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Consultation Panel on the Use of Minicomputer  
Systems to Manage Industries,\*

Budapest, ~~Hungary~~, 4-8 December 1978

REPORT

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\* This was not one of the consultations called for in paragraph 66 of the Lima Declaration and Plan of Action and should not be confused with any of the "consultation meetings" organized by UNIDO in response to that call.

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## INTRODUCTION

The Consultation Panel on the Use of Minicomputer Systems to Manage Industries was held at Budapest from 6 to 8 December 1978. The Panel was organized by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Government of Hungary acting through the International Computer Education and Information Centre (SZMOK), and the Institute for Economy Organization and Computerization in Metallurgy and Engineering Industry (KG-ISZSZI).

The purpose of the Panel was to bring together computer application experts, managers and government officials from developing countries responsible for the management of industrial enterprises, manufacturers of computer systems and management consultants to discuss problems and possibilities of using minicomputer-based management systems to manage industrial enterprises and to make recommendations with a view to enhancement of management capabilities through computer-based management systems. It was expected that the Panel would help to identify the needs and problems of developing countries relating to the subject, to promote technical assistance to and co-operation among developing countries, and to give examples of experience available in industrialized countries.

The Panel was attended by 9 participants from six developing countries, 12 discussion leaders and 38 observers. The names are listed in annex I and titles of the papers presented are shown in annex II.

The convening of the Panel reflected an awareness that the technological development of the minicomputer has made its use so flexible that the areas of application have been expanded to a great extent and accordingly many promising - as well as problem - areas have emerged. The application of minicomputers in industrial management can be cited as a typical example.

The growing complexity of industrial activities and organizational requirements make it necessary for managers to be currently aware of:

- (a) The appropriate management applications of minicomputers;
- (b) The problem areas envisaged in the selection, design and implementation of minicomputer-based management systems.

UNIDO involvement in the management application of minicomputers has revealed that there is a growing need for assisting developing countries in this field. Those who participated in previous UNIDO meetings on subjects related to industrial management have voiced the necessity of continuous promotion of such catalytic activities as holding meetings and panel discussions.

## RECOMMENDATIONS

The Panel made the following recommendations:

1. Recent developments in minicomputer technology have created considerable flexibility in computer usage and have opened up new possibilities of applications. In view of the different levels of socio-economic development of developing and developed countries the optimal and effective use of minicomputers in the industrial management of developing countries should be worked out. In accordance with the Lima Declaration and Plan of Action, UNIDO must assist the developing countries in the "progressive mastery of the different production and management techniques". Therefore, in an attempt to develop management capabilities through the application of minicomputers, consideration must be given to the progressive changes in the socio-economic conditions of developing countries.

2. In view of the fast-changing minicomputer technology and varying specific implementation problems of developing countries it is recommended that UNIDO should provide a common means of exchange of information on applications software packages, and a means of sharing case studies of projects on the introduction of computerized management of industries in developing countries. The sharing of information on applications software and system implementation will be of considerable significance for the evolution of an effective strategy for the development of dynamic managerial capability in developing countries. Since software aspect of minicomputer usage poses a difficult problem, it is recommended that UNIDO provide to the users in developing countries a suitable software development, implementation and maintenance service with a software sharing library.

3. In order to develop a significant level of computerized data processing capability in developing countries it is necessary that suitable skill development programmes be evolved and organized in different developing countries. Standardized skill development programmes for data processing personnel and suitable training programmes for instructors must be developed. In addition to the skill development programme, an appreciation programme should be developed for industrial managers in developing countries so that they can effectively interact with the data processing personnel.

4. In order to provide effective dissemination of information of software and co-ordination of skill development it is recommended that UNIDO identifies suitable regional centres for exchange of information and co-ordination, through the organization of workshops, seminars and regional meetings.

The selection of regional centres should be made on the basis of the availability of expertise and experience of implementation of industrial management systems.

5. Since the application of mini-computer-based industrial management systems has its own problems of implementation and organization it is recommended that UNIDO stress a catalytic promotion of indigenous consultancy organizations in order to generate self-supported management capabilities in developing countries.

6. In view of the importance of information management in social organization it is recommended that the attention of the governments of developing countries be drawn, and these governments be requested to, establish a respective National Organization of Data Processing in their countries, with appropriate allocation of resources for hardware, software and implementation of systems. It is recommended that each of these national organizations tries to evolve common data processing procedures in their countries, e.g. product code etc., at a national level. Subsequently, the representatives of the National Data Processing Organization may evolve common standardized procedures and practices in information management technology.

## I. ORGANIZATION OF THE PANEL

The Panel was opened by Mr. A. Gábor, Deputy Minister, Ministry of Metallurgy and Machine Industry, of the Hungarian People's Republic, who pointed out that providing technical assistance for developing countries has become an integral part of Hungary's international policy.

The use of minicomputer systems in industrial management is the second discussion, in the form of a Consultation Panel, arranged by UNIDO, in Budapest.

In reviewing the development of minicomputers, it was found not to be an accident that the production of "minis" doubled every second year. The main aim being to make computers available not only for the larger but also for the smaller enterprises. Present requirements for such computers are that they are small and require a minimum of computer competence from the user.

The use of minicomputers is of special importance for developing countries. In this respect, Hungary may be of assistance in providing valuable information on their production and their application. It was expected that the present Panel achieved the following goals:

- (a) To identify the fields in which considerable experience has already accumulated in minicomputer application;
- (b) To elaborate possible use of minicomputers in the management of industries in developing countries;
- (c) To provide opportunities for creative discussions resulting in the preparation of programmes of action for minicomputer uses; and eventually to enable the foundation and the involvement of the technical assistance programme of UNIDO in this field.

The Acting Head of the Factory Establishment and Management Section of UNIDO made the following points:

- (a) Minicomputers are foreseen as one of the most effective management techniques of the future;
- (b) They do not take the place of industrial management, whose role is indispensable to certain aspects of the decision-making process; rather, some areas of their application can be utilized to provide the generated information to be used as the basis for decision making;



(c) The computerized dissemination of intelligence will concern a great number of non-electronic data processing (EDP) staff who will have become computer users either at the top management level or at the routine work level;

(d) "Computer-based management system" does not mean replacing people by machines - the vast majority of computer-based management system applications involve the use of computers to support and augment the work of the people, not to replace them.

At the opening session the following officers were elected:

Mihály Végh, Director of KG-ISZSZI, Hungary, Chairman; Ferenc Dénes, Deputy Director, SZAMOK, Hungary, Vice Chairman; and Ashok Sharma, India, Rapporteur.

Individual presentations were initiated by computer hardware and software suppliers and consultants using visual aids. Later, discussions took place on some specific aspects of the respective presentations. At the Panel's commencement the problem areas of hardware and software, and appropriate approaches to the design, implementation and maintenance of minicomputer-based management systems were the main topics of discussions. The present involvement of UNIDO and a possible co-operation scheme were then introduced as topics. Participants from Algeria, Cuba, India and Thailand made presentations, describing the general state of the art in each country as well as indigenous problems.

The actual applications of minicomputers in the sugar-cane industry, introduced by the Cuban participant, indicated the possibility of transferring such experience to other developing countries in co-operation with UNIDO. The Algerian participants emphasized the necessity of establishing a national organization of data processing in developing countries. Indian and Thai participants pointed out that: (a) human resources are the most important factor for the implementation and maintenance of successful computer-based management systems, and (b) the skill development programme and management consultancy capability enhancement scheme should be emphasized in developing countries (a summary of discussions follows).

At the closing session, the observers summarized their present use of mini-computers and expressed their interest in future co-operation with UNIDO.

## II. SUMMARY OF THE DISCUSSION

Two aspects of the usage of minicomputers in improving the industrial management capabilities in developing countries were highlighted:

- (a) The technical considerations of the hardware and software;
- (b) The question of the desirability and viability of minicomputer applications under the different socio-economic conditions of the developing countries.

Since the Lima Declaration clearly envisages a "progressive mastery of the different production and management techniques" by the developing countries, it must be clearly realized that industrial management techniques must follow certain stages of socio-economic development.

However, the method of application of minicomputers for accelerating the pace of industrial development in developing countries must be carefully examined and its optimally effective usage must be delineated. Although the more advanced nations' technical experience of minicomputer technology is valuable for developing countries, their experience in industrial management is not totally relevant because of obvious differences in socio-economic conditions.

It must, however, be clearly realized that the recent emergence of minicomputer technology has introduced considerable flexibility in computer applications and has opened up new areas of potential applications. In view of these developments, which are still taking place, the question of its effective application in developing countries must be realistically examined and an optimal strategy must be worked out. On this point, a realistic view of the socio-economic conditions of the developing countries must be taken into account. Thus, it is envisaged that a different mode of minicomputer usage may be found suitable at the initial stage, which may progressively coincide with that of developed countries as the gap is narrowed.

The present state of the art of minicomputer technology and its future direction were also discussed and it was realized that a variety of new modes of its application may have to be thought out, especially in its application at the lower levels of economic operations in developing countries. This exercise is not a trivial operation; it requires a concentrated effort of experts in minicomputer technology together with a realistic understanding of the operational conditions in developing countries. An effort from UNIDO will be necessary in view of the uncertain market potential in developing countries. Because of this it is not yet clear whether manufacturers will develop special management application systems suitable to developing economies.

A. The present state and future possibilities  
of minicomputer technology

The continuous and progressive reduction in the cost of manufacturing LSI and MSI (large-scale integrated circuits and monolithic semiconductor integrated circuits) has considerably reduced the hardware cost of computer installation and has also introduced a variety of alternatives. The main changes foreseen in the computer hardware characteristics are: terminal orientation, higher degree of modularity, standardization of interfacing devices, and lowering of the cost of peripherals. These changes in hardware characteristics have introduced considerable flexibility in computer system designs and extensive versatility in their application. In fact, the computer applications in developing countries are no more hardware cost-limited, but, at the present time, a suitable hardware of moderate cost can always be found for specific applications. In the near future, further reductions in the cost of minicomputer hardware and progressive increases in its versatility are expected.

The recent developments in hardware technology of minicomputers have been encouraging and favourable for their application to developing countries, but the software considerations have been posing discouraging problems for their extensive application. In this connection, it must be noted that, whereas hardware cost was previously the main expenditure of a computer installation, the software cost has now become the major item.

With the availability of a variety of machines on the market, the software support and their inter-machine compatibility have become a problem. It must, therefore, be clearly noted that more serious efforts have to be made by UNIDO to enhance the software handling capabilities of the developing countries. In the meantime a centre for exchange of application software should be established so that the efforts of the developing countries are not limited by the bottleneck in the availability of software information.

The main advantage of the resurgence of the prolific minicomputer technology is that a tailor-made system of any volume-handling capacity can be designed for specific applications. Moreover, considerable advantages can be obtained by designing distributed data processing systems with multiple interactive machines which can be geographically located at different points.

In view of the present versatility and flexibility of minicomputer applications a spurt in the minicomputer manufacturing industry has been experienced in recent years, registering a growth rate of 200 to 300 per cent in the period between 1974 to the present day. In fact, such a large variety of hardware equipment is now available, that a specialized procedure has to be adopted for the technical evaluation of the suitability of the required management system.

B. Computer applications in developing countries

The conventional meaning of the development of a country is the transformation of its predominant agrarian economy into an industrial economy. In an agrarian economy the average time-constant of operations is much larger than in an industrial economy. Consequently, considerable advantages are derived if in a developed industrial society the time-constant of reliable information processing were lowered by the introduction of computers. On the other hand, it is apparent that the application of computers in a developing society will not produce the same cost-benefit ratio as in a developed society. This fact was also noted by the first Consultation Panel discussion in 1976 on the use of management information systems for raising industrial performance. It was mentioned in the summary of that discussion that "it was felt that for developing countries more research and development should be devoted to the areas of company organization and data organization as basic prerequisites for introducing and using planning and control systems effectively". This is still valid today and a concentrated effort has to be made in the orientation of the industrial managers of the developing countries so that they may be able to generate an appropriate management environment in which the computerized management techniques can be effectively introduced with an acceptable cost-benefit ratio.

It must be noted that the experience of developed countries has been limited to computerization at a higher level of socio-economic organization. It is, therefore, necessary that UNIDO undertakes a study of the application of computers at a relatively lower level of socio-economic organization, and how they can be effectively utilized for enhancing the organizational capability of the managers of the developing country. Such a study is of vital importance and should be carefully planned. Considerable advantages in the understanding of the problems of the computerization in developing countries can be obtained if UNIDO actively develops an indigenous management consultancy service in developing countries.

It is apparent that the developing countries are at various stages of socio-economic development, and a planned effort has to be made to enhance their information management or data processing capabilities.

Annex I

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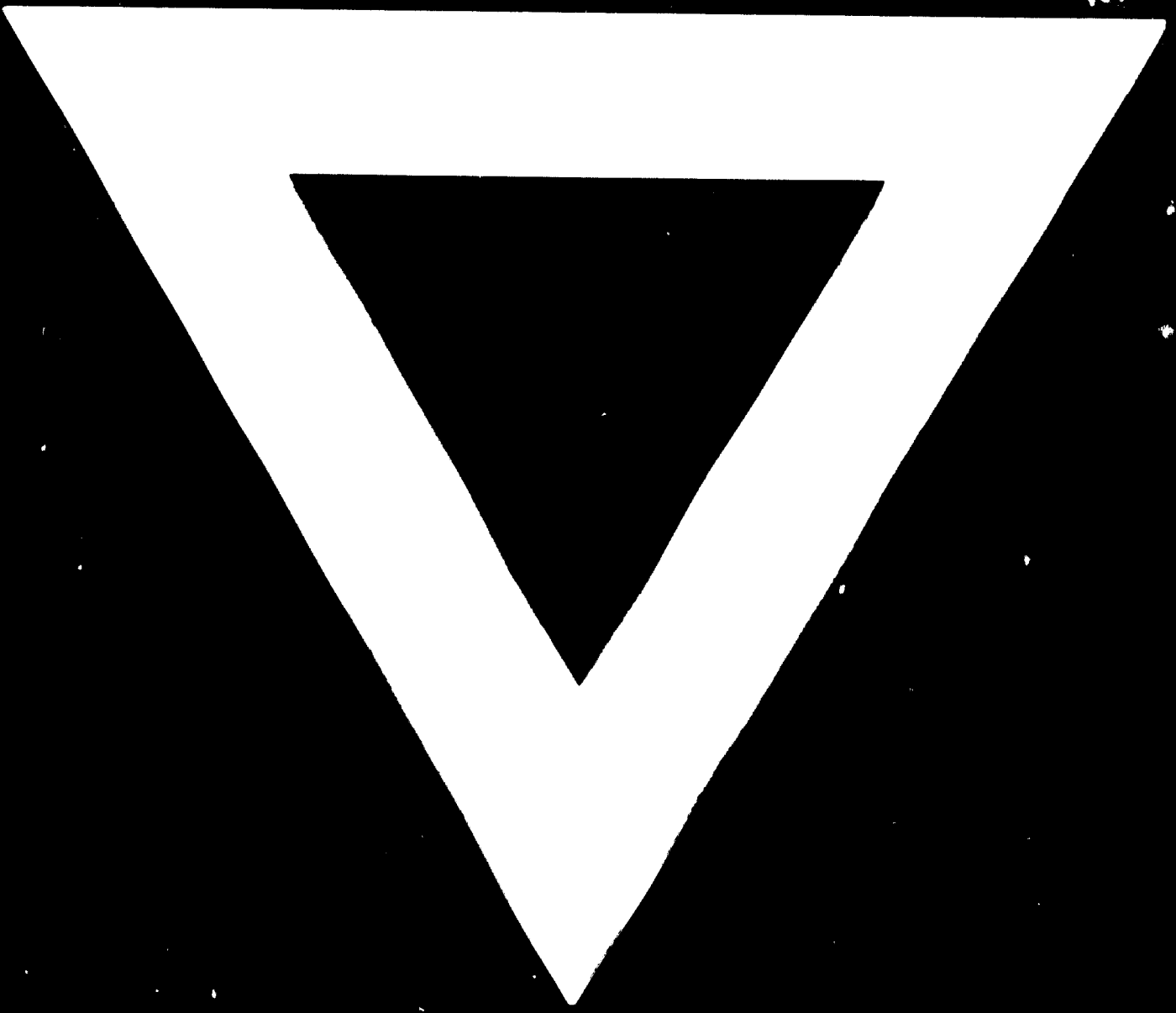
Annex II

PAPERS PRESENTED AT THE PANEL

- ID/WG.288/1 Commercial and Business Application for the TPA Minicomputer Family,  
A. Szabo, KFKI, Hungary.
- ID/WG.288/2 Application of Small Scale Computers in Industrial Management,  
Secretariat of UNIDO.
- ID/WG.288/3 The Computer Impact in Thailand, Kwanchai Kanarat,  
National Statistical Office, Bangkok, Thailand.
- ID/WG.288/4 A Review of a Very Good Minicomputer Application in the Austrian  
Paper Industry,  
Paul E. Martin, EXEC AG., Basel, Switzerland.
- ID/WG.288/5 Possibilities of the Hungarian Participation in the Co-operation  
with the Developing Countries in the Computer Field,  
L. Sipka, Institute for Co-ordination of Computer Techniques,  
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