. The development of a country depends to a large extent on the use of knowledge and information.

Industrial and technological information is a kind of extremely important resources and one of the major supports to the modern economic development. Now the people of the world deeply recognize its role in improving and expanding the productive force and promoting the development of society.

China is a developing country and is carrying out the construction of four modernizations at present. Therefore, strengthening the information exchange and facilitating the use and transfer of technological achievements are very important to the development of economy and society.

Industrial and technological information service should be geared to the needs of economic construction, not only to the needs of large-scale enterprises, but also to the needs of small and medium-sized enterprises, township enterprises and the rural specialized households. Following the reform of economic, scientific and technological management system, the rural specialized households and township enterprises are eager to get industrial and technological information nowadays. The collective enterprises and small-sized state enterprises also have pressing feelings. The demand of quite a few large-scale enterprises is not so imperative for technological progress. This is a temporary phenomenon. The greater the vitality of enterprise is, the intenser the competition, the more imperative the demand

for industrial and technological information. The rural specialized households and township enterprises learn the hardships of technical backward in competition and become aware of the benefits of using industrial and technological information. They are keen to adopt new technology. Collective and small state enterprises are also subjected to the pressure and have the motive force in the application of new technology.

The information institutions at various levels should seriously study their information users. If we gain a clear idea of the essence of information needs and changing trends from both theory and practice, it will play an important role in promoting and developing the industrial and technological information services. All of the effective services are to meet the needs of information users to a certain extent.

The following will describe and analyse the demand and trends of various categories of industrial and technological information users in China.

II. The Great Demand for Industrial and Technological Information in China

Following the development of national economy, industry and technology of our country, the demand of every trade and profession for access to various information sources is more and more eager. For example, great changes have taken place in personnel structure of manager and decision-makers in industrial enterprises and technological units. Their information needs are also changing. Because of carrying out the open policy, a great amount of foreign industrial and technological information flow into the coastal open cities. These cities should strengthen the ability of digestion and absorption so as to suit the new situation. The information needs of following categories of users clearly show this characteristics.

The Information Needs of Managers and Decision-makers

In order to change China's management backward conditions and implement scientific decision-making, the research organizations of decision-making are built and strengthened from central organs to local institutions. The consultation units of decision-making are founded. 76 management and training institutes are set up over past two years. More than 12,000 people are being trained as enterpriser, business executives, factory directors and managers. Information constitutes the basis of decision-making. Based on investigation and sufficent information, The specialists in every aspect carry out repetitive proof and feasibility study of some major economic and technical decision-makings. The important task and social function of industrial and technological information service are to provide the decision-makers with relevant information. First of all, we should know the information needs in decision-making activities.

The characteristic of information needed in decision-making is: Firstly, it has strict scientific nature and should be accurate. Secondly, it should be in time. Thirdly, it has comprehensive nature, it needs not only industrial and technological information but also social and economic information. Fourthly, it has strong foreseeable nature and should predict future. Fifthly, it should provide the information with highly consolidated content, easy understand and adopt by decision-makers. Based on the experience, the information needed for decision-making is as follows:

1.The information on technical policy. Technical policy is an important part of modern management and basis for scientific and technical decision-making. The information on technical policy includes:

A.The historical background and environmental analysis of a certain technical policy which is carried out by each country.

B.The social, economic and technical benefits of a certain technical policy.

C.The evaluation and comments on every technical policy.

D.The drawback of technical policy and the lessons of failure.

E.The revision of technical policy.

F.The term of validity of technical policy.

The technical policy of each country reflects the position and role of science and technology in the development of economy and society; the strategic objective, direction and fundamental principle of scientific and technical development; the internal structure and management principle of science and technology.

2.The information on technology and economy. The information on technology and economy is mainly aimed at the evaluation of technology and economy and the analysis of effects, for example, the technical reliability, appropriateness, the economic reasonableness and the impact on human, society and nature. These are the starting point and the end-result of scientific and technical decision-making. In the past, some institutions provided information stressing the advance in technology while neglecting the economic reasonableness, sometimes made the decision-making fail. We should learn a lesson from this practice.

3.The information on developing levels and trends. In preparing the plan of scientific and technical development or making the decision on developing a certain technology, first of all, we should make an investigation both at home and abroad on the developing levels and trends of science and technology as well as our current situation and the gap between China and foreign countries. This kind of information is beneficial to the leaders for enlightening the thoughts, widening the outlook and deepening the understanding of a certain problem. For instance, the new technology revolution is now emerging in the world, our industrial and technological information

institutions should report the developing status and trends of foreign new technology and its impact on society, so that the leading body concerned can strengthen the study of the way to deal with this situation.

4.The information on experiences and measures. In developing a certain undertakings and adopting a new technology, we should both attach great importance to our own experiences and use the experiences of other countries for reference. This kind of information is useful for studying and using the experiences and lessons of foreign countries, so as to avoid decours and failure of decision-making.

5.The management information. This kind of information is an important factor in management and decision-making of enterprises. It mainly refers to the development of new technology, the renewal and replacement of products, the adoption of new technologies and materials, the investigation and forecast of market, etc. In the contemporary world intense competition of economy, in order to make the enterprises have the ability to suit the change of market and to result in scientific decision-making at any time, we should put more emphasis on management information.

6.The information on future forecast. The decision-making on the development strategy of economy and technology is an important and social activity in planning and affecting the future. At present, there are a lot of information materials on forecast both at home and abroad. Our industrial and technological information institutions should timely collect and disseminate them, carry out analysis and scientific decision-making and offer proposals to the leaders. The extent of decision-making information service to the leaders is very wide. It deals with multi-disciplinary science, natural science, applied science, social science, economics, statistics, etc. In order to meet such a extensive information needs, it is not enough to depend merely on S & T information,

the economic information system and the centre of statistical data must be set up. These three systems mentioned above coordinate each other and form a comprehensive information network, in this way, the information service for the leader's scientific decision-making could be done well.

The Information Needs of Coastal Open Cities

There are 14 coastal open cities in China. It has an important significance to analyze and discuss how the industrial and technological information service vigorously develops the economy, how the technological and economic information disseminates well and how the extension services open up.

The industrial foundation of these coastal cities is better. The technical force is stronger. Under the conditions of extending the information services, some cities prepare to set up New Technology Development Corporation in charge of the collection, synthesis and dissemination of industrial and technological information; technical communication with foreign countries; the study, opening up and transfer of new emerging technology; technical consultation; founding S & T information centre including documentary data base and foreign on-line service.

Through introducing the advanced technology and speeding up the technical transformation of the old enterprises, these coastal cities are in the forefront in absorbing and disseminating the advanced industrial and technological knowledge and scientific management experience, thus support and promote the inland of China. In order to meet the various kinds of information needs, the following measures are taken:

1.The information services should be further strengthened and reach such a level that there are full-time information staffs in large and medium-sized enterprises and part-time information staffs in small-sized enterprises and community.

2.The information policy should serve the economic construction. The documents of the light and port industries are the main collections. In the meantime, attention should be paid to collecting the materials about the development and application of new technology such as micro-electronics, information technology, new materials and energy.

3.Actively engaged in information analysis and consultation service.

4.Doing well the circulation of information.

5.Setting up the information network of all trades and professions.

The Information Needs of Large Factories, Mines and Enterprises

The large-scale enterprises have the clear superiority in fanance, equipment and technical personnel. Its information needs are as follows:

1.The industrial and technological documents which are relevant to its speciality and combine closely with scientific research and production of factories and enterprises.

2.The information needed for the production plan, selecting the subject of scientific research, opening up, introducing and applying the new technology as well as decision-making.

3.The advanced information materials used for factories and enterprises in order to renew products, improve the quality of products, increase productivity, reduce labour intensity, reduce production costs, design and trial-manufacture of new products, open up new technology, technological innovation, transformation, tap potentialities and appraise technical achievements, etc.

In order to meet these needs, the measures are taken as follows:

1.Doing well the basic information service.

A.Accumulating the document abstracts and bibliographic

retrieval cards relevant to the proper speciality. Particularly, the computer search is not so popular in China at present, it will play an important role to set up "artificial terminal" suited to the needs of proper speciality and used for the information provision service. It will also make the preparation for computerized service.

B.Compiling the directory of factories and enterprises relevant to the proper speciality both at home and abroad. We should put the stress on collecting the information materials of companies, factories and research organizations concerned, including the history of founding and development, size, scope of operation, the kinds of products, major research achievements, management experiences, outstanding specialists, technical route, technological specification, insealation and equipment, the trends of scientific research, the item of development, the force put into, the measure taken, the operation condition, the research progress, the reasons for success and failure, etc. It is useful for understanding and grasping the engineering level and developing trends both at home and abroad.

C.The archive of products and technical materials concerned with proper trade and profession, including the variety of products, types, specifications, design and moulding, major characteristics, application, cost of products, quotations on the market, the supply of raw materials, the follow-up archive of new technology, new equipment, new materials and new products. These materials would have important reference value to scientific research and production.

2.Information consultation service

The information consultation service of factories and enterprises should meet the various needs for documents put forward by the proper unit. The technical personnel or users come to ask for materials needed or tackle the key problems concerned. For example, search, translation and answering

various difficult questions come across in scientific research and production, or the general investigation of special subject, preparing the reference materials for special subject. It will save the scientific and technical personnel a lot of time. However, the information personnel must be proficient in professional work of information and librarianship, familiar with document retrieval methodology and skill, know speciality, have higher ability of reading and translating foreign languages. In addition, they must devote every effort to their work, have strong sense of responsibility and provide services conscientiously and actively.

3.Information analysis

As far as information service of factories and enterprises is concerned, it is not enough to provide only documents for scientific research and production. For the purpose of raising the quality of service, the value of information and economic effectiveness, we must carry out information analysis, that is, to analyze and synthesize a large amount of collected documents, to compare each other, to discard the dross and to select the essential, to eliminate the false and to retain the true, then, to process, to sort out and to prepare survey, review and forecast, to provide valuable appropriate information for scientific research and production of proper unit.

The Information Needs of Small and Medium-sized Enterprises

The number of small and medium-sized enterprises accounts for over 98 per cent of the existing various enterprises in China. The production value is about 75 per cent of the country's total industrial output value. The staffs of such a kind of enterprises are normally less than 500. They are weaker in technical force, lack of fanance, ill-informed and backward in production mode. In the present economic system reform of our country, the market competition is getting more and more fierce,

they are faced with great pressure. In order to suit the needs of market development, they are eager to adopt new technology to speed up the renewal of products and the transformation of technology and to develop the production. Owing to their ill-informed conditions, they can not get the technological information in time only depending on themselves. In competition, the information institutions are urgently required to provide technological and economic information and market forecast for them. But after analysis, you may make out that small and medium-sized enterprises also have their own advanteges and characteristics, that is, they are comparatively flexible and have certain favourable conditions in adopting advanced technology, reinforcing management and changing production line. The results are notable so long as the needed information is provided and a decision-making is resolutely made.

1.Doing well the investigation of developmental information, providing the new products and new technology for small and medium-sized enterprises.

Most of small and medium-sized enterprises become aware that they are lack of new products. Because the old products are unsalable and the development of new products does not follow, quite a few small and medium-sized enterprises which have the weaker foundation operate under capacity and support their factories depending on the contract of machining. They eagerly require information institutions to provide salable new products and suitable new technology which can reverse this trend. Some small and medium-sized enterprises which have the better operating condition also require information units to provide new products and new technology for renewal and replacement in order to raise the quality of products, reinforce the capability of competition and suit the needs of market change. Faced with the urgent information needs of small and medium-sized enterprises, the industrial and technological information work must firstly serve the management, decision-

making and technology transformation of enterprises, put the developmental investigation on an important position. The developmental activities of information investigation play the role of supporting the small-sized enterprises. Through the channel of opening up new products, some enterprises vigorously develop and enhance their quality. The planning and subject of investigation must be closely related to local economic development and lay stress on the relevance.

2.Making every effort and opening up information sources

Small and medium-sized enterprises have a lot of trades and professions and a great variety of products, therefore, various kinds of technological information are needed. It is difficult to meet the information needs of every trade and profession in opening up new products and new technology if only depending on organizational information units. The part-time information personnel of every aspect should be organized to engage in industrial and technological information service. Because the number of information personnel in such enterprises is small the number of staffs engaged in scientific research, production and management is relatively large. They thoroughly understand the information needs. So, we should mobilize them to carry out information investigation, to open up information sources and to transfer the research achievements into the material wealth.

The channels of opening up information sources and transfering rapidly into the productive force are as follows:

A.The Technological Information Service Corporations organize the technical personnel of all trades and professions to carry out consultation services for small and medium-sized enterprises in spare time. The scope of consultation service activities is from technical cooperation to the design of new products, providing market information, searching and translating technical materials, etc. It is welcomed especially by the small and medium-sized enterprises which are lack of technical force.

B.The learning organizations unite some specialists and technician, offering advice and leading the academic research to serve the development of production.

1) Making suggestions to some enterprises which have weaker technical force and solving the technical problems in production.

2) Inviting the professional personnel of commerce and trade sectors to introduce the quotations on the market to the small and medium-sized enterprises, to give market forecast and comments on local produced commodities, to make suggestions on improving quality and management, to build close relations between industry and commerce, to provide information feedback for industry and production units.

C.Organizing the leaders and technical personnel of small and medium-sized enterprises to take part in various information activities to broaden the outlook and to enlighten the throughts. Through these activities, they may well understand the development trends and recent technological achievements of proper trade and profession.

D.Recommending the information of new products and new technologies to enterprises through journals.

E.Strengthening the contacts with large-scale enterprises and professional information network and carrying out the information exchange between the small and medium-sized enterprises.

The Information Needs of Rural Specialized Households and Township Enterprises

China's rural production structure has been adjusted and reformed from producing solely grain to diversification. Particularly, the township enterprises have been developed rapidly in recent years. All of these new trends have led Chinese rural economy to a comprehensive and harmonized development of

agriculture, industry and commerce. In the development of commodity economy, the enthusiasm of 800 million peasants is rising to an unprecedented height. It has an immense significance to the prosperous of our country. The outstanding characteristic of rural areas is the rapid development of commodity economy. It provides the favourable conditions for transforming the traditional agriculture into the modern one. The urban reform will release greater energy and promote the diffusion of science, technology, qualified personnel and information to the rural areas on a large scale. Hundreds of thousands of rural specialized households have emerged under such conditions. The peasants' needs for science, technology and information are dramatically increased because of their emergence. A new category of information users has been formed. There are now 24 million of specialized households in China, over 13 per cent of the total rural households. They are engaged in a variety of specialized production and services, promoting the transformation of agricultural production towards the specialized and socialized direction. More and more peasants are keen to learn and adopt science and technology. This situation greatly speeds up the popularization of agricultural research acheivements and advanced production technology. There were 1.34 million township enterprises in China in 1983, whose staffs made up more than 10 per cent of the rural work force. The production value of the rural industries reached nearly one-ninth of the country's total industrial output value, it makes a very important part of the rural economy.

After the rural areas go beyond producing solely grain, various plantings, breedings, township factories and mines have set new demands on industrial and technological information institutions before and after production in various links including consultation service, storage, transportation and further processing. Generally speaking, a majority of rural specialized households do not have necessary technical capability

and lack of information services in the course of adopting new technology and carrying out technical renovation and transformation. Their inhabiting places are scattered. They simply have no access to the information sources. Even if they go to the information centre personally, due to the language barrier and the poor education, it is very difficult to search the materials they need. Therefore, the S & T information organizations at various levels should develop the search, translation and consultation services for them. The information they need are mostly marketing information and appropriate technologies which are reasonable in economy and feasible to their concrete conditions. Through investigation, the information needs at this level are as follows:

1.Information needed for decision-making.

2.Developing a diversified economy and comprehensively utilizing resources.

3.The processing of farm and sideline products.

4.The breeding and popularization of elite seeds.

5.The breeding of fish, livestock and poultry, the protection of animal and plant, the prevention and control of plant diseases and elimination of pests.

6.The prescription of feeding stuff and bait.

7.The preservation, storage, processing and transportation of agricultural products.

8.The information materials needed for factories, mines and enterprises using local resources.

9.The application of appropriate technology and new technology.

10.Others.

III. The New Forms of Industrial and Technological Information Dissemination

In the information era, the industrial and technological

information is the key factor of productive force, competitiveness and economic effectiveness. The demands for such information are unprecedentedly imperative. An obvious trend is emerging in recent years in China, that is, setting up various forms of technology market and technological information consultation service corporation. These new forms of information dissemination have the rapid, immediate, flexible and broad masses nature. It plays the social role which the traditional information service could not play.

Technology Market

Owing to opening up the technology market in recent years, the technology enters into the field of commodity circulation. In this way, the scientific research closely links up with production. It plays an important role in promoting the technological progress and economic development of our country. At present, various forms of technology market are emerging in China.

1.Scientific research and designing units spontaneously make contact with production units, transfer scientific research achievements at a reasonable rate and carry out technical cooperation. It is favourable to transforming scientific research achievements into productive force as early as possible.

2.The various forms of scientific and technological communication and trade fair organize technology transfer within the greater extent according to the plan. The two sides of supply and demand can have face-to-face discussion on business and exchange information, which produces a notable result in promoting scientific and technological communication.

3.The organizations of S & T development, communication and consultation services in cities and regions.

4.The permanent organization of technology market. It has the fixed place and particular businessman. The two sides of

supply and demand can directly hold trade talks about buying and selling of technological achievements at any time.

Technology as a commodity is urgently needed. Many of the production units can conveniently buy the appropriate technology they need. It greatly shorten the period of transforming the technological achievements into productive force. A lot of scientific research units select the subject from the enterprises. Through various economic measures such as technical cooperation, their interests are closely related to the production units. It enhances the capability of technological development of enterprises. There are various forms of transforming technological achievements into commodity, including both the enterprises buy technological achievements from research units on technology market and research units sign a contract for scientific research with government departments. The emerging of technology market is especially favourable to the small and medium-sized and township enterprises whose technical force is in general comparatively weak. Their technological problems are normally solved very soon. There are over 15,000 items of technological achievements to transfer in First National Trade Fair on Technological Achievements held on May in Beijing this year. The forms are the technology transfer, the technical consultation, the technical service, the technical training, the technological renewal and transformation of large-scale, small and medium-sized enterprises, the contract of engineering design, the competition bids on technologically difficult problems, the technical information exchange, the technological development of new products, the cooperative development, the trial sale of new products, etc. Through practice, it is recognized that once production units purchase advanced technology, the backward conditions of production are changed rapidly, the economic gains are doubled. The new trend of development is that the producers of industrial and technological information directly contact with their users.

This is a challenge to traditional information service. But information service can also play its role in this respect. It acts as a bridge between the buyer and seller of technology and links up the two sides.

New Emerging Information Organization of Consultation Services

The traditional industrial and technological information services used to take the decision-makers, managers, researchers and engineers as their major users. The information products are mainly secondary publications and overview reports.

The current information users in China can generally be divided into three categories: scientific research-oriented, application-oriented and public-oriented users. The relevance of the traditional information products to these three categories of users decreases in turn. Because the information products are still in documentary form. These documents can be the end products for the scientific users, but are merely the intermediate products for the latter two categories of users. The focus of information market has been transferred to application-oriented users at present. With the advent of the information society, the public users will dominate the information market. Under this situation, various kinds of information processing organizations and consultation services are set up and vigorously developed. They are newborn things springing up in Chinese information field. Some of them are run by several or dozens staffs. They are scattered among users and provide the right information for the right users in the right time. In the most time they serve as intermediate stations between the traditional information and documentation centres and the end users. The services are oriented to application-type of users, especially for the small and medium-sized enterprises, including the township enterprises and

rural specialized households. They search the information according to users needs from traditional information and documentation centres, process and repackage them as the end products, then send to the local users.

Because the staffs engaged in consultation services are close to the users and have an intimate knowledge of various information sources and retrieval methodology, they play a role which information centres and users could not play. These staffs orient to problems and subjects and provide many forms of services. In recent years, there is an outstanding trend of development in China, various types of information consultation corporations are set up one after another. Its forms are as follows:

1.Part-time information service. For example, Xin Hua Scientific and Technical Service Department in Chongqing has been running successfully without government investment at all. Only one year after founding, there are now 880 staffs. Over 650 items of S & T information services have been fulfilled for more than 350 units and individuals all over China. The services includ searching, translation, consolidation and repackaging, in some cases, providing the samples of products. Furthermore, they go to the users from time to time and send the right information to them. Such an initiative service not only benefits to the current users, but also can promote the potential users becoming actual information users. This service greatly increases the use of information and facilitates the wider dissemination of information. The staffs' salary is based on their service, the more work to be done, the higher salary they will receive.

2.Information consultation certres. They carry out repayable service and sign a service contract with users. The charge depends on:

A.The difficulty or easy of the subject.

B.The degree of urgency.

C.The work force put into and the time spent.

D.Users' utilization result.

This method reflects the objective value of information and raises the quality and standard of services. Some of the information consultation centres are specialized, others are regional. For instance, Chinese Information Centre for Livestock and Poultry is made up of 11 interdepartmental units. Its objective is to strengthen the information service and promote the development of national production in livestock and poultry breeding and processing. It is a nongovernmental joint organization. The users have to pay at very reasonable rate for information services. It collects the livestock and poultry information both at home and abroad, processes them, then provides SDI services to the related enterpreses and rural specialized households.

IV. Conclusion

The demand for information is, in a broad sense, something of an objective phenomenon of the society, which is complicated and ever changing, subject not only to the influence of the tradition of national culture, but also to time and space. The demand for information is closely related with information circumstances, the latter is obviously affecting the former.

With the impact of new technology revolution of the world and under the new situation of overall implementing the system reform at home, it has experienced some changes in information circumstance, information demand, information dissemination and information users with many new emerging features. Hence, to study the changes and the counter-measures to deal with them is our important task at present. One of the measures is full us of favourable situation and direct adoption of domestic and foreign new technological achievements which can result in outstanding economic effectiveness in local conditions. An

effective way of promoting technological progress and economic development is to introduce and to open up new technology, particularly, the appropriate technology which can bring about the better economic results to the society.

Today, all trades and professions of our country put their requests to industrial and technological information institutions. The situation forces us to make a thorough survey of information users' needs, to improve traditional information service, to play the role of information networks, to increase the cross-wise links and to desseminate information concerned directly to the end users. We should further enhance the quality of information personnel, adopt new technological means and strengthen the different forms of information consultation service, the purpose is to quicken the development of industry and technology and the pace of economic construction. In order to serve the national economy and the grass-roots units and meet the diversified information needs of the society, the industrial and technological information institutions and units at various levels should adjust its information policy, the direction and content of services, so as to meet the needs of new situation.