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PROPOSAL ON TECHNICAL ASSISTANCE FOR INDUSTRIAL TECHNOLOGY

DU/UGA/87/002

UGANDA

Technical report: Development of industrial technology*

Prepared for the Government of Uganda
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

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* This document has not been edited.

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EXPLANATORY NOTES

Value of the local currency New Uganda Shillings

United States Dollars in October 1988

1 US\$ = 150 NUSH

ABBREVIATIONS

NRM	National Resistance Movement
GDP	Gross Domestic Product
PTA	Preferential Trade Area
UDC	Uganda Development Corporation
MOIT	Ministry of Industry and Technology
NTAC	Management Training and Advisory Centre
ILO	International Labour Organisation
NOL	Ministry of Labour
DOSSI	Department of Small Scale Industries
USSIA	Uganda Small Scale Industries Association
USIDC	Uganda Small Scale Industries Development Organisation

ABSTRACT

The report provides information on the industrial sector of the country as well as the recommendations on actions to be taken in order to strengthen the country's capacity in developing indigenous technology and in transfer, adaptation and application of appropriate foreign technology. A technical assistance aimed at achieving these objectives is proposed and specified in detail.

1. INTRODUCTION

Uganda, a land locked country with an estimated population of 16 million has a population growth rate of 3%.

The economy is essentially agricultural, with well over 90% of the working population living in rural areas and 85% of the working population involved in agricultural production.

In 1970 Uganda had the fourth highest GDP per capita in Southern and East Africa, the period since then has been characterized by political turmoil including expulsion and large scale exodus of professional and skilled manpower, gross mismanagement of the economy, and civil war and unrest with resultant killings, lootings and destruction of infrastructure, productive capital and private property.

As this process continued more or less for fifteen years, the impact on the productive capacity of the country has been dramatic, perhaps most so for industry.

Added to this were the problems which Uganda had to face when the East African Community broke up in 1977, the effects of which were particularly negative on the country, due to its geographical location and the economic dislocation caused by the oil price rises with Uganda having to import all its petroleum products.

The Government which came to power in early 1986, under the leadership of the National Resistance Movement, laid out its basic and social policies in a document entitled "Ten Point Programme". It stresses the need to build an independent, integrated and self sustaining economy. The programme includes the restoration and improvement of social services and the rehabilitation of the war ravaged areas, enhanced regional cooperation and the adoption of a mixed economy.

Throughout 1986 and early 1987, efforts were focused on improvement of the security situation, quick rehabilitation of the worst affected areas, investment in the transportation system and the restoration of services which had been interrupted by war.

In May 1987 the Government unveiled its Rehabilitation and Development Plan as its investment plan for the period 1987 - 1991. In the industrial sector large scale capital assistance was expected. This sector has received substantial inflows of resources in earlier periods however, without this having much impact on overall productivity and the sectors development.

This has been largely due to too much attention being paid to the capital investment side and not enough on managerial and technical training, strengthening of basic services and institutions and upgrading of workers skills.

More important the sector had not had a coherent plan for its long term development but has instead tried to rehabilitate existing enterprises without first critically analysing the real need and linkages for each firm and its financial viability.

It is the aim of the Government to elaborate indicative plans with the aim of creating a suitable environment in which the enterprises operate by means of appropriately designed industrial policies and instruments.

The Uganda industrial sector is relatively small but it did contribute substantially towards providing basic goods such as edible oils, soap, textiles, cement, leather, footwear, metal workings and allied products, wood products, paper products, fertilisers and basic chemicals.

The 1960's and early 1970's witnessed a satisfactory rate of growth at around 6% per annum. However from late 1970 until 1987 the overall growth rate of the industrial sector experienced a substantial slow down with increasingly negative results in the later years. It is estimated that real GDP fell 43 per cent between 1970 and 1985, while the industrial sector fall was 60 per cent.

2. BACKGROUND

The "Rehabilitation and Development Plan 1987-88 to 1990-91" has the over-riding objective "to rehabilitate the economy and reverse the cumulative decay which has been inflicted on the country for the past 20 years."

The sequence of implementing the "Ten Point Programme" started with the Rehabilitation and Development Plan which was launched in May 1987. In this plan the NRM Government took some bold steps in introducing reforms directed at turning inflation, by tight budgeting on the part of the government and public institutions. Having inherited a state of high domestic and external indebtedness the plan was directed at improving the balance of payments position, restoring productive forces in the key sectors of the economy and rehabilitating the physical, economic and social infrastructure.

On the side of industrial development the plan has the following objectives and goals:-

1. To rehabilitate existing industries especially those producing essential goods for local consumption and construction through high levels of capacity utilisation.
2. To create self-sufficiency in basic consumer goods and reduce the import bill.
3. To restructure the industrial sector in a manner consistent with government goals of building an independent, integrated and self-sustaining national economy.

What is being pursued here is the development of linkages within and between sectors of the economy especially between agriculture and industry.

4. To harness existing indigenous scientific and technical capability among artisans, technicians, professionals and women entrepreneurs.
5. To lay the foundation for the development of other industries in line with Uganda's resource base and comparative advantage.
6. To broaden the industrial base by establishing new industries, especially those which utilise local raw materials.
7. To rationalise the role of the parastatal sector of industry.
8. To promote the export of industrial commodities especially to the Preferential Trade Area countries and other African states.

Most manufacturing is based on the processing of agro-based commodities particularly cotton, coffee, sugar, tobacco and oil seeds, large scale industries include textiles, tobacco, beverages, wood and paper products, fertilisers, cement, steel and iron bars for construction.

It has been clearly demonstrated that the productive sectors and particularly the manufacturing sector did not have the technical and managerial capacity both at the national and enterprise levels to absorb external assistance and investment finance to reactivate the sector. Therefore the impact of those programmes have been negligible in the sector.

In early 1987 UNDP/UNIDO project DP/UGA/83/001 commenced which provided technical assistance to specific industries. At a tripartite review meeting held in July 1987 it was decided that a multi-functional project to provide technical assistance for the rehabilitation, management and development of industries should be included in the then forthcoming UNDP Country Programme (1988-1991).

The new project, which was a logical outcome from the experience and findings of 83/001 should continue providing direct technical assistance to individual establishments having access to related material inputs required for enterprise level rehabilitation.

It was also decided that the proposed new project should be an "Umbrella Project" providing direct operational technical assistance to the enterprises in:-

1. Pre-rehabilitation advice.
2. Operational assistance during rehabilitation.
3. Management development.
4. Technical skills up-grading
5. Technology acquisition, adaptation, application and development.
6. Small enterprises promotion.

In view of the likely time-lag in the preparation of a Project Document involving multi-functional assistance programmes and its final approval for implementation, it was decided to initiate a Preparatory Phase of the Project to begin in October 1987 but this project, UGA/87/013, failed to materialize.

In the meantime project BR/UGA/84/003 was approved and commenced in December 1987. This project is to "strengthen the capabilities of the Planning Unit of the Ministry of Industry and Technology and to provide direct support in the preparation of policies, plans, and programmes on the sectoral and sub-sectoral

levels."

The position of Industrial Engineer within the project calls for advise and assistance in the preparation and implementation of appropriate technology policies and technological aspects of industrial planning and programming. A number of reports have already been issued under this project.

However, recognising the importance and need to provide specific technical assistance projects UGA/87/002 and UGA/87/003 were initiated to:

- (a) Advise the Government an action to be taken aimed at strengthening the country's capacity in developing indigenous technology and in the transfer, adaptation, and application of appropriate foreign technology, in order to enhance the self-sustaining economic development of Uganda.
- (b) Identify the needs for technical assistance of the Uganda small-scale industrial sector and formulate, in close cooperation with the Government and the UNDP office, Kampala, the small-scale industry component of the Industrial Umbrella project financed by UNDP and executed by UNIDO.

These two component projects relate to two specific elements of the Rehabilitation Project DP/UGA/87/013 and the investigations and preparation of Project documents are being undertaken by an Industrial Technology Expert and a Consultant in Promotion of Small-Scale Industries respectively who are working in close cooperation.

However as the writer is specifically concerned with Industrial Technology the report will be confined to this field.

3. MINISTRY OF INDUSTRY AND TECHNOLOGY

Under UNIDO project BR/UGA/84/003 "Strengthening the Planning Unit of the Ministry of Industry and Technology" a number of reports and proposals have been issued and much of the information contained in this report has been sourced from these reports.

The Industrial administration of the Ministry of Industry were adopted from the Ministry of Commerce and Industry when the latter was split into two Ministries in 1974.

These functions were handed down from the Colonial times when the functions of the Government and the various Ministries comprising it, mainly consisted of maintenance of law and order, administration of economic activities and revenue collection.

The main thrust of the Ministry of Industry was administration of the industrial laws and regulations, licensing of new industrial investments, both local and foreign and monitoring the managements of public enterprises. The activities with regard to industrial promotion and development were slowly grafted onto the functions of the Ministry but have not yet been adequately spelt out and supported by trained or sufficient personnel to undertake such activities.

As the Ministry was created immediately after the expulsion of the Asians, it had additionally to undertake the burden of co-ordination, control, supervision and monitoring of the abandoned industrial enterprises for which it was ill-equipped.

In 1986 the NRM Government added that new responsibility of technology development and re-named the Ministry as the Ministry of Industry and Technology.

As a result the emphasis is now changing from industrial administration to providing initiations in industrial development and rehabilitation. In this emerging new situation, providing services in technical, commercial and managerial fields to existing enterprises and prospective new entrepreneurs and investors is a strategy to accelerate and sustain a healthy self-reliant and integrated industrial base in the country.

However this new phase in the Ministry's functions of development initiatives requires a team of highly motivated and professionally qualified officers with adequate training and exposure to industrial development activities and practices. Though the existing officers in the Ministry of Industry and Technology have reasonable academic qualifications in general, the exposure of some of them to industrial development activities and practices as well as industrial and technological planning do not appear to be adequate enough to meet the challenging tasks ahead of them. Furthermore the number of officers appear far too few in comparison with the ever increasing tasks being allocated

to them.

In the exercise of strengthening the Ministry of Industry and Technology to effectively undertake the emerging new functions of, among others, the acquisition, development and adaptation of appropriate technology a five year scenario is drawn up.

In making the proposals the current workload of the Ministry was noted, together with the recognition of the fact that Governments initiatives and intervention are necessary to bring about changes in the existing scenario during the next five years.

Within the Ministry, the Department of Technology is a new unit added to the Ministry in 1986. At the time it was established the Government had included among its priorities the following:-

- a) the encouragement of appropriate technology application by industrial establishments so as to make the best use of local natural resources and expertise and to supply quality goods to the people.
- b) to ensure that only technologies which are successfully tried in similar circumstances elsewhere will be considered for acquisition in Uganda.
- c) that technologies which are to be acquired will be suitably modified whenever necessary to suit the country's factor endowments.
- d) that where appropriate new technologies will be locally developed so as to produce quality products at the most competitive prices.
- e) that technologies for the small and rural enterprises will be upgraded to reduce the physical strain, improve the quality of products and increase the income of the rural and small enterprises.

The newly established Department of Technology was intended to co-ordinate the development and utilisation of local technological capacities and capabilities for the economic development of the country using appropriate technology.

Technology is a critically important aspect of an efficient and cost-effective industrial sector. Utilisation of appropriate technology at the enterprise level is a major factor in establishing technically efficient commercially and economically viable enterprises in the country.

To achieve this the main functions of the Department of Technology include:

- a) Advising the Government on policy formulation regarding the development, adaptation and transfer of technology, application of appropriate technology and establishment of technological research and development centers;
- b) Advising industrialists and entrepreneurs on the type of available technologies while establishing new enterprises or while expanding and diversifying existing industrial activities;
- c) Promoting local technical skills through dissemination of information on training possibilities, and wherever possible securing and co-ordinating sponsorship for such training from donor agencies either locally or overseas;
- d) Assisting in the establishment of engineering and machine building industries to fabricate simple machines and equipment required for the application of appropriate technology.
- e) Encouraging and promoting industrial technological research and development with a view to facilitating the application of technologies ideally suited to local conditions;
- f) Establishing and promoting industrial and technological research either in existing institutions or new establishments with a view to either adapt or develop appropriate technologies suitable to Uganda's industrial needs;
- g) Collection, collation, storage and dissemination of industrial, scientific and technological information and data;
- h) Liaising with all agencies, national and international, which are involved in activities bearing on all aspects of technology.

As the acquisition, development, adaptation and dissemination of appropriate technology was a new function in the Ministry of Industry and Technology, a clear demarcation between policy formulation and implementation should be made.

In addition, the various activities involved in the development, acquisition and adaptation of technologies should be funded from local resources and international aid funds as appropriate.

With regard to research and development, it is intended to promote the development of new products and to improve the quality of existing industrial products. The Government shall encourage Research and Development programmes and activities by

the industrial sector and research institutions.

Although the Department of Technology was established in 1986, it functioned for two years with only one member in the Department. During 1988 two additional staff were appointed, the Commissioner for Technology and the Chief Engineer, to join the Chief Scientific Officer already appointed.

The Department of Technology does not have an agreed formal function or programme and consequently project BR/UGA/84/003 set out proposals in its report DP/ID/SER.A/1032 "Proposals for Functions and Structures of the Ministry of Industry and Technology."

It is intended that the Department be headed by the Commissioner for Technology and will have two divisions namely a Scientific Division and a Technical Operations Division, each headed respectively by a Chief Scientific Officer and Chief Engineering and Technology Officer.

The Department will have two major functions:

- Identification and promotion of industry oriented Research
- Selection and application of technologies

The functions of the two divisions will be:

Scientific Division

The Division will be headed by a Chief Scientific Officer and assisted by two Principal Scientific Officers. The Division will also have four Senior Scientific Officers and eight Scientific Officers.

The Scientific Division will function as a catalyst in identifying and promoting industry oriented research in higher institutions of learning such as Makerere University and Applied Research in Technical Institutes and other Technical Training Institutions. The results of such a research would be passed on to the Technical Operations Division for further refining and application in enterprises.

Technical and Operations Divisions

This Division will be headed by a Chief Engineering and Technology Officer and assisted by two Principal Engineering and Technology Officers. The Division will also have four Senior Engineering and Technology Officers and eight Engineering and Technology Officers.

The Technical Operations Divisions will intervene in technology selection and technology application at two levels. In the case of large new investments (exceeding \$ 300,000), this Division will fully participate in the technical evaluation of

the project to ensure that the technology is appropriate to local conditions and that skills, information and practices which constitute the major elements of the technology package are clearly understood by the local partners and are effectively transferred to their operations staff. The Division will prepare technological policies and strategies to govern technology transfer through foreign investment projects. It will also obtain technical assistance, if necessary, to evaluate the technical and technological aspects of large industrial investment so as to avoid untested investments and technologies.

In the small-scale and medium enterprises sector, there is considerable scope for the absorption of technology available elsewhere and the modification and upgrading of existing technology. If one makes a quick assessment of areas of small industry clusters, the scope for initiatives and interventions in upgrading, modifying and absorbing technologies appears very vast.

In the large and medium industries, appropriate technology will be selected through the project evaluation mechanism and monitoring of the project implementation schedule. This will be achieved through the strengthening of the Department of Technology in the Ministry of Industry and Technology.

In the evaluation of the project, the appropriateness of different technologies to suit local factor endowments shall be examined.

In the small-scale sector, rural and small-scale technology shall be upgraded, modified or adapted through grass-root initiatives wherever necessary.

It is also intended that the Ministry of Industry and Technology shall pursue the amendment of the Uganda Development Corporation (UDC) Act to include the provision of Technical, Economic and Managerial Consultancy services to public enterprises.

To summarise, the Department of Technology within the MOIT, although now established is lacking Technology policy and a programme of implementation. It also lacks the manpower required to meet its future role and the skills and experience that are developed given exposure to Technology development over time.

1. EDUCATIONAL AND TRAINING INSTITUTIONS

There is only one University in Uganda catering for science and engineering, it being Makerere University located in Kampala. It is difficult to assess their academic standards but as their curriculum has not been revised for many years and as the numbers of lecturers have suffered through immigration and loss to industry there is a clear need to review the institution and its courses to meet the new challenges.

The Management Training and Advisory Centre, under the Ministry of Industry and Technology concentrates on developing Management skills through courses and seminars.

There are also a number of Technical Institutions in Uganda and in the past they catered for the vocational training programmes for both students and entrepreneurs.

These centers were mainly established in the 1960's but during the last twenty years they have been allowed to deteriorate to such a degree that now hardly any training courses are taking place at all. All the institutions including the University, had well equipped workshops and laboratories but these are only operating at a fraction of their intended use. Most machinery and equipment have broken down and the staff seem frustrated in their inability and competence to repair them. They also lack the funds and foreign exchange to purchase spare parts and, even if available, many of the machines and items of equipment are so out-dated as to make it impossible to source spare parts.

So further add to this problems the lack of funds also affects their ability to purchase raw materials and training equipment. Even with the machines and equipment that are in working order training and demonstration courses cannot take place so that the students who do graduate have not properly acquired the necessary technical skills while others in the field are deprived of training.

Because of time constraints it was only possible to visit the units in operation in Kampala. Although other units exist in Jinja and Masaka, two other towns visited, they have not been in operation for a number of years.

Three units are located in Kampala, these are:-

1. The workshops at the Management Training and Advisory Centre, located at Nakawa near to the Ntinda Industrial estate.

These were equipped in the late 1960's through the assistance of the ILO and cater for the following trades:-

- light mechanical engineering
- light electrical engineering
- woodworking
- auto body repair (panel beating)

To provide for mobile demonstrations a bus was also supplied equipped with a workshop. Although the bus is in reasonable running condition it has no tools or equipment remaining. The general equipment is in reasonable condition though lacking spare parts and maintenance.

The Centre also lacks strong management and direction and appears to have too few instructors.

2. The Uganda Polytechnic in Kyambogo has a number of workshops and was once very active in practical training of students from the technical institute to which it is attached and to outside students including those from the University.

The workshop cater for the following trades:-

- Light mechanical engineering
- Woodworking
- Foundry
- Auto mechanics
- Building construction
- Steam boiler techniques
- Civil engineering
- Mechanical and soil laboratories

Training programmes are no longer taking place although some activity continuous with instructors and some students engaging in manufacturing and auto repair as a private business.

The general condition of the machines and equipment is surprisingly good but again lacking spare parts.

3. The Ministry of Labour erected and equipped workshops at Nakawa, nearby to MTAC, in 1966 with technical and financial assistance from the Japanese Government.

The ILO provided extended technical assistance for a number of years in the form of technical advisors on a "train trainers" programme.

In addition the MOL has three more workshops, one in Kampala at Lugogo and two in Jinja. One of the Jinja units has closed

down due to the condition of the machines.

As there are no funds available for training the programmes are very limited and very few programmes are taking place.

The trades which can be serviced, provided machines are replaced or refurbished and the necessary raw materials provided are:

- Mechanical workshop
- Electric motor rewinding
- Small repairs to household items
- Auto Engineering
- Woodworking
- Building and construction
- Plumbing

In discussions with the Management of the units it was revealed that the Government of Japan has indicated a willingness to assist the Ministry of Labour in rehabilitating the workshops. As well as rehabilitating some of the existing equipment, new machines will be provided.

In summary the Educational and Training Institutions have the basic structures and facilities to provide technical training and opportunities for research. However they act in isolation of each other and are concerned with rehabilitating their own units to the standards and capabilities they once had without a coordinated and agreed government or industrial policy.

There is a need to provide a coordinating body to ensure that the future needs of Uganda in relation to training and research facilities will be met in the most effective way.

This role should be filled by the Department of Technology within its overall policy framework.

5. THE MANUFACTURING SECTOR

As outlined in earlier sections of this report the performance of the manufacturing sector during the last two decades is a mirror image of the turmoil in the socio-economic situation in the country and a reflection of the countries economic mismanagement and lack of direction during that period.

One of the major disappointments of the economic recovery programme introduced in 1981 was its failure to regenerate the local industry. Even with substantial in-flows of external assistance for the manufacturing sector, it has failed to reach even 20% capacity utilisation compared with the pre 1970 level, with the greatest improvement occurring in this last year.

The major constraints to bring about a recovery of the manufacturing sector have been analysed during the last few years both at national and international levels. Most important among these constrains are:-

1. Inadequacies in the policy environment
2. Absence of macro and industrial sector plans
3. Problem derived from unsettled ownership of enterprises
4. Inadequacy of foreign exchange
5. Idle capacity in industrial establishments due to problems arising from poor management, lack of technical expertise, lack of spare parts and raw materials.
6. Inadequate infrastructure facilities such as water, electricity, transportation etc.

In addition to the above, the country had an acute shortage of high level technical and managerial personnel in the post-independence decade because of the concentration of industrial and commercial activities in the hands of expatriates. The expatriates not only owned but also managed their own enterprises providing employment opportunities to nationals at the middle and lower levels in the management and technical fields. Whatever national expertise that was existing in the early 1970's is now diluted for several well known reasons. The expulsion of the Asians and the loss of other expatriates deprived the country of its only qualified technical and managerial expertise and the personnel who took their places were neither qualified nor committed to undertake the duties given to them.

Small and rural industries have over the period of political and economic disturbances shown considerably greater resilience than the larger industrial enterprises because of their relative insulation from political interference and Government regulations and bottlenecks. However, in spite of their

potentialities and staying power, the small scale industries sector has only received benevolent lip service both from the national authorities and international aid agencies.

Despite some Government efforts since Independence in 1962, there has been no positive and concrete development programme in the field of small-scale industries development and promotion. Also Government policy on development of small-scale industries has never been defined.

The selection of technology in industrial enterprises is a difficult task even in industrialised countries where technology is developed and produced and where technological knowledge and expertise is abundant.

In Uganda, both technology and technological expertise are in acute short supply, as a consequence the selection and application of technology in industrial enterprises has been on an ad hoc basis and often inappropriate in the past.

In the case of large scale industries, and particularly the parastatals, the majority of installed equipment is still inefficient, dilapidated and unreliable. In many cases the equipment is no longer manufactured and in some cases the manufacturers of the equipment no longer exist.

In the case of the small scale industries some advances have been made but they have lacked technically qualified and coordinated guidance. They have clearly demonstrated that many of them, given the appropriate technical and financial support, undoubtedly have the potential to upgrade themselves in viable enterprises. Others, having acquired the necessary basic technical skills could easily be trained to diversify their production to manufacture items as part of an import substitution programme.

Two important exercises being undertaken within the Ministry of Industry and Technology, under UNIDO project BR/UGA/84/003, should provide the basic information on which policies and programmes can be developed for the promotion of the manufacturing sector.

"An Overview of the Manufacturing Sector for Industrial Planning" examines a broad spectrum of medium and large scale industries under a number of headings. The findings provide details of the technical and manufacturing capabilities, inputs and sources of inputs of raw materials and spare parts and linkage opportunities.

Arising from a lack of information on the types of small and cottage industries operating in urban and rural areas in Uganda and to establish their needs and potential a survey is being undertaken by The Small Scale Industry Department of the Ministry assisted by the UNIDO experts. The basic problems being identified in this survey, which is still ongoing, include:-

- inadequate supply of raw materials and funds to purchase them
- lack of technical and managerial expertise
- use of inappropriate technologies
- lack of information on product and market opportunities.

The separate report by the expert in Small Scale Industries will cover this area in greater detail.

The manufacturing sector, and particularly the small scale and cottage industries, have clearly demonstrated a willingness and ability to revive the levels of production and productivity of industry to meet the consumer demands for the future.

Because of the lack of technical and managerial experience and expertise the sector will require assistance and guidance if it is to achieve its objectives.

There appears to be an over emphasis and inappropriate programme to rehabilitate the industry which by definition means restoring it to the levels pertaining in the 1970's. This approach takes no account of the technological developments that have occurred since then and the Department of Technology will have a key role to play to advise the implement an appropriate revival plan for the country.

6. TECHNOLOGY PLANNING

As was stated in the section dealing with the Ministry of Industry and Technology the Technology Department does not have a formal function or project but proposals have been put forward to redress this situation.

The first and foremost responsibility of the Technology Department in contributing to the industrial planning exercise is to translate the national technology policy into planning programmes and projects.

For this purpose the existence of a national technology policy is an imperative. In Uganda a national technology policy has not yet been formulated although a draft of the policy outlining the main elements has been prepared and are comprised of:-

- a. the Government shall encourage appropriate technology application by industrial establishments so as to make best use of local natural resources and expertise and to supply quality goods to the people;
- b. the Government will ensure that only technologies which are successfully tried in similar conditions elsewhere will be considered for acquisition in Uganda;
- c. technologies which are to be acquired will be suitably modified wherever necessary to suit the country's factor endowments;
- d. where appropriate, new technologies will be locally developed so as to produce quality products at the most competitive prices;
- e. technologies for the small-scale and rural enterprises will be upgraded to reduce the physical strain, improve the quality of the products and increase the income of the rural and small enterprises.

The newly established Department of Technology shall coordinate the development and utilization of local technological capacities and capabilities for the economic development of the country using appropriate technology.

The need for a more clear cut and programme oriented technology policy for Uganda has to be emphasized.

In elaborating a technology policy for Uganda, it is important to have basic data on the country's factor endowments in relation to the long term development objectives. Furthermore, detailed information on the technological capabilities of the country, in manufacturing establishments, in research organizations, teaching institutions, polytechnics, workshop, etc. should be obtained and analyzed. The management

capability in manufacturing enterprises, consulting firms, public sector and parastatal institutions, etc. should also be examined. In short, a technology policy cannot be formulated in a vacuum. The Technology Department should therefore organise intensive visits to enterprises, large, medium and small, research organisations, teaching institutes, polytechnics and technical workshops in the country and make in-depth analysis of the various determinants of appropriate technology. A technology plan can only be conceived when a technology policy is elaborated.

The Technology Plan should be an integral part for the industrial planning exercise. In Uganda, because of the substantial rehabilitation content in industrial planning, selection of technology at the enterprise level should be a critical input at the corporate planning level. If technology planning is not done, sectoral planning may result in backward planning. For example, it is common knowledge that most industrial establishments in Uganda had major technological problems in the 1970s. In sugar, textiles, paper and a host of other industries, it was a common sight to see machinery and equipment manufactured in early 1900's still in operation. Since 1970s not many renovations and replacements have taken place in Uganda industries, and the world-wide technology development had minimal influence on Ugandan industries. For example, during our visit to Papco in Jinja it was observed that the only two paper making machines were manufactured in 1900 and 1903 respectively and the 1903 machine, imported second hand, was still in crates to be installed. The machines in Uganda Fishnets are over 25 years old and those in Uganda Clays over 30 years old. In most of the industries the technology is old, the breakdown in machines and equipment too frequent, the quality of production poor and the whole operations are very inefficient. Rehabilitation of these enterprises should not imply bringing them back to their 1972 level of operation; but looking forward with radical intervention of new and appropriate technology wherever needed. Otherwise, the exercise would result in movement in the reverse gear and will be counter productive.

In indicative planning; selection of technologies in the sub-sector planning exercise is a difficult task. Technology selection is meaningful in industrial establishments at the stages of rehabilitation, expansion or at the time of establishing new enterprises. In public and parastatal enterprises; technology planning is ideally done at the time of preparing the Feasibility Studies. If external consultants are contracted to undertake the Feasibility Studies; technology planning is likely to be constrained by the level of exposure of the consultants to the available technologies. The parastatal organisations and the Government agencies under whose jurisdiction the enterprises fall are even less knowledgeable about the technologies. Therefore; the possibility of external consultants determining the technologies at the enterprises level is considerable. To influence the planning and selection of technology at the parastatal or government level two pre-

requisites are necessary. The are:-

- (a) detailed information on the various available technologies;
- (b) capability for evaluating and selecting appropriate technologies and in some cases even modifying available technologies.

In Uganda, a beginning is being made in establishing these two pre-requisites. A Technological Information System is being established in the Ministry of Industry and Technology under, Project BR/UGA/84/003. But it takes time to establish such a facility and to make it operational.

The Technology Department has two engineers and a scientist, but they need to be exposed to different types of technologies. Once these two pre-requisites are met the Technology Department should work as a catalyst in technology planning obtaining specialist services in sub-sectoral planning, inter-acting with them, questioning them, examining information on alternative technologies are some of the methods through which technology selection and planning can be done.

The Technology Department should ideally be given the responsibility of choosing between entrepreneurs who offer competing technologies and have selected the one that carries minimum element of risk in the success of the project and profitability. Political and social factors are sometimes overriding influences through which inappropriate technology may come into the country. For example, Uganda's industrial sector is starved of capital investments for many years. Credits and loan finances may be offered by donor countries and tied to their own equipment and technology. The choice for the country can sometimes be between the technology offered by tied credits or alternatively no credits at all. The decision for the Government can be very hard in this case.

There is considerable scope for an effective technology plan and its implementation in the small and informal industries. But for this purpose, a meaningful development programme for small and informal enterprises has to be drawn up and the details of its implementation worked out. By means of extension services, direct advice, influencing technology selection through development finance institutions, pilot project mechanisms, demonstrations, etc. sub-sectoral technology can be planned and implemented for small and informal enterprises.

In summary, a sub-sectoral industrial plan in Uganda, would involve a considerable number of enterprise level rehabilitation activities. Because of the dilapidated status of machinery, equipment and technology in many of these individual enterprises, synchronization of technology plan with the economic plan is a necessity for the country.

In parastatal and public enterprises technology plans should be done during the rehabilitation, renovation or diversification exercises at the time of preparing the feasibility studies and implementing them. Availability of information on alternative technologies and capabilities for technology evaluation in feasibility studies are important pre-requisites for this exercise. For private enterprises, a judicious selection of policies and strategies for industrial development along with tax incentives, dissemination of technological information and technological evaluation of project proposals constitute important elements in influencing technology selection at enterprises level. For small-scale and informal enterprises a well conceived development programme with direct intervention through extension services, loan programmes, training and pilot projects mechanisms can be used to upgrade existing technologies, developing and introducing new technologies. The planner should be flexible in making use of the various tools for technology planning depending on the circumstances of the situation, the ownership pattern and the size of industrial enterprises.

7. SUPPORTIVE BODIES AND INSTITUTIONS

The need for technical assistance to the Manufacturing Sector has been clearly evident and a great number of exercises, programmes, project proposals and grants or loans have been directed to the sector. Supportive bodies and institutions who have provided assistance in the past have indicated willingness to continue to do so in the future and a number of new institutions have offered their services.

As far back as 1968 the UNDP Special Funds programme assisted by UNIDO started the concept of Industrial Estates by developing 20 acres of designated land at Ntinda about 5km from Kampala. It was intended to build 24 small scale industrial units each employing up to 10 workers with further plans to build 14 larger units employing up to 25 people. In 1971 when the Military Government came to power the project was neglected. The buildings which were constructed, including a comprehensive office building and a central workshop facility both of which are devoid of equipment, are now under the MTAC which only acts as a rent collector and does not provide any assistance. Some few industries continue to operate there.

In 1976 another attempt was made to set up a promotional programme for providing financial technical and other assistance to Small Scale Industries and a fully fledged Ministry of Small Scale Industries was established. This only remained on paper and never functioned at all.

In 1979 a team of experts from the Commonwealth Secretariat came to Uganda to carry out a survey on how the economy of the country could be rehabilitated. Among their recommendations the team listed in their final report were the provision of technical managerial assistance and the establishment of a few common facilities and service centers as well as training cum production centers. However the recommendations were never implemented.

In 1980 the then Government revived the idea of promoting small scale industries and recommendations were made to create a Directorate of Small Scale Industries within the Ministry of Industry. The working group appointed for this project decided on a number of economic and social advantages and to embark on a comprehensive programme for the development of small scale industries.

The proposals for the establishment of DOSSI were presented to cabinet in 1982 and rejected as being too ambitious. The only concession made was that a Department of Small Scale Industries was established in 1983 within the Ministry of Industry.

The frustration of small scale enterprises scattered all over the country and operating without Government guidance or assistance in their activities resulted in the creation and formation of the Uganda Small Scale Industries Association.

USSIA has been recognised by the Government of Uganda and is affiliated to the World Assembly of Small and Medium Enterprises whose head office are situated in Delhi, India.

The members are classified into 10 groups covering, Woodworking, Building Industry, Metalworking, Pharmaceuticals and Chemicals, garments Printing, Handycrafts, Leatherwork, Repair and Maintenance and Ceramics.

Although the Government recognises the Association there is no allocation in the budget nor is there provision within the Ministry of Industry and Technology for financial or other assistance. The members of USSIA were most helpful in providing introductions, arranging meetings and visits and directing a positive approach to the fact finding part of this mission.

In February 1988, a 12 member committee with the Vice Chairman of USSIA as its Chairman and members representing the Ministry of Industry and Technology, including members of the Departments of Technology and Small Scale Industries, Ugadev Bank, Uganda Development Corporation and from USSIA presented a report entitled "The Small Scale Industrial Sector in Uganda - Review and Recommendations for Improved Performance."

This is the latest in a series of efforts by the Government to introduce an appropriate programme of assistance geared to the small and cottage industrial sector.

The report reviews the problems and issues affecting the small scale industry sector in five major areas namely:-

- The institutional framework
- Finance
- Technology and Training
- Marketing
- Procurement

The report proposes that a new organisation to be known as Uganda Small Scale Industries Development Organisation, USIDO, be created as a subsidiary of Uganda Development Corporation, UDC.

In the section dealing with Technology and Training they note that the small scale industry sector has both imported and indigenous technology. With regard to imported technologies there is a need to develop the capability to understand these technologies and to appraise them for their suitability to local conditions

They further recommend:-

1. Close Cooperation between higher technological institutions and small scale industries should be fostered through industrial training for students in establishments like those in Katwe.

This marriage between the 'thinkers' and the 'doers' should lead to improvements in the technologies used by these industries.

2. There should be in-service training for small scale industry personnel in the various Vocational and Polytechnic Training Institutes. Furthermore the courses should be conducted in the other commonly used languages besides English.

The technical colleges and institutes of technology responsible for research, documentation and dissemination of technological information should be strengthened and upgraded.

3. The Uganda National Bureau of Standards of the Ministry of Commerce should play a more active role in the establishment of standards and in the training of industrialists in Quality Control.

These recommendations have yet to be adapted. A programme for implementation and the responsibility for it have also to be agreed.

Also in early 1988 another industry organisation was formed, thus one being the Uganda Manufacturers Association. This caters primarily for medium to large enterprises but also recognises small scale industries.

In the time available it was not possible to establish if firm objectives had been agreed for the Association. In the short time it has been in existence it has presented a number of proposals to Government which were mainly concerned with the allocation of foreign exchange.

Uganda Development Corporation has been in operation for many years under the MOIT. It acted as the Government partner in joint venture operations and, as a promoter and developer of industry, had a considerable number of enterprises reporting to it. The profits from these were used for loan financing as well as development programmes.

However in 1975 UDC was politically dismantled and many of its profitable subsidiaries were allocated to individuals on the basis of party association. UDC was deprived of its profits source and as a result was unable to assist the development of industry as it had. Its problems were further compounded as UDC had borrowed heavily on behalf of these companies and they were left to repay the loans.

The role of industrial development ceased in 1975 and has not been reactivated since. Although most of the enterprises have since been handed back to UDC, they have failed to avail themselves of their previous profit making situation and appear to lack the technical and managerial skills necessary.

Through Ugadev Bank, which came under UDC in 1962 but was inactive up to 1986, UDC provides loan facilities primarily to the small scale sector. It charges 35% interest per annum against the commercial rate of 40% but due to lack of security most enterprises fail to meet the requirements of the loan conditions, funds have been made available through the Uganda Commercial Bank, the World Bank, EEC and USAID.

Financial support also comes from the International Aid Agencies which include:

1. UNDP "Country and inter-country programmes and projects" of December 1987 envisaged a total financial package for Uganda of \$65 million covering the four years to 1991. Of this 9,44% has been earmarked for the industrial sector.

It is assumed that the project recommended in this report on Industrial Technology would be UNDP sponsored out of the above funds and executed by UNIDO. This provided that the project is accepted by the Government of Uganda and UNDP/UNIDO.

2. World Bank's first health project in Uganda involves the rehabilitation of Mulago hospital in Kampala, eight district hospitals, thirty health centres, a central blood transfusion centre, a new hospital in Rwakai as well as the supply of various drugs and medical supplies.

It should be possible to identify the inputs and provide industrial opportunities in Uganda to meet the programme requirements.

3. Japanese trust funds are to be made available in Mbale district, amounting to \$350,000 with UNIDO as the executing agency. This is for the promotion of small scale industry and 5 units for disabled people.
4. The Danish Government, through its aid agency DANIDA, wants to join UNIDO in developing small scale industry in Uganda, in the form of machinery and technical assistance for the establishment of training workshops.

Obviously the types of machines and their suitability to conditions in Uganda would need to be examined.

There are also a number of other international agencies and NGO's prepared to extend financial and technical assistance to Uganda, again primarily in the area of small scale industries, but they are trying to promote specific projects of their own and, as such, are not attached to the UNIDO programme.

These include:

- ACCORB
- International Labour Officer

- Friedrich Herbert Stiftung Foundation
- Canadian Aid Organisation
- CFTC

Uganda does not have a specific coordinating body established as the sole Government institution where all matters relating to technical and financial assistance for industry could be channeled and evaluated.

In reviewing the role of the Department of Technology the MOIT should seek to remedy this situation.

The number of aid agencies and the vast amount of technical and financial assistance available should impress upon the Government and particularly the MOIT the need of a policy formulation to ensure that the maximum benefit can be accrued for both the country and the industrial sector.

8. FINDINGS

The purpose of the six week assignment was to prepare a project document on Industrial Technology for the Government of Uganda.

The consultancy assignment was to be carried out by two consultants as part of a proposed umbrella project and much of the investigatory and fact finding part of the mission was conducted in the company of the consultant for Small Scale Industries.

The contents of the findings and recommendations have been fully discussed by the consultants and agreements reached on the individual responsibilities and linkages to be adopted.

Within the Ministry of Industry and Technology the Department of Technology has yet to clarify its role and establish its credibility, reputation and respect.

The Department of Technology has not only to be catalyst and manager of Technology transfer, adaptation and application but must be seen to do so.

The traditional role, as has been evident in the past, of background adviser without any follow up or progress monitoring must change. The reputation of the Department must be developed and a respect for it built up by the clear demonstration that it is qualified, able and willing to not only advise but also assist in the implementation of new approaches to Technology in Uganda.

To achieve this new purpose will require a dedicated commitment within the Government, the various Ministries, the educational and training institutions and industry itself to the programmes and policies. It is also imperative that the efforts of the Ministry to upgrade its performance are not thwarted by the bureaucracy and red tape of another.

The individual associations that have grown up over the years are in itself, an indication of the willingness of industrialists to combine and cooperate to better themselves and the industrial base and economy of Uganda. However, because of lack of coordination, guidance and financial or institutional support they have failed to realise their goals.

The involvement of financial institutions, both within Uganda and from the international aid agencies, have not been coordinated and have resulted in concentrations of efforts to one sector while others are ignored.

To examine the needs of Uganda in respect of Industrial Technology in isolation of the umbrella needs of its Industrial Development is perhaps putting the cart before the horse. To strengthen and assist the Department of Technology must be supplemented and complimented by bringing other Departments to the same level of development and this must be considered in the function of the umbrella project.

The proposed functions and staffing levels for the Department of Technology, as set out under project 84/003 should be pursued and amended and implemented to provide a firm base prior to the implementation of an Industrial Technology project. Otherwise some confusion could exist between the projects resulting in a diversion of the main efforts of the two projects in question.

9. PROPOSALS

These proposals deal specifically with Industrial Technology, and lay emphasis on the main element of Technology Planning and Implementation by demonstration and example.

The proposals deal with three specific areas namely:-

- Institution Building
- Upgrading and Strengthening
- Direct Training Facilities

1. Institution Building

The newly established Department of Technology in the Ministry of Industry and Technology is made responsible for many functions and is likely to take considerable time to be fully operational.

As set out in the section 6, the first and foremost responsibility of the Department of Technology will be to draft and present to the Government a National Technology Policy and seek its approval for implementation. The Department will require technical assistance to prepare this document as it will play a key role in the direction and decision making processes of both the Government and the Industrial Sector.

To be fully involved in the rehabilitation programme for industry the Department of Technology must critically examine all the technical aspects such as the status of machinery, equipment production processes and the technology of the various enterprises, both large and small. They must collate information and use it for decision making and development proposals.

They are also expected to function as a catalyst in identifying and promoting industry oriented research and this will demand considerable inputs of both time and technical contribution.

The Department will also be involved with the Technical institutions regarding training programmes and courses and the means of technology transfer.

Although the members of the Department are academically qualified they lack the experience and exposure to industrial development activities and practices. This experience and exposure can only be gained with time and in a properly organised way.

To achieve this an Industrial Technology Expert should be assigned to the Department. The expert will be attached to the Department and will provide direct support in the preparation of policies, plans and programmes. The expert will advise on and assist in the preparation and implementation of appropriate technology policies and technological aspects of industrial planning and programming.

The strengthening of the Department can also be assisted by the organisation of visits to more developed countries to examine their experiences and approaches. Provision has been made in the budget for this.

The development of a close working relationship with the Planning Department and the Operations Department within the Ministry will also be included as well as regular communications with other Ministries.

The Department must also develop the necessary skills to equip it to undertake the new roles that will be required to manage and control the added functions of information dissemination and direct training support to industry.

2. Upgrading and Strengthening

The educational and training institutions have neither reviewed their course contents nor upgraded their equipment facilities for many years.

The Department of Technology should consult with each of them and, in the light of the Industrial Technology Policy of the country, establish what is required to be done to provide facilities to meet the new requirements. Aid agencies have already expressed interest in providing training and development programmes for instructors and re-equipping of the workshops.

This should be controlled by the Department of Technology to ensure that the training programmes and equipment being used are appropriate to conditions either pertaining or planned for Uganda.

The Department should also prepare, or advise on the preparation of, requests and submissions to donor agencies to fund the programmes.

The Industrial Technology expert will be expected to advise the Department on procedures to be followed to achieve this and to develop programmes to continually review and upgrade as necessary as the technology skills and expertise develop.

3. Direct Training Facilities.

The vocational and technical training institutes, when upgraded and strengthened, will provide off-the-job facilities

for students, entrepreneurs and workers. However their numbers are limited and they are concentrated in the main urban areas. Some of the courses may be either too specific or cost prohibitive and therefore will discourage the participation of otherwise interested participants.

To encourage the development of technical training and technology transfer a facility for bringing this to the people should be provided. It is therefore proposed to provide a number of Mobile Demonstration Units which will be equipped for both trade demonstrations and visual training.

These mobile units shall be controlled by the Department of Technology and manned by UN volunteers who will demonstrate the various trade skills and techniques.

It is proposed to have a number of mobile units covering the main technologies of metalwork, foundry and village blacksmithing, carpentry, building and construction, food processing and textiles.

The units will also be equipped with video facilities and a library reference section from which material can be sourced.

These units will be used for demonstration purposes at all levels of industry and can be availed of by private and public enterprises irrespective of size.

Although the mobile units will provide technical training facilities to areas previously not served there is a need to set up small scale modern plants in the private sector. These plants will be used to demonstrate the latest most appropriate technologies and manufacturing techniques while at the same time generating output.

These plants should concentrate on such areas as:-

1. Oil extraction, soap manufacturing, textiles, food processing and other which will use local raw materials and utilise skills and resources already developed albeit without the facilities of modern equipment and technologies.
2. The manufacture of products currently being imported to demonstrate the levels of cost and quality that must be achieved to compete on the open market. There are many items on sale in Uganda that could and should be produced locally, it is only the lack of knowledge, experience and access to technical specifications that prevented their development.
3. The manufacture of products currently unavailable or prohibitively expensive using local raw materials and modern manufacturing techniques. In this area the development of the chemical and pharmaceutical market could be exploited for home markets and export.

4. The manufacture and development of equipment and spare parts which can in turn be used in linkage programmes between enterprises.

The present policy of open and free market to import any equipment, assuming local cover and foreign exchange availability, results in machines from all over the world and at various stages of technological development and progress being found on the Ugandan industrial scene. This places an unnecessary strain when spare parts are required.

An example of this is the large variety of vehicle types and origins being imported by the Government Ministries without considering the future implications of maintenance and repair.

It will be the responsibility of the Department of Technology, assisted by international experts, to coordinate these activities and to involve others.

PROJECT BUDGET COVERING GOVERNMENT CONTRIBUTION(In UGANDA SHS)

Country: Uganda
 Project Number: UGA/87/013
 Project Title: Industrial Technology

BUDGET LINE	PROJECT COMPONENT	W/M	1987	W/M	1988	W/M	1989	W/M	1990	W/M	1991	W/M	TOTAL
	PERSONNEL												
11.	International Experts												
11.01	Industrial Technologists	-	-	-	-	6.0	60,000	12.0	120,000	6.0	60,000	24.0	240,000
11.02													
11.03													
11.04													
11.05													
11.06													
11.07													
11.93	PROJ PERSONNEL, SUB-TOT	-	-	-	-	6.0	60,000	12.0	120,000	6.0	60,000	24.0	240,000
13	Administrative Support												
13.01	Secretarial	-	-	-	-	6.0	4,200	12.0	8,400	6.0	4,200	24.0	16,800
13.02	Drivers	-	-	-	-	6.0	3,100	60.0	31,000	30.0	15,500	96.0	49,600
14	United Nations Volunteers												
14.01	UNV, -	-	-	-	-	-	-	48.0	88,000	24.0	44,000	72.0	132,000
19	Personnel Component Total	-	-	-	-	18.0	67,300	132.0	247,400	66.0	123,700	216.0	438,400
30	TRAINING												
32	Group Training	-	-	-	-	-	20,000	-	20,000	-	10,000	-	50,000
33	In-service Training	-	-	-	-	-	-	-	5,000	-	5,000	-	10,000
33	TRAINING, Sub-total	-	-	-	-	-	20,000	-	25,000	-	15,000	-	60,000
40	EQUIPMENT												
41	Expendable equipment	-	-	-	-	-	10,000	-	20,000	-	20,000	-	50,000
42	Non-expendable equipment												
42.01	Transport	-	-	-	-	-	20,000	-	100,000	-	-	-	120,000
42.02	Machinery	-	-	-	-	-	-	-	100,000	-	50,000	-	150,000
49	EQUIPMENT, Sub-total	-	-	-	-	-	30,000	-	220,000	-	70,000	-	320,000
53	Sundry	-	-	-	-	-	10,000	-	10,000	-	10,000	-	30,000
59	MISCELLANEOUS, Sub-total	-	-	-	-	-	60,000	-	255,000	-	95,000	-	410,000
99	PROJECT TOTAL	-	-	-	-	-	127,300	-	502,400	-	218,700	-	848,400