IAEA FAO UNESCO UNIDO

INTERNATIONAL SYMPOSIUM ON THE FUTURE OF SCIENTIFIC, TECHNOLOGICAL AND INDUSTRIAL INFORMATION SERVICES

Leningrad, USSR, 28–31 May 1990

IAEA-SM-317/ 14

INFORMATION NEEDS OF ENGINEERS

THE METHODOLOGY DEVELOPED BY THE WFEO COMMITTEE ON ENGINEERING INFORMATION AND THE USE OF VALUE ANALYSIS FOR IMPROVING INFORMATION SERVICES

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ABSTRACT

The World Federation of Engineering Organizations - WFEO - through the work of its Committee on Engineering Information aims at improving the efficiency of engineers and particularly at developing new attitudes and practices concerning the specialized information mastering

One important part of the WFEO CEI programme of activities during the last years and for the next years was and is devoted to a better understanding of the information needs of engineers But also it seems now essential to WFEO CEI to better evaluate information services in order to correctly adapt them to the identified needs of engineers

The following communication will emphasize these two main and related perspectives

- identifying the information needs of engineers
- developing Value Analysis approaches for engineering information services

1 - SURVEY OF INFORMATION NEEDS OF ENGINEERS
THE METHODOLOGY DEVELOPED BY WFEO CEI AND ITS APPLICATION IN INDONESIA

The Committee on Engineering Information of WFEO (World Federation of Engineering Organizations) published some years ago a methodology for the identification of the eeeinformation needs of the engineer [1] - The Committee decided to test the proposed method in WFEO CEI member countries covering engineers working in key national developement sectors namely

in Hungary pharmaceutical and electronics industries
in Indonesia agricultaral production and industry

An overview of the methodology and its application in Indonesia will be presented

1-1 Methodological Approach for Identifying the Information Needs of the Engineer

Engineers are dealing with information as a tool or work basis Scientific and technical information needs are not to be considered as such but in terms of information destined for technological application and exploitation with a view to industrial development

1-1-1 Characteristics of information depends on the following factors

a function of the engineer decision making research study manufacturing and teaching

b organism research institutes developement and project offices companies and business public administration and services

c economic political and geographical conditions in a given country

d level of training and attitude

The nature of information needs in a given country is determined by the country s level of developement priorities of development and existing means of information and documentation

Why should information needs of engineers be identified ?

Objectives for identification of information needs are to guide the user the information supplier and the policy maker The engineer-user would be guided in identifying their needs and choose priorities evaluate cost and time Business and companies needs to choose priorities and fix possible costs define medes of operation Information suppliers needs to situate outlets and define clientele determine products and promotion Professional associations have to create information facilities and fix priorities Governments must determine information policy develop production and utilization of instruments for efficient industrial development

1-1-2 Procedure for data gathering and evaluation of results

The methodology for identifying the information needs may be broken down into 3 stages

- definition of the aim
- specification of the kind of operations
- identification of data required

- the data gathering process and evaluation of results to answer the initial target

- follow-up and analysis of divergencies

The aim of the survey should be clearly defined whether it concerns the engineer-user information facilities or information policy

Identification of data required should be referred to characteristics of information according to function of the engineer the organism in which he works level of training and attitude The condition of the country will determine the sophistication or depth of the items required

In gathering the data the following methods may be utilized

- statistics of information and data centers

- user's own records of reactions and information utilized

- questionnaires

In addition two following methods are proposed

- analysis of sectors and activities under consideration to identify information supposed to be necessary to their running and development

- sampling techniques

Statistics concerning data used provide an image of both users and information service provided but its relevance to the analysis depends upon the kind and quality of the statistics which in turn depends on the parameters defining information needs They only indicate effective - not potential - utilization

User's own record of his activities, the information he used and the difficulties he confrontsmay furnish an undistorted "photograph" of the subject. But as it is difficult to follow-up observation of all users, it is advisable to create user-panels by selecting a certain number of typical potensial users and follow the expression of their needs But from such a panel a bias factor may arise from the selected test population, therefore broader surveys should be carried out to verify the representativeness of the panel

Questionnaires allow consultation of organisms and subjects whether or not they are information users But because users are frequently solicited to answer questionnaires the number of replies are constantly going down (5 to 10 % for distribution by mail) Thus, it is useful to design a brief questionnaire one page recto verso for a written questionnaire and a half hour interview for oral questionnaires It is also important to fix limits on the number of targets prior to drawing valid conclusions The grill for analysis of answers should always be drawn up prior to designing the questionnaire Problems for analysis should be defined from the outset and the questionnaire drawn up in consequence Exhaustive enquiries is steadily decreasing representative sampling should be sufficient with subsequent generalization of results

In formulation of questions there are three possibilities namely closed questions - calling for yes, no answers guided questions with several predetermined answers and open questions - calling for comments or explanations.

Diffusion may be carried out by mail or through interviews Postal surveys allow large number of subjects and are easily conducted but give poor returns Date limits are seldom respected so that reminders are necessary Interviews permit more detailed results but consequently limited number of subjects Interview guides will be preferable to straight questionnaires The choice between these methods depends on means targets and consultation possibilities A combination of both methods is often preferable

In choice and definition of sample population a nomenclature of user categories should be established giving each group s size and geographical situation Next the number of potential subjects (persons or organizations) should be defined

1-1-3 Evaluation of Results

Results should be interpreted in keeping with the initial objectives to identify

- field of knowledge to explore characteristics of information according to field of interest usefull topics and kind of information which kind of data could not be obtained.

- sources apt to provide maximum security of information and their geographical origins

- category of organizations and by type of action the different forms whereby information may be transfered rating cost and speed of reply

- existing suppliers of defined products and conditions of supply in terms of accessibility time and cost

1-2 Application of the Methodology in Indonesia

The choosen sector "agricultural production and industry" was devided into four subsectors including supporting upstream fields namely

- irrigation concern of the Ministry of Public Works

- fertilizers and pesticides concern of the Ministry of Industry

- machinery and equipment concern of the Ministry of Industry

- agricultural production concern of the Ministry of Agriculture

Use and application of fertilizers pesticides machinery and equipment naturally comes under the administration of the Ministry of Agriculture

In selection of the sample population the Committee was fortunate that the Indonesian Institute of Engineers conducted a registration of engineers in 1951 so that it could be utilized as reference for identifying distribution of functions and types of occupation It was also used as source of target addresses especially for thee production subsectors which are geographically scattered over the many islands This census also shows that agricultural engineers are the highest in number compared to other disciplines in line with the priority of national development policy in agriculture Directories issued by the corresponding Ministries provide the organizational set up and distribution of public administration and main (government owned) factories This source is important as statistics show that about 55 % of the engineers are occupied in the government sector which may be typical of a developing country Another useful reference are the annual

conference proceedings of professional associations, which reveal authors and participants not only from the directly concerned industry but also from (unexpected) related fields. But nevertheless some subjects identified for one subsector turns out for another one as the respondent identified himself otherwise.

Identification of data required was compiled according to "characteristics of information" considering also the questionnaire of Hungary as an example and the WCEO-CEI study on Engineer's needs for scientific and technological information "2". A simplified questionnaire was compiled consisting of two pages only in line with recommendations of the Methodology also considering local conditions, as engineers in Indonesia may not be trained or familiar with the use of sophisticated information services. Classification of functions was compiled according to the 1981 registration of engineers which actually do not differ much with the Methodology. Sources of information were identified according to the above mentionned references along with reading language ability considering that as a developing country the bulk of information originated from foreign (western countries (as against 80 % local information used indicated by the "Study") This is also apparent from the main journals utilized which are predominat foreign. Access to information was identified written as well as face-to-face communication.

In formulating the questions guided questions were applied only the final question forms a request for recommendations on improving information services. But during interviews naturally many open questions were put forward. Libraries of each subsector were visited and the librarian consulted on information availibility and use.

The bulk of the questionnaires were sent by mail. Addresses identified through the registration of engineers were sent in excess, in view of the many unknown factors such as change of address or occupation. A 19 % response was received which is much higher that the 5-10 % anticipated by the Methodology for distribution by mail. This concerns most of the scattered occupation of the production subsector which are not backed by visits. 25 visits were made to main targets for interviews with key engineers and librarians who then help to distribute or recommend addresses for the questionnaires, so that a good cross section of engineers in their organization could be represented. Of the 573 questionnaires an overall response of 20 % was received from the first round. After one reminder it increases to 29 %. As the country is widely scattered, the geographical distribution was taken into account although the capital as seat of the Government was higher represented.

Instead of elaborating on the survey results evaluation of the application of the Methodological Approach will be discussed.

Following the survey a workshop on information use of Engineers was conducted in 1985 with financial aid of UNESCO ROSTEA. For this workshop engineering information and data sources was compiled for introduction to the users and information workers, and subsequent evaluation at the closing session which could be viewed as a user-panel, as the participants were selected to represent nearly all sectors of engineering (except for agricultural engineers because the survey shows that this field is the best served). The workshop's conclusions shows that information sources presented covers most of the engineer's needs and is even considered overflowing. It also considered the existing network of scientific and technological information services adequate to fulfill their needs. The material collected was then compiled into a guide for data and information sources for the engineer in Indonesia, adding site specific data sources indicated during the workshop.

In 1988 the application of a WFEO/CEI Guide of Consolidation of Information was compared to existing COI services in the same sectors covered by the above survey. This study also shows the prominency of agricultural information services compared to other fields due to national priority in development. Compared to recommendations of the guide, requirement of staff and product of services are less sophisticated, and consequently time limits to fulfill

requests are much shorter COI is relatively a novelty in Indonesia and has no definite place in each organization as yet It may be an extension of library information and training services but it may also be produced by research centers or non-profit organizations

1-3 Evaluation of the Application of the Methodology

The WFEO CEI Methodological Approach for Identifying the Information Needs of Engineers provides a very useful basis from which to start a survey on engineering information needs in a given sector It provides the philosophy behind dthe survey conditions and characteristics of the engineering society and its information needs It gives a choice for the modes of execution of the survey and reminds us to keep to initial objectives in evaluating the results

Beside the Methodology the Study on Engineer s Needs for Scientific and Technological Information issued by WFEO CEI in 19~9 was also helpful especially as checklist of items for identification

Examples of questionnaires in related fields should be consulted to obtain a better view of possibilities although as the Methodology warns they can never be simply copied because objectives and conditions vary from one survey to the next

Selection of target addresses is very important to obtain a representative cross section of the sector surveyed and to receive a meaningful response quantitatively as well as qualitatively Therefore data on the engineering population should be available as reference in the form of a census directories and conference proceedings

Interviews with information workers librarians in the given sector provides the other side of the picture to confront replies from the user-engineers served

Key engineers and librarians are effective channels for distribution of questionnaires in their respective organization

2 - VALUE ANALYSIS APPLIED TO INFORMATION AND DOCUMENTATION SERVICES

The Value Analysis method largely used by industrialists for increasing their competitiveness has recently be applied in the field of information and documentation

Numerous experiences developed in France during the 10 last years allow now to consider VAID - Value Analysis in Information and Documentation - as an essential tool for improving the functional quality of the information products and for reducing the non-user-oriented cost of these products or services

WFEO/CEI is particularly looking at the possibility to systematically use VAID in order to better satisfy the information needs of engineers - which have been previously identifiedddd thanks to the general methodology developed by the Committee

2-1 How to define Value Analysis

In few words one could say that the Value Analysis is based on a mix of various concepts such as

- methodological developement
- design process improvment

- user needs understanding and satisfaction
- cost reduction or cost mastering
- information and knowledge cross fertilization
- team work
- creativity

A simple definition of Value Analysis could also be the following VA is a method for improving the design of products and services in order to increase their quality and to reduce their cost

A more detailed definition which is included within the French Standards on VA considers that VA is a method for competitiveness which aims the satisfaction of the needs of the user through a specific approach for designing products and services based on

- system analysis
- functional analysis
- cost analysis
- group or team work
- creativity and innovation
- methodological developement and strict job plan

2-2 The French experience on VAID

At the end of the seventies some papers begun to be published in France which demonstrated the usefullness of VA for improving information products and services

The first VAID studies appeared in 1950 and a general research work on this topic was supported by a French national Agency - ANVAR - for examining the possibilities of applying Value Analysis within information and documentation sectors Considering the success of these first experiences information professionals decided to largely promote the application of VA in the field of information and documentation Thus the French Documentalists Association - ADBS - Association des Documentalistes et Bibliothecaires Specialises - proposed to include VA within its continuing education programme in 1955 two first level seminars are regularly proposed now every year and a second level seminar is organized since 1988 Regional conferences have also been organized in 1989 More than 400 information specialists have been informed and trained in 1988 and 1989 in France

Schools and universities educating and training information and documentation professionals introduced now lectures on Value Analysis in their courses

Big information companies advanced documentation centres as well as small and medium sized units introduce now VA in their developement programmes either for improving the general quality of their services or for re-designing their information products

At last recently the first book devoted entirely to "VAID" - Value Analysis in Information and Documentation - has been published [3]

2-3 Examples of recent VAID studies

During the 10 last years VAID has been applied to various subjects such as

-the check up of small-sized and medium-sized documentation centres

- the definition of a new methodology for creating Standards Information Centres within developing countries

- the creation of a new mixed 'information-formation' product within a Business-School

- the creation of a new ressources centre within an Engineering School in Algeria how to correctly adapt the possible information means to the real needs of the students and teachers and to the specific resources limitations

- the reduction of the cost of a full-text data base of a French Press Company and the improvment of the usefulness of the data base for the users (journalists)

- the re-definition of the role of the abstracts within a computerized bibliographic data-base how to choose the right words and the right style in order to help the users

- the choice of a new and adapted solutions for stocking documents in the context of very strong room constraints

- the improvment of the quality of the welcome and the orientation of the users in a documentation centre

- the evaluation of a big and well-known French bibliographical data-base devoted to agriculture

The diversity of the subjects and of the situations clearly show that VA is a general method which can be used every where when a precised problem has to be solved and when it exists a conscious need for increasing the competitiveness of the concerned documentation centre or unit

Thus more and more engineers need

- new adapted work methodologies such as Value Analysis

- but also very adequate information systems taking into account the true information needs

The Committee on Engineering Information of WDEO will try, during the next four years, to establish links between on the one hand, information needs identification and information services development and on the other hand, Value Analysis and other work methodologies, links which could be appropriated to engineers for the 21th century

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[1] WFEO/CEI Methodology for Identifying the Information needs of the Engineers UNESCO Paris (1954)

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[3] MICHEL J. SUTTER E Valeur et Competitivite de l Information Documentaire ADBS. Paris (1955)