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## **Aspects of Training and Education in Developing Countries**

Formation et éducation dans les régions en développement

Schulung und Ausbildung in Entwicklungsländern

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### **SUMMARY**

Construction in developing countries requires much educated and skilled personnel to be imported if quality is to remain high, since, as yet, little higher educational opportunity exists for many of the native inhabitants. Increasing these opportunities is of primary concern in many developing third world countries. In Tanzania, for example, much more skilled man-power is expected to be needed than can be obtained from technical educational facilities within the country. The Faculty of Engineering is accomplishing some of the needed educational work, for the first time offering professional engineering education within Tanzania. Still, because of the demand for educated man-power, self-sufficiency in developing countries in general remains unattained.

### **RESUME**

La construction dans les pays en voie de développement nécessite une importation de personnel hautement qualifié si la qualité veut être maintenue à un haut niveau, car les possibilités locales sont encore limitées en matière de formation supérieure. Un premier point dans le développement des pays du tiers monde est l'augmentation de ces possibilités. En Tanzanie, par exemple, bien plus de spécialistes qualifiés sont nécessaires qu'il n'est possible aux instituts technologiques nationaux de former. La faculté d'ingénieurs est en train d'accomplir une partie de la formation nécessaire et rend possible pour la première fois l'éducation et la formation d'ingénieurs en Tanzanie même. Cependant la demande de spécialistes qualifiés demeure supérieure aux capacités locales de formation dans la plupart des pays en voie de développement.

### **ZUSAMMENFASSUNG**

Das Bauen in Entwicklungsländern setzt ein Mitbringen von hochqualifiziertem Personal voraus, wenn die Qualität auf hohem Niveau erhalten bleiben soll, denn die örtlichen Gegebenheiten für höhere Bildungsmöglichkeiten sind noch beschränkt. Ein erster Punkt in der Entwicklung der Länder der dritten Welt besteht darin, diese Möglichkeiten zu erhöhen. In Tansania, zum Beispiel, werden viel mehr qualifizierte Spezialisten benötigt, als die dortigen technischen Institute auszubilden vermögen. Die Fakultät für Bauingenieurwesen ist im Begriff einen Teil der notwendigen Ausbildung zu gewährleisten und ermöglicht zum ersten Mal, in Tansania selbst Ingenieure zu schulen und auszubilden. Trotz der örtlich ausgebildeten Kapazitäten bleibt in den meisten Entwicklungsländern die Nachfrage nach qualifizierten Spezialisten bestehen.



## 1. INTRODUCTION

Construction activities in developing countries require a similarly wide variety of skills as in industrialized countries. This paper shall provide some basic information on how developing countries try to overcome the lack of properly skilled workers and professionals: It is a fact that some countries invest upto 30 % of their expenditure in education and training, on the other side contributions of the industry and the professionals are frequently neglectable. The same industry is continuously complaining about a shortage of qualified manpower and tries to by-pass the problem by an "adapted technology" which means lower quality, standards and productivity. It is rarely the case that organisations realize their potential to train their own manpower.

In Tanzania, an example for a developing country in middle Africa, education and training are primary objectives of government development policy.

## 2. MANPOWER PROBLEMS IN TANZANIA

In 1975 construction (the monetary sector only) contributed ca. 1'600 m Shs. (550 mio. Sfr.) or 36 % to the Gross Capital Formation of Tanzania. The construction sector employed ca. 60'000 men, which is less than 10 % of all wage and salary workers.

With an anticipated growth rate in the construction sector of 5 % p.a. and with the intention to replace as many expatriates as possible the requirements for the period 1975 - 1980 have been worked out as follows:

Profession	Employed 1975	% Citizens	Additional re- quirement 75-80
Civil Engineers	370	64	520
Architects	43	40	56
Town Planners	22	64	38
Technicians	370	95	1165
Draughtsmen	300	90	395

The total additional number of skilled manpower required for the construction sector is estimated at 7.500, i.e. an output quota of 1.300 p.a.

## 3. FORMAL TRAINING AND EDUCATION

### 3.1 Craftsmen, Foremen and Technicians

Existing and planned training centres have an intake capacity of 1'000 students p.a. The 4-years courses include 1 year of basic indoor- and 3 years of on-the-job training. Trainees frequently face difficulties in finding working places, it seems that quality requirements and promotor's supervision in the construction sector are often so low that contractors do not bother about employing skilled workers.

There is at present only one training opportunity for foremen, consisting of a 3 weeks course. The foremen's abilities to read drawings and to interpret specifications are frequently limited, because they hardly master written Swaheli, but all project documents are in English.

The key intermediate group, the Technicians, are trained in the Technical College with an output of 80 C.E. technicians upto 1981. They don't have a craftsman training as many european countries, their ability to train and supervise is therefore also limited.



### 3.2 Professionals

Upto 1972, when the Faculty of Engineering opened, all professionals had to study abroad. They came back with a training which was frequently not adequate to the needs of their country, with which they were nearly as unfamiliar as an expatriate.

The first 30 Civil Engineers have graduated at the Faculty in 1977 after 4 years of studies, the present intake is 60 Civil Engineering students p.a. The curriculum includes 420 hours of workshop training and also 3 Practical Training periods of 8 weeks durations each, and offers a choice between Transportation- and Water Resources Engineering in the 4th year, one of them in addition of Structures and Construction Management.

The main objective of the studies is to provide the country with graduates with a basic, but wide and practical education, adapted to the needs, resources and technologies available in the country. When the graduates join the professionals, they frequently realize that the few experienced professionals in the country cannot provide them with the required practical follow-up training, because many of them are in managerial or administrative positions. So some of the graduates are practically left on their own in governmental or parastatal organisations, where they have to work for 5 years.

Also expatriates working under contract for the government lack frequently the local experience because of their rather short presence in the country. This applies also to the senior staff of the Faculty of Engineering, where expatriates normally work for about 3 - 4 years.

### 4. SUPPLY AND DEMAND OF MANPOWER

It will not be possible to satisfy the manpower needs in Tanzania (and in many other countries) in the forthcoming 5 - 10 years with suitably qualified citizens. The construction sector will therefore continue to depend on experienced expatriate professionals, consultants and contractors. Quality and productivity of construction will not improve decisively without heavy inputs of skilled manpower on all levels, thus leaving quite some space for technical cooperation and investments in the construction industry.

### 5. THE ROLE OF THE FACULTY OF ENGINEERING

The Faculty's prime objective is to educate engineers for Tanzania. Postgraduate studies, consulting and services also have a high priority and are at present undertaken by a number of laboratories and sections. The Faculty has decided to set up a scheme to promote and advertise the latter two. The first short courses for professionals are planned for 1978 in cooperation with the local professional institution.

### 6. CONCLUSIONS

In most African countries relevant training institutions for all types of skills required have only been established in the last 5 - 20 years. The number of qualified manpower is very limited, but the construction sector grows frequently at such rates that not even the additional demand can be satisfied by locally trained staff. This



leads to a net increase of the number of expatriates employed, although most of the countries intend to reduce the dependency on expatriate know-how and capital.

Realistic estimates for the time required to achieve selfsufficiency in manpower in the construction and other engineering sectors vary between 5 and 20 years, thus leaving ample space for individuals and organisations to work within the given framework of the countries, if they are prepared to aim at long range targets and don't concentrate on short range objectives only.

The technical cooperation offered by the industrialized countries might contribute to the solution of the manpower problems, as in the case of the Faculty of Engineering and other institutions, but it will not be in a position to solve them.