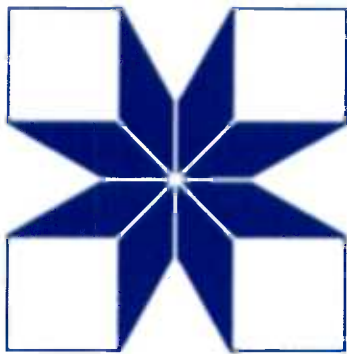


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NATIONAL INFORMATION AND INFORMATICS POLICIES IN AFRICA

REPORT AND PROCEEDINGS
OF A REGIONAL SEMINAR
HELD IN ADDIS ABABA, ETHIOPIA
28 NOVEMBER – 1 DECEMBER 1988

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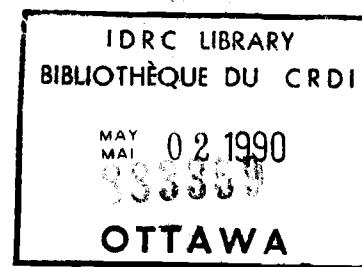
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NATIONAL INFORMATION AND INFORMATICS POLICIES IN AFRICA
Report and Proceedings of a Regional Seminar

Addis Ababa, Ethiopia
28 November - 1 December 1988

International Development Research Centre (IDRC)
&
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Shahid Akhtar
Editor



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**NATIONAL INFORMATION AND INFORMATICS
POLICIES IN AFRICA:
REPORT AND PROCEEDINGS OF A REGIONAL SEMINAR**

**Addis Ababa, Ethiopia
28 November - 1 December 1988**

**A PRACTITIONERS' POINT OF VIEW
ON NATIONAL INFORMATICS POLICIES IN TANZANIA**

**C. Ndamagi
Tanzania Railways Corporation**

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I. REFERENCES

A. INTRODUCTION

This paper provides an up-to-date review of the current informatics situation in Zimbabwe including computers, telecommunications, software bases, consultants, education and training, informatics policy, the computer in society, and industrial infrastructure. In Zimbabwe, the link between the informatics and information sectors is slight.

Informatics is a relatively new concept which was first defined by the French Academy in 1966 as "the science of the systematic and effective treatment, especially by automatic machines, of information seen as a medium for human knowledge and for communication in technical, economic and social contexts". Although still valid, this definition has undergone slight modification over the years.

Informatics is closely associated with the concepts and disciplines of information and computer science. The primary concern of informatics is information.

It is, therefore, a technology developed to promote the efficient collection, processing, organization, generation and dissemination of information, for effective application in social, political, economic, technical and other spheres of activity.

Informatics is still evolving. As new developments continue in microelectronics, telecommunications and computer technologies, so informatics changes, and the resulting impact, increase. In order to control informatics development in Tanzania and to achieve a rational system, a national policy is vital. This paper will discuss the content of such a policy in Tanzania, giving particular attention to computer technology, the major driving force behind informatics.

B. OVERVIEW OF INFORMATICS IN TANZANIA

i. Introduction

In Tanzania, the use of information technology with electronic computers began when the first computer, an ICT 1500 mainframe, was installed by the Government in 1965.

Since then, there have been many developments although, as in many developing countries, the pace has been modest. The number of computers, especially of micros, is now growing at a phenomenal rate largely because the silicon chip revolution has made large scale integration (LSI) technology feasible. This has resulted in improvements in computing power at greatly reduced hardware costs.

ii. Computer Hardware

All computer hardware in Tanzania is imported since the requisite local technological infrastructure and expertise is still very low.

Although the importation of computers into Tanzania is controlled and recorded, a precise count of all computers presently in the country is not possible. Records of permits issued to various institutions to import computer systems into the country have existed since 1980 in the Ministry of Finance, Economic Affairs and Planning. These records, however, are not an accurate reflection of all the computers in the country. Some systems for which permits were obtained may not have been imported, because purchasers may have changed to systems entirely different from those for which permits were issued. There are no figures for systems which may have been disposed of. Furthermore, a certain number of systems undoubtedly found their way into the country without being recorded.

The statistics quoted in this paper, therefore, are based on a recent analysis of a sample of 778 computers and related equipment obtained from import-permit records and maintained by the Director of Computer Services, in the Ministry of Finance, Economic Affairs and Planning. No attempt is made to express this sample as a percentage of the total.

On the 778 computer units analysed, more than 66 per cent are in the public sector. The following table shows the distribution of operational computer systems in the public and private sectors in Tanzania.

DISTRIBUTION OF COMPUTERS BY SECTOR

TANZANIA

Sector	Micros	Minis	M/Frames	Other	Total	%
PUBLIC						
i) Government	223	7	3	4	237	30.5
ii) Parastatal	223	23	15	17	278	35.7
PRIVATE	235	16	4	8	263	33.8
Total:	681	46	22	29	778	
Percentage:	87.6	5.9	2.8	3.7		100.0

As expected, most of the hardware is located within 40 km of Dar-es-Salaam, the main commercial centre, reflecting resource availability (personnel, infrastructure, etc.) and market focus.

In recent years, microcomputers have made a significant impact on the Tanzania market. The trend is understandable because microcomputers are becoming cheaper while still retaining all the power necessary for the average user's computing needs. More than fifty different brands are recorded ranging from "Acorn" to "Zenith", and mostly with no after-sales services. According to a 1986 survey, the most popular brand was Apple with a 13 per cent share of the market, followed closely by Wang PCs at 12.5 per cent.

There are still very few mainframes and these are found mostly in large organizations. They account for less than 3 percent of all computer units currently installed. The most common mainframes are the ICL ME29 series, with 10 units in 10 installations, followed by Wang with six units in four installations.

At present there are at least seven active vendors of computer products in Tanzania:

Business Machines Limited (BML):

Agents for Apple and Olivetti equipment;

Computer Corporation of Tanzania Limited (CCTL)

Agents for Wang Computers;

International Computers Limited (ICL):

Represented by Computers and Telecoms Systems Limited (CATS) for ICL computers;

International Communications Systems Limited (ICS):

Agents for IBM Computers;

MEECO International Limited (MEECO)

Agents for Unisys systems;

NCR Corporation (Tanzania) Limited (NCR)

Representatives of NCR machines;

IMS Computer Limited (IMS)

Agents for Amstrad and Tandon computers;

In 1986, BML led the market with 21.4 per cent of the installed units, followed by CCTL with 16.1 per cent and ICL with 8.8 per cent. Recently, however, Amstrad and IBM PCs have made significant inroads into the local market.

iii. Software Availability

Most computer applications in Tanzania are developed locally. Each installation handles its own software development. In the absence of necessary expertise, local consultancy services are used. Few locally developed standard packages suitable for nationwide use are available to date.

The most obvious aspect of this approach is the unnecessary duplication of efforts in applications and software development. Thus, there is a need for a common form for the packaging of such efforts, particularly in view of the meagre personnel resources available.

A complete list of all the installed and operational computer applications is difficult to compose. The most common applications, however, include:

- (a) Financial systems - e.g. payroll, pension, accounting, billing, fixed assets registers, insurance policies, savings accounts, debtors and creditors ledgers, costing. etc.
- (b) General Management Information Systems - e.g. personnel statistics, stock control, airline passenger reservations, budget control, spreadsheets, etc.
- (c) Planning and Development Models - e.g. population census, agricultural census, various statistical systems, hydrology surveys etc.
- (d) General Office Automation - e.g. automatic telex message routing and recording, word processing, etc.

During the last seven years, there have been many hardware acquisitions, accounting for more than 97 per cent of the cumulative total since 1965. The development and implementation of new applications, however, has not been as great.

The individual level of sophistication of each application normally varies from institution to institution.

The majority of existing applications are in the financial area, showing that much remains to be done before computers are fully integrated into the overall planning and decision-making process.

iv. Software Packages

There is an almost total lack of ready-made software packages in Tanzania, especially on mainframes. All microcomputer software is imported. This dependence on off-the-shelf software is understandable

since most micros are in nonprofessional hands, in terms of software development. Other factors also contribute to the lack of ready made software:

- (a) Ineffective software marketing to the users, who remain ignorant of what is available.
- (b) Management unwillingness to outlay the investment necessary to develop a computer application.
- (c) General ignorance on the subject of information technology, resulting in the commonly held opinion that computers are only useful for payroll and accounts.

C. HUMAN RESOURCES AND TRAINING

i. Human Resource Availability

The number of Tanzanians professionally trained in informatics is still small - probably no more than one to two hundred. This is not adequate to meet present demand. In addition, some of these professionals unfortunately are not in the country and others are in unrelated jobs. The local salary structure for I.T. professionals is partly responsible for this situation. According to the Computer Association of Tanzania, there are about 60 registered members in the professional category.

There is also the semi-professional level with exposure to microprocessing using off-the-shelf software such as wordprocessing, spreadsheets, etc. Over the last two years, more than 300 people have attended such training in local private institutions.

On the non-professional side, there are many Tanzanians who have been exposed to this technology. They include professional accountants, managers, economists, etc. Most professions now include computer studies in their curricula. These are not easily quantifiable but they play a significant role in enhancing the application of the technology.

ii. Training Facilities

Computer science training began in 1969 when supplementary computer science courses were introduced at the University of Dar es Salaam. Development has been slow and training facilities in information technology remain poor, despite recent efforts by the private sector. This may possibly result from the absence of an overall national policy on information. Training facilities and courses exist in the following institutions:

- (a) University of Dar es Salaam
After the basic training courses in computer science which began in 1969, a one year postgraduate Master's Degree course in computer science was introduced in 1974. The course has experienced several problems, however, particularly the absence of appropriate teaching staff. Only 12 Tanzanians have attended this course and, of these, not more than six are active professionals in information processing.
- (b) Institute of Finance Management
In 1974, it was recommended that the Institute offer higher and professional courses in computer science. To this end, the Institute bought an in-house microcomputer, but its present major application is payroll processing and the data processing course, currently offered, as a complement to accountancy and financial courses.
- (c) Institute of Development Management
A similar recommendation was made to the Institute, to offer short courses in computer studies. Preparations were initiated and at least two lecturers were sponsored for computer studies in the UK. Two such lecturers have, however, since left the Institute for jobs elsewhere. Computer courses are run only to complement accountancy courses.
- (d) National Institute of Productivity
NIP started short courses and consultancy services in computer studies in 1974 where a specialized unit was established. The unit no longer exists, however, and the staff have left to take up other jobs.
- (e) Eastern and Southern Africa Management Institute (ESAMI)
This is a regional management training centre. Short courses and seminars are conducted on a consultancy basis and are offered regularly in systems analysis and design; computer operations management; micro computer courses and programming.

These are the public institutions where professional training in informatics should be taking place. With the exception of ESAMI, however, the performance of the rest is far from satisfactory. Several local institutions in the private sector also conduct training courses in computer studies.

- (f) International Computers Limited (ICL)
ICL now offers regular short and full time courses in computer studies in the best equipped training centre in the country.

- (g) Dar es Salaam Institute of Computer Science and Management (ICSM)
This institute offers micro-computer based courses in word processing, computer appreciation and BASIC programming.
- (h) IMS Computers Limited
The training centre opened recently and offers courses in word processing.
- (i) Advanced Commercial Institute
A new course in word processing has recently been introduced at ACI, which is mainly a secretarial training institute.
- (j) MEECO International Limited
MEECO plans to establish a new training centre.

All private sector training facilities have emerged within the last three years. It is interesting to note that, while the public sector has remained static, the private sector has become increasingly involved in this area.

Advanced and professional training is only available abroad and, since access to such courses requires foreign exchange, there are considerable limitations on Tanzanian participation.

D. INFORMATICS INSTITUTIONS IN TANZANIA

Computer technology in Tanzania is largely the responsibility of the Treasury, Ministry of Finance, Economic Affairs and Planning. This is the result of historical events rather than of deliberate government policy. The Government Computer Centre, which was the first computer installation in Tanzania, has always been under the Treasury. Thus, all matters pertaining to computer technology were put under the control of the same Ministry. In practice however, Ministry involvement has always been limited to controlling the import of computer hardware.

The need, therefore, for a central government body to be responsible for computer technology has often been expressed in various forms and reports since 1974. The only result to date has been the formation of the Ad-Hoc Computer Advisory Committee.

i. The Ad-Hoc Computer Advisory Committee

The Ad Hoc Advisory Committee was set up in 1974 by the Government to control the acquisition and importation of computers. The ten members are selected from local computer centres and appointed by the Minister of Finance, Economic Affairs and Planning. Its

functions are purely advisory: to assess all import permit applications and make the appropriate recommendations to the Minister. The Minister may, however, overrule committee recommendations.

This limited function has gradually become a formality rather than a control mechanism. In some cases, the Committee has queried and sought more clarification on various issues, but no application has ever been turned down. In fact, the Committee has not met for at least two years, but computers continue to be imported under temporary permits. The Committee, therefore, has little influence on informatics affairs.

ii. The Computer Association of Tanzania

The Computer Association of Tanzania, a national association of professionals in the computer field, was officially registered in 1987 with the objective of developing and advancing the use and application of computer technology.

There are two categories of membership: professional (voting) with approximately 60 members to date, and non-professional (non-voting).

Since the Association is not a statutory body, it has no legislative mandate or power to regulate or control the conduct of informatics in Tanzania. It does, however, provide a common forum for discussing professional views on various aspects of informatics with the Government and other relevant bodies. There are indications of Government interest in the Association which has great potential to become a very influential organ in informatics affairs.

iii. The Tanzania National Commission for Science and Technology

The Commission was established by Act of Parliament to replace the Tanzania National Scientific Research Council which was formed in 1968. It is the principal advisory organ to Government on all matters relating to scientific research and technology development.

It is also empowered to establish a National Centre for the development and transfer of technology, including the assessment and choice of imported technology. Although not explicitly mentioned, the Commission's mandate is wide enough to accommodate informatics as another major area of concern. It is hoped that such will be the case.

iv. Educational Institutions

Although there is no common standard, all courses offered in the private sector are classified as vocational training. Course content, examinations, and certification are controlled by the institutions

themselves. This is cause for concern. The Computer Association of Tanzania has already taken up matters of standards in informatics training with the relevant organs of the Government.

v. Support Infrastructure

The application and development of informatics cannot be discussed in isolation from the necessary infrastructural support such as communications facilities and electricity supply. Development in this sector, however, has been satisfactory and is more advanced than the present technological needs and capabilities of information processing.

In most urban centres in Tanzania, electricity supply is fairly reliable and stable; most of the country should be covered by the National Grid in the very near future.

There is a reasonably comprehensive telecommunications network serving national, regional and international needs.

At present, teleprocessing is used only by the Air Tanzania Corporation (ATC), with a computer terminal network for passenger reservations covering most of the airline's major operational centres in Tanzania. ATC also subscribes to the SITA international communications network based in the USA. Other institutions are planning similar networks, particularly the Tanzania Posts and Telecommunications Corporation (TPTC) and the National Bank of Commerce (NBC). The TPTC has already imported all the necessary computer equipment, while NBC has acquired the equipment for the first phase of the project.

vi. Role of the Private Sector

To the present, the force behind informatics development has been the private sector and donor agencies. The current direction of informatics in Tanzania is still dictated by the suppliers, at least in terms of hardware acquisition.

The private sector also offers local training facilities which, with proper government control, should help alleviate the personnel shortages.

As yet, the private sector is not effectively engaged in the applications of software support and related consultancy services. A number of software houses have sprung up recently. Since they are not yet well developed, it is too early to predict their future.

vii. Impact of Informatics on Tanzanian Institutions

The application of informatics may be considered under two major headings:

- (a) General Data Processing applications of a routine nature such as payroll, accounting, stock control, etc. Such applications generate relatively little information for top management and so have very little influence on decision-making.
- (b) Management Information applications including population censuses, hydrological surveys and statistics, early warning systems, international trade statistics, etc. The information supplied is brief and concise and has a significant influence in decision-making.

In Tanzania, a lot has been accomplished at the operational level but relatively little has been accomplished at the tactical level, whether in service rendered to top management, or in the strategic planning level of management.

viii. Informatics Trends Affecting Tanzanian Institutions

The need for informatics products and services is growing very rapidly. The Computer Services Department in the Ministry of Finance, Economic Affairs and Planning receives an average of ten applications per day to import computer equipment. In addition, there are undeclared imports of such material. The period between 1980 and 1988 accounts for over 97 per cent of all computer acquisitions in Tanzania since 1965.

The number of computer vendors has also increased. In 1980, there was only one Company (ICL) dealing exclusively in computer products but this number has increased to at least seven - this does not include smaller businesses dealing in stationery, magnetic media and other accessories.

Training institutions in the private sector are also mushrooming. In 1985, only two institutions offered training courses; presently, there are at least six training centres offering elementary courses in computer studies. During the last three years more than 300 people have attended micro-computer based training in these private centres. Numbers of courses and participants continue to increase.

The requirement for computer networking is also emerging and three large institutions have already shown interest. Telefax, is another innovation causing much excitement. A few telefax units have already been installed by several local firms and organisations.

All these developments show the mounting interest in informatics. The Government cannot again ignore developments and ban informatics products and services, as it did in the past. It must acknowledge the existence of the technology and formulate appropriate strategies for its effective application. This would seem to be the only practical option for the Government to be prepared for these new developments.

E. PROCEDURES FOR THE PROCUREMENT OF COMPUTERS

i. Selection of Hardware and Software

The Minister of Finance, Economic Affairs and Planning has the power to permit or prohibit the importation of any computer equipment, and the mandate to exercise control over the selection of equipment. In practice, this is not now applied and the customer is free to choose any computer from any vendor or donor. The type of computer equipment imported, therefore, is actually controlled by the vendors, or, in the case of donated equipment, by the donor. As a result, some computer equipment is under- and over-configured depending on the customer's financial ability; others have no local after-sales support, and the material supplied may be behind the current state-of-the-art. There is such a wide variety of different computer brands in the country that some, especially micros, are unused for lack of expertise or servicing facilities.

It is not clear how the problem can be remedied, without the imposition of unnecessarily restrictive measures, unless competition for business between local vendors becomes a major influence.

ii. Guidelines for Hardware and Software Acquisition

The Guidelines for Computer Acquisition came into effect in 1974. Before then, computers were imported freely by the few institutions which could afford them. This new development was a result of Government dissatisfaction with computer services of the time.

Because of dissatisfaction with the system of uncontrolled importation, in 1974, the Government published an order under the Imports Control Ordinance absolutely prohibiting all importation of computer equipment into Tanzania. Soon afterwards, a provision was added empowering the Minister for Finance, Economic Affairs and Planning to permit such imports if they were judged to be in the public interest. Hence the "Guidelines for Evaluation of Computer Requests for Import of Computer Equipment", were formulated. In summary, it stated that:

- (a) To justify an in-house mainframe installation, the applicant must have had extensive experience with computer applications, and have a comprehensive technical manpower base, supported by a management team knowledgeable in the application of computer technology.
- (b) To justify an in-house minicomputer, the applicant must have had extensive experience on electrical/electronic accounting machines and a thorough understanding of computer technology.
- (c) Any application will only be considered if available local capacity cannot satisfy the applicant's requirements. Otherwise, users are encouraged to use available resources on time-hire basis, in order to conserve resources.

F. TOWARDS THE FORMULATION OF AN INFORMATICS POLICY

i. Needs Identification

The need to develop a policy or control mechanism for computer technology arose in 1974. This was nine years after the installation of the first computer by the Government. Before this time, the Government and several institutions had acquired in-house computers.

By 1972, the Government had, with expatriate assistance, computerised at least seven applications, including Government payroll, water billing, national provident fund, pension benefits, motor vehicles registration, Government accounts and police crime records. In that year, however, disadvantageous developments occurred, including:

- (a) The expiry of expatriate contracts at the end of 1972, which resulted in:
 - a shortage of expertise in the systems and programming cadre;
 - system maintenance becoming a problem because of the absence of proper system documentation;
 - new systems not developed.

- (b) The implementation of the Government Decentralisation Policy, by which accountability became regional instead of central. In the process, document flow was adversely affected and the Government accounting system slowed down. Most applications, with the exception of Government payroll and the pensions system, got into arrears or fell into disuse.

By 1974, the situation was acute and the Government decided to revert to the use of accounting machines, after questioning both the relevance and necessity of computers. There had already been one disastrous experience with the computer at the now defunct State Trading Corporation and the Government feared that similar occurrences could effect its own installations.

The Government, therefore, appointed two independent teams to study and report on the viability and utilisation of the computers already installed in the country such as the Tanzania Electric Supply Company, Tanzania Farmers Association, and the East African Railways Corporation which seemed to be operating satisfactorily. The teams were:

- (a) The National Institute of Productivity (NIP) in co-operation with and under the sponsorship of the International Labour Organisation (ILO) - the ILO/NIP Study Team. Their report, on Computer Development in Tanzania, included recommendations on:
 - the formulation of a National Policy on Computer Technology (acquisition and utilisation);
 - a National Training Programme in Computer Science, consisting of short, higher and professional courses.
- (b) The Government Computer Task Force - mainly made up of computer staff from the Government Computer Services Centre was formed specifically to report on computer utilisation in the country, including:
 - computer utilisation in existing computer installations;
 - analysis of installed computer applications;
 - manpower;
 - recommendations on the retention of some and the discarding of others; etc.

The Task Force recommended:

- the retention of almost all computers in the country;
- the setting up of a government advisory body on computer technology;
- the formation of a secretariat within the advisory body, consisting of professionals in computer technology, to oversee technology developments in the country;
- the formulation of detailed guidelines on computer acquisition in Tanzania.

Most of the recommendations of both study teams were adopted and some were implemented. Unfortunately, the formation of a National Policy Body on Computer Technology is still pending. The formulation of guidelines on the acquisition of computers was implemented almost immediately which involved the formation of the Ad-hoc Computer Advisory Committee.

ii. Steps Already Taken

Between 1974 and 1980, there was little addition to the number of installed computers in Tanzania. This, however, was due more to the unfavourable economic climate than to any restriction of computer imports. It caused three significant draw backs: the tempo of the introduction of training in computer science slackened significantly; some professionals in computer technology either left the field or sought employment outside Tanzania; and, more significantly, the issue of policy formulation was set aside.

Beginning in 1980, however, the situation changed dramatically. The computers of the sixties and early seventies were aging and becoming more erratic in performance; maintenance was an increasing problem because with changing technology, spares for old equipment were scarce. The East African Community had collapsed and former component corporations, with long experience in computerisation, were desperately looking for alternative computer services to revive their systems. As a result, requests for new computer equipment began to flow into the Ministry of Finance.

Between 1980 and 1986, over 500 new computers and related equipment were acquired. More than 85 per cent of these were microcomputers. Computer sales outlets had increased from one to four; by 1988 this number had risen to eight. With the proliferation of computers came the establishment of private training centres.

The revival of interest created the need for an information policy. Thus, in 1985, the National Science and Technology Policy for Tanzania was issued by the Ministry of Finance, Economic Affairs and Planning which included the statement that:

"The provision of up-to-date and efficient scientific information systems including libraries, documentation centres, computer systems, etc. shall be recognised as vital tools and components in strengthening the nation's scientific and technological capability."

The Government established the Tanzania National Commission for Science and Technology in place of the Tanzania National Scientific Research Council which had existed since 1968. In 1987, the Ministry of Finance, Economic Affairs and Planning, the University of Dar es Salaam and the Intergovernmental Bureau of Informatics (IBI) jointly held an international conference on informatics which recognised the need for a comprehensive informatics policy.

In December 1987, the Minister for Finance, Economic Affairs and Planning formed a Task Force for Informatics Development, consisting of eight members appointed from the Planning Division of the Ministry, the University of Dar es Salaam, the Tanzania National Commission for Science and Technology and the Ministries of Communications and Works, Agriculture and Education. The purpose of the Task Force was to "study and recommend to the Government the actions required to ensure appropriate progress in informatics development in Tanzania".

The Computer Association of Tanzania has also stressed to the Government the need to control and standardise training in computer studies.

These are all promising developments towards the formulation of an informatics policy, but as yet no such policy exists. It is hoped that this will be remedied in the very near future.

iii. Future Informatics Policy Issues

The IBI Document Policy Considerations on Informatics / Telecommunications describes informatics as being divided into three distinct levels: strategy planning, the formulation of policy to guide governmental units, and the translation of policies into public services such as education, health or agriculture, supported by various physical systems including computers and telecommunication networks.

In Tanzania, the strategy for science and technology development has already led to the establishment of the Tanzania National Commission for Science and Technology. The guiding policy recognizes

scientific information systems, including computer systems, as vital tools and components in strengthening the nation's scientific and technological capacity. To this extent, it could be said that a strategy for informatics development already exists.

The formulation of policies focused on the national strategy is still to be carried out. In this effort, salient issues for consideration, may be grouped into three distinct categories:

(a) Informatics versus national issues

Every technology including informatics has social, economic and political implications. The policy should, therefore, take certain sensitive factors into consideration, including:

- labour and employment issues;
- individual privacy rights and protection;
- cultural implications;
- involvement of the private sector in informatics development;
- priority areas and allocation of resources;
- balance of political power and the definition of rights of access to public information.

(b) Technical aspects of informatics

The technical issues to be considered include:

- equipment: should not conflict with national interests such as labour opportunities, national sovereignty and integrity etc.
- the vendor: the policy should define vendor obligations such as a requirement for a viable infrastructure for after-sales engineering support, training, etc.
- the user: relevant areas include a comprehensive strategy in education and training catering to technical and non-

technical disciplines; legal aspects of the technology; laws applicable to the sale, export and use of computers; patents and copyrights on computer-related products; etc.

- support infrastructure: the quality and services of the major support systems of informatics, electricity, telecommunications and computers, must be ensured through a co-ordinated strategy for their meaningful development.
- standardization: the level of acceptable standards in training and physical support systems such as telecommunications equipment, etc. must be defined.

(c) International issues

Since there is an interdependence between nations, any informatics policy should include issues such as transborder data and information flows; intellectual property rights; potential areas of regional or international co-operation, including the use of satellites, surveillance systems, etc.

iv. Linkage with Information Policy

Information processing has advanced from the traditional batch processing approach to interactive on-line computing, which has facilitated faster information flows and an increasingly more effective utilisation of computers. There is now a growing interdependence between computer systems and telecommunications facilities.

The technological considerations involved may, however, be too sophisticated for the installed telecommunications system, the main function of which was voice transmission.

It may, therefore, be necessary to allocate further resources in an effort to match the requirements of computing with telecommunications facilities. Financial resources, however, are unfortunately scarce and the nation may have other priorities. There is also a requirement for some measure of co-ordination between the various informatics support sectors, which may be difficult to achieve because of unfavourable administrative arrangements.

In Tanzania, such co-ordination may be a problem because of the administrative structure. For instance, information policy comes within the responsibility the First Vice President and Prime Minister; computer technology is under the Ministry of Finance, Economic Affairs and Planning; while telecommunications is part of the Ministry of Communications and Works. The bureaucratic processes and the different priorities in the various sectors tends to retard the progress of informatics. Policy-makers must effectively address the issue of streamlining needs.

G. THE NEED FOR ACTION

Not all weaknesses at the policy-making level of government can be tackled at the same time. Each selected problem will have to be tackled methodically to achieve policy objectives. The present requirement is for a strategy on both short and long term priorities.

In the meantime, while planners and policy-makers ponder the issues, informatics products will continue to flow into the country unhindered. There is a risk that the situation could be out of control before a comprehensive policy is formulated and implemented. Fortunately, as in most developing countries, there has not been a lot of investment in computerisation in comparison with developed countries. The issues which could be addressed immediately include:

i. Recognition of informatics as a vital tool

In many developing countries computer technology often is not regarded as a distinct discipline which must be managed by its own professionals. The Tanzanian Government must deliberately recognise the discipline of informatics and develop its requisite resources accordingly.

ii. Setting priorities

The Government should then choose priority areas for computerisation and encourage the indigenous development of computer applications and software relevant to local conditions. Software is increasingly more lucrative in the developed countries and much seeps into Third World economies, thus stifling local talent and draining scarce foreign exchange. Whilst it may not be possible to be self-sufficient in every aspect of software and applications development, Governments should give deliberate encouragement to the local availability of such services. Joint efforts could prove effective in this respect by using the limited equipment available more efficiently and effectively.

iii. Training

One of the major problems at present is the lack of proper training strategies in informatics. Available statistics show that the number of computers in Tanzania exceeds available trained personnel. The unco-ordinated state of available training facilities carries possible disastrous long term implications. There is, therefore, an immediate need for an institutionalized strategy for training in informatics including the definition of standards, development of course content, preparation of examinations and setting of certification requirements.

H. CONCLUSION

At a Southern African Regional Workshop on Informatics for Development held at Victoria Falls, Zimbabwe, in May, 1986, Thomas Ennison Jr. Legal Counsel of IBI, introduced his paper with the following words, which are a fitting conclusion here: "

Informatics holds a promise of a better life for the developing countries. These countries missed the Industrial Revolution and have since not really found their way into the society created by that revolution. In the meantime, however, they have been overtaken by events in the rushing tide of the Informatics revolution which is creating a different kind of world in a so-called Information Society. ... with the right kind of strategies and policies in the use of Informatics, the developing countries can and should make a direct bid for the technology which is driving the revolution, and use it to pry open the gateway to their economic and cultural salvation. This is the opportunity which Informatics gives to developing countries."

I.

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