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United Nations Industrial Development Organization

in Africa

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Summary

In less industrialised nations of Africa,universities are considered to be the institutions of higher learning, only by both industry and general public. Thus there do not exist any link either formal or informal amongst universities, research institutions and industry. Each of these continues to exist in isolation without realising the considerable potential for mutual co-operation and advantage. To correct this state of affairs the universities and in particular faculties of engineering should initiate modifications in their structure so as to become partners in the technological activities of the nation. In Kenya the Faculty of Engineering of the University of Nairobi had initiated an investigation in collaboration with a UNESCO consultant to identify ways in which the Faculty could participate in the technological activities of the country. As a result of this investigation the Faculty is proposing to establish industrial research and consulting unit with the aid of UNESCO/UNDP. The unit will cater for the development and research needs of industry and Government organisations. It is anticipated that this approach by the Faculty would lead to considerable co-operation between the University and industry.

1 INTRODUCTION

In less industrialised countries of Africa it is safe to say that the capabilities of universities are not fully utilised for technological activities. This may be due to the misconception amongst the industrialists and the general public that universities are the seats of higher learnings only. Also the fact that most academics are trained in universities of industrialised countries and the stigma attached to non-basic research activities in universities may have possibly discouraged any attempts of entrepreneurs to involve academics in technological activities.

Fortunately in engineering it is difficult to distinguish between basic and applied research, and between applied research and development. However, because of training backgrounds of the local academicians in faculties of engineering and the standards of acceptibilities in academic circles both applied research and development work have been avoided. As a result very little research is being conducted in engineering.

In industrialised countries many industries have been involved in research and development in their own fields of specialisation. Even governments have established industrial research centres. Often academicians from engineering and science faculties act as consultants and provide a very useful link between industry and education. However, foreign students during their training in industrialised countries are usually not aware of this link and hence when they return to their countries of origin the aspects of involvement with both industry and government organisations are neglected. Compared to less industrialised countries the industrialised countries have an advantage of having many universities and thus some of them can afford to pursue only basic research in engineering. In recent years there is a tendency in engineering faculties even in industrialised countries to increase contact and to provide assistance in problems of industry.

As mentioned before in less industrialised countries of Africa there is hardly any engineering research activities outside the universities and, moreover, whatever little research expertise there is, it is mainly congregated in the universities. Thus it appears that there is no justification for the lack of involvement, in particular, by staff of engineering faculties in engineering problems of a country. On the other hand it should be mentioned that most universities in less industrialised countries of Africa are young. They are normally short of dedicated and enthusiastic local staff and often dedication and enthusiasm of the few is hindered by the lack of financial support and encouragements. Furthermore, the staff of engineering faculties are heavily preoccupied in developing undergraduate courses and in training engineering graduates for the need of the country. In such situations one does not expect the research tradition to grow and to flourish. It is essential therefore that for a healthy development of engineering faculty's activities and from the point of view of the country, engineering research of importance to national development should be undertaken in the local university. If this is not done then in the long run it will have profound effects on the country's self-reliance policies.

Engineering research activities undertaken by the local universities should have a strong applied development or consulting content. The problems

tackled should also be locally relevant. It is accepted that some engineering problems are general and may not be confined to a particular locality and it is best to conduct research on such problems where finances and facilities are plentiful. Indeed engineering faculties should be able to identify and provide guidance on such problems. The most important aspect in this is the direct involvement of specific people in industry, government and education on concrete projects.

II PRESENT SITUATION IN KENYA

The Government of Kenya in its Development Plan[1] for the period 1974-78 has laid down general guidelines for the growth of economy. These include:

(a) The trend from large-scale industrial activity towards small-scale activity in all sectors of industry especially in agriculture, in manufacturing and in construction.

(b) The trend towards labour-intensive rather than capital-intensive operations in all sectors of industry.

(c) The need to conserve foreign currency reserves by import substitution and the stimulation of exports, particularly of primary products.

(d) The increased emphasis on rural development, especially on the development of marginal and semi-arid areas of the country.

(e) The need for improved communications.

(f) The need for the maximum utilisation of local natural resources, as for example, water, minerals and local sources of energy.

There seems to be very little engineering research in progress on local problems. Most of the industrial research is conducted by the East African Industrial Research Organisation. This organisation is situated in Nairobi and serves the three members of the East African Community. The organisation has only eight professional research workers on its staff and thus its activities are limited.

In the industrial sector there is lack of the engineering research effort. This is particularly noticeable in large-scale or small-scale manufacturing industries. These industries do need assistance in the development and improvement of processes, advice on product development, and on quality control. It is anticipated that with the formation of Kenya Bureau of Standards some help will be forthcoming.

The technological activities in Kenya is mainly concentrated in what is known as Secondary Industry. For the Kenyan scene the Secondary Industry may be classified as follows:

(a) Large overseas-based firms

(b) Medium locally-based firms with overseas links,

(c) Large locally-based state-supported or state-owned enterprises mainly for processing and marketing agricultural products,

and (d) Small to very small locally-based firms and businesses of which many are in the "informal" sector of industry.

Co-operation required in research, development work and consultancy varies considerably between the above groups. In group (a) whenever problems arise they are usually transferred to parent firm for solutions. Sometime this approach may be slow and uneconomical. It should be noted that problems concerned with operation of a plant are often best handled locally if the "know how" were available locally. There seems to be a vacuum as far as consultants in this field are concerned.

Group (b) may need assistance with development problems; e.g., process and product development, tooling, jigs and fixtures and operational problems.

At present firms in Group (c) do not have engineering design expertise to institute much needed developmental work.

Industries falling in Group (d) are weakest in technology. They are least organised and most fragmented. Also this is the sector most difficult to make contact with and to assist. Yet, as pointed out in UNDP/ILO Report on Employment, Incomes and Equality[2], this sector is relatively efficient in the use of man-power and materials. It certainly plays an important part in the industrial economy.

Aid to the informal sector in various parts of the country (at the moment in four centres) is provided by the Rural Industrial Development Centres. These centres provide well-equipped workshops which people in the vicinity can use on a hire basis. It is rather unfortunate that the informal sector in Nairobi which is the largest in Kenya is not accessible to the same kind of assistance.

III SITUATION IN THE FACULTY OF ENGINEERING

In spite of the short history of the only Faculty of Engineering in Kenya it has done a splendid job in producing about 900 graduate engineers since 1965. Indeed the Faculty is still preoccupied in stabilising the undergraduate programmes. The faculty has four main departments: namely Civil, Electrical, Mechanical and Surveying and Photogrammetry. In recent years attention has been directed in developing postgraduate studies and about 20 Master degrees and 2 Ph.D. degrees have been awarded. Most of the post graduate work involves investigation of engineering relevant problems of Kenya.

Generally, the Faculty is reasonably well equipped to carry out a variety of research and development work. There is also present among the staff a variety of special expertise.

Realising the importance of co-operation amongst the Faculty, Government Organisations and Industry the Faculty of Engineering had initiated a recent investigation in collaboration with a UNESCO Consultant. One of the important findings was a keen desire by both industry and government organisations to establish closer contacts with the Faculty and to utilise its facilities in staff expertise and in equipment. As a follow-up the Faculty has prepared a booklet to circulate among interested bodies giving details of staff interests and expertise and of the physical facilities in the laboratories.

The Faculty also appreciates the need to help the practising engineering community to keep abreast of modern developments by providing specialised courses and seminars. The departments have tried to meet this need as far as their resources have permitted. As an example the Department of Civil Engineering has recently introduced a post graduate course in Public Health Engineering. In the past short courses and seminars had been organised for the practising engineers.

IV PROPOSED INDUSTRIAL RESEARCH AND CONSULTING UNIT IN THE FACULTY

The Faculty of Engineering has proposed to establish an industrial research and consulting unit with the following aims:

(a) To encourage traditional consulting work,

and (b) To help small business enterprises.

It is anticipated that the major efforts of the unit will be directed in design and development of new products; in improving of manufacturing processes including the design of jigs and tools or the modification of existing machinery; in testing or analysis; in identifying and advising industrial sector on areas of common interest and quality control in industrial processes.

Other areas of interest may possibly include: small-scale manufacturing, low-cost building with emphasis on the wider use of local materials, agricultural structures, agricultural machinery, equipment and tools, wider utilisation of local sources of energy; e.g., solar, geothermal, etc., feasibility studies of various industries and specialised testing services.

Indeed with a limited resources of the Faculty all of the functions mentioned above cannot be performed efficiently. Hence, whenever the need arises the expertise and equipment of other faculties of the University could be used. In such a unit it is difficult to be specific about the types of product that may come up but the willingness and attitudes displayed will decide the success or the failure of the unit.

It should be mentioned that some work has already been done in the Faculty but it is still on individual basis and not many people either in the University or outside know about it. As an example, a pilot plant for the

solar distillation of mineralised water is in operation at a station in the north of Kenya. This was built by the help and advice from the Faculty. Similarly many students in their final year projects have investigated the use of solar energy to heat water fo schools, hospitals, etc. in remote areas.

Another example is on the use of wind power. Work is at the moment in progress on the construction of a cheap, maintenance-free windmill and a pump for raising water.

The proposed unit would be organised in such a manner so as to be able to handle projects efficiently. To do this one needs an independent accounting system, independent transport, independent day-to-day supervision of projects and independent workshop facilities. Of course in the early stages of the unit all of these will not be realised or available but these would be the aims over the long period. The support from UNESCO/UNDP for the unit has been requested by the Faculty.

The University is expected to make a substantial contribution towards the staffing of the unit. There would be an Advisory Committee which will decide broad issues of policy. This committee will be chaired by the Vice-Chancellor and include among its members the Deans of the professional Faculties, Heads of Engineering Departments and representatives of various outside interested organisation.

For the day-to-day operation the Unit will be headed by a member of staff qualified specially in and with a strong interest in the type of work mentioned above. In the initial stages he will be the counterpart of a specialist. The unit will establish and maintain close links with similar organisations in other universities and will build up its own library.

Although students in the Faculty of Engineering are required to undertake projects in their final year it would be difficult to make use of them for the Unit because of tight time schedules. However, students would benefit both by observing and sometimes by participating in the activities of the Unit. The other advantage of having such a unit in the Faculty of Engineering is that it will mould the attitudes of students and staff and it may bring about the necessary changes in the undergraduate courses. It may also lead to basic research in due course. Clearly a central organisation would ensure co-ordination, continuity and mobilisation of the resources of the University.

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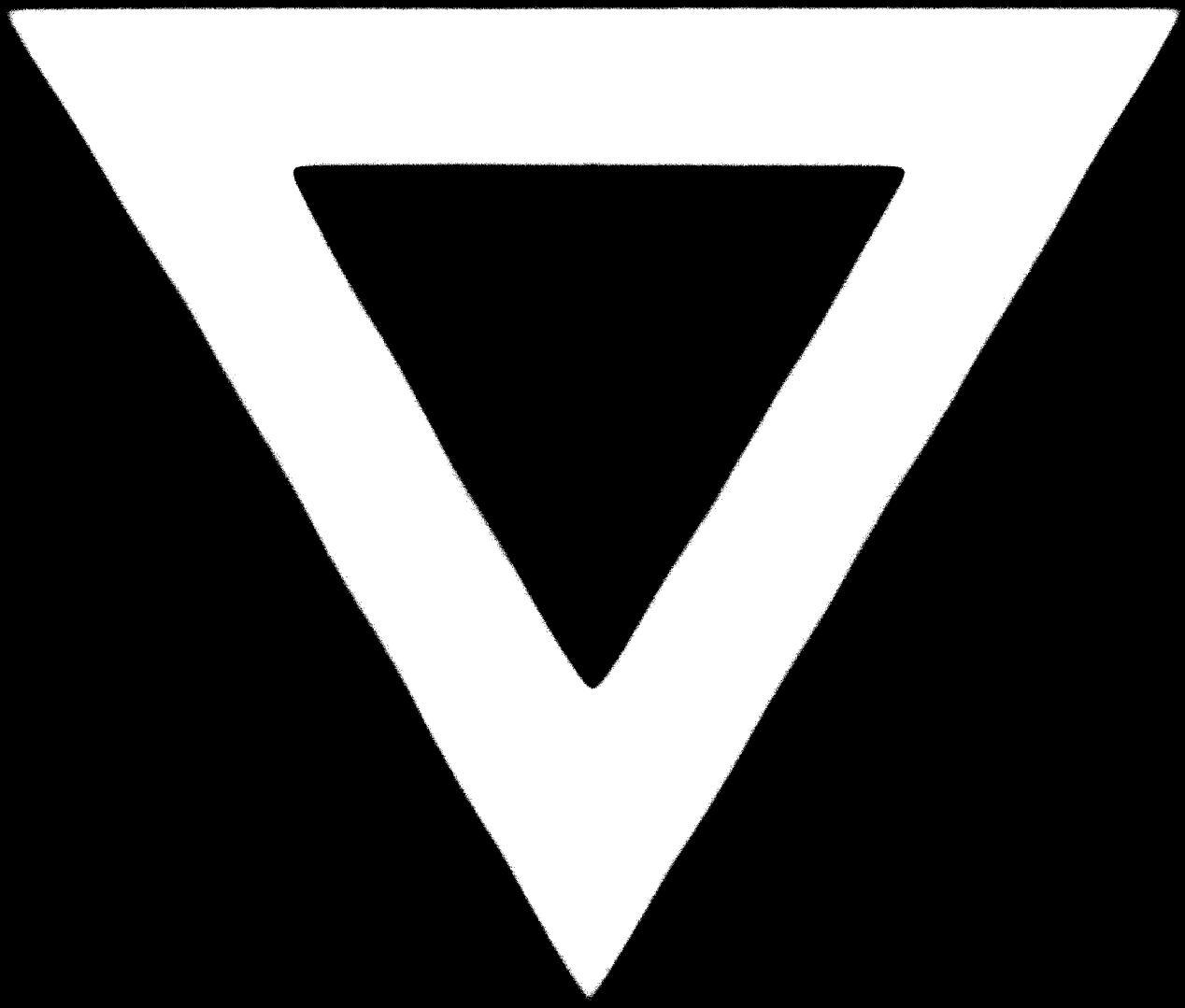

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