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# THE KENYA ASSOCIATION OF MANUFACTURERS

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**A NATIONAL CASE STUDY PAPER  
ON HUMAN RESOURCE  
DEVELOPMENT  
IN  
INDUSTRIAL MAINTENANCE**

**A KENYAN EXPERIENCE  
BY  
S. M. ITA  
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**THE KENYA ASSOCIATION OF MANUFACTURERS**

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INTRODUCTION

a) General Back-ground information

i) Country Profile on HRD in Industrial Maintenance

Country	KENYA
Gross Domestic Product	\$ 5958 million (1985)
Manufacturing C <sup>o</sup>	\$ 798 million (1985)
Share of manufacturing	13.4% (1985) at 1982 constant prices

Main Industrial sector (manufacturing)

Food & beverages processing of Agricultural produce, engineering, textile, pharmaceutical, chemical and allied industrial minerals, motor vehicle industry, leather and leather goods, printing and packaging.

Main Exports

Coffee, tea, cement, pineapples (canned), petroleum products, fresh fruits and vegetables, pharmaceuticals, textiles (and tourism)

Population (NO) 20.2 million (mid. 1985)

Labour Force (NO) 7,199,000 (1983)

Percentage Literacy % 45% adult literacy

Population in Primary Schools (NO) 4,323,822 (1983)

" " Secondary Schools (NO) 493,710 (1983)

" " Technical Schools (NO) 9,258 (1983)

Population in University Art & Humanities (NO) 1512 (1983/84)

Social Sciences (NO) 2645 (1983/84)

Pure Sciences (NO) 798 (1983/84)

Technology, Engineering &

Applied Science (NO) 2295 (1983/84)

Population in Technical Colleges - Tertiary (NO) 5,167 (1983/84)

Kenya Polytechnic (NO) 4001

Mombasa Polytechnic (NO) 1166

ii) Name of National Training Organizations, if any

Universities

Nairobi, Kenyatta, Moi Universities

Technical Diploma Colleges

Egerton, Kenya Technical Teachers College, Kenya Science Teachers College, Jomo Kenyatta College of Agriculture & Technology, Kenya Polytechnic, Mombasa Polytechnic, Eldoret Polytechnic

iii) Colleges of Technology (Several)

Muranga, Kiambu, Kinathi, Ramogi, Rift Valley etc (established at Provincial and District levels)

iv) Names of Industrial Maintenance Training Institutes

Kenya Railway, Bandari College (Ports and Harbours), Post & Telecommunications Training College, Kenya Power and Lighting, (Meterology) Kenya Institute of Mass Communication, aerodromes Training Institute, and many on the job maintenance training programmes established at company and project levels.

b) Overview of Industrial Maintenance Problem

In this paper, the discussion on industrial maintenance relates to the function of skillfully sustaining the operation and use of industrial plants and equipments, during their expected life time. Discussion is further extended to policy and organization aspects of maintenance, but only in relation to the development of local capability in maintenance referred to above. It is in this context that the overview of the Industrial Maintenance Problem both at the national and the industrial project levels is analysed in the following paragraphs.

In the framework of the national development process, industrial and infrastructural projects, are undertaken on a continuous basis both at the national and industrial project levels. Industrial plants and equipments are acquired for use in the execution and implementation of these development processes from different sources. Their types and models determined by the source of origin and application for which they are intended. This variety alone, presents a large problem of the adequacy and reliability of skills, needed across the national development spectrum. Further, the development of the industrial and infrastructural projects promoted and supported by the expatriate technical skills, has been faster than the development of the national technical capability.

To sustain this type of industrial development, both local and imported resources have to be found, to operate and maintain the industrial plants and equipments in use. Consequently even without going further with this analysis, it is clear that in Kenya there exist an industrial maintenance problem. This is characterized by inadequacy of technical skills and insufficiency of hard currency for sustenance of operations and use of the industrial plants and equipments available in the country.

Inevitably the stated inadequacies do result to industrial shut-down loss of production and below optimum operations. The recognition of the maintenance problem, appear to have some relationship with the importance attached to the Human Resource Development in Kenya as evidenced by the mushrooming of technical training institutions and the strong national bias for a technical curriculum in the new education system.

c) Methodology applied in collecting information for preparation of the study

The methodology was mainly a desk survey in the form of extracting existing and relevant information from Government, Statistical reports, international agencies publications (i.e. World Bank).

These were implemented by a wealth of information available and collected over the years by the Kenya Association of Manufacturers and by day to day experiences and knowledge gained in dealing with the topic subject matters.

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## INDUSTRIAL MAINTENANCE POLICY AND STRATEGY

The development of a broad and fairly complex industrial infrastructure in Kenya, has inevitably resulted to an evolution of a national awareness of an industrial maintenance problem. This national awareness and other basic aspect of the emerging industrial tradition, operate as a base on which to develop an industrial maintenance policy and strategy.

The emerging industrial tradition is characterized not only by the national awareness of industrial maintenance problem, but also by the present technical bias in the national education system, patterns of interaction between the formal education system and specialized action oriented training.

However, it is apparent that the development of a co-ordinated national and sectoral industrial maintenance policy and strategy is still yet to emerge. The development of this national framework, is necessary for a systematic assessment of the organizational and managerial needs for industrial maintenance with respect to project design, formulation and implementation. It is likely that the nature and scope of the co-ordinated national approach to this problem and the dependence of the donor/supplier expertise compounded by the rapidly changing technologies has tended to delay the development of a co-ordinated national industrial maintenance policy and strategy.

Co-operation in human resources development in industry and industrial maintenance at national, sub-regional, regional and international levels, as suggestion, has some potential, though a remote idea at present. This can only be realized, when the national industrial maintenance policy and strategy framework is fully operational. However some opportunities do exist for the developing countries to exchange experiences and train personnel on the job and in formal specialized fields.

These opportunities fully exploited, can enhance the promotion of HRD in the countries involved. Kenya is already making full use of these opportunities when they occur.

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## ORGANIZATION AND METHODS OF MAINTENANCE

Kenya as a country, pursues the policy of a mixed economy, as a strategy for her economic and national development efforts. This policy, permits active participation of both private and public sectors, in the development and management of the economic activities, both at the macro and micro levels of the economy.

Aspects of Organization and Methods of Maintenance are being developed in both public and private organizations at the project level. Examples of this development are available at the public sector corporations undertaking major national infrastructural projects like - Kenya Railways, Kenya Ports and Harbours, Telecommunications, Kenya Power and Lighting Company etc. There is also evidence of similar development, in the public and private sector industrial projects. There is however no clear evidence of this development, at the national or sectoral levels. Nor is there evidence to support that maintenance jobs are highly regarded.

Maintenance and training for maintenance at the project planning, implementation, commissioning and operational stages, is regularly undertaken locally under various schemes. Lack of the national co-ordinating maintenance and training framework, makes this effort purely an initiative for individual organizations, dependent largely on expatriates skills and availability of funds and other facilities.

Local evidence is available, on the establishment of the posts of maintenance directors, supervisors, technicians at the project level though not in the same nomenclature. Maintenance workshops are also common as integrated features of the local projects. Collection of statistics on break-downs, loss of production and cost of maintenance, are activities normally carried

out by large enterprises. The national bureau of statistics, has of late taken keen interest, in the collection of these statistics for economic planning rather than for maintenance and training for maintenance purposes.

There are several maintainency consultancy and service organizations established by, both local and outsiders in Kenya, to undertake project planning and imolementation on contractual basis. These contracts are for a period of time, after which the project operation, is left entirely to the management of the promoters. In a number of cases consultancy services of a technical nature are requested from outside at prohibitive costs. The small and informal industry, has a central and complementary role, in providing maintenance and repair services in Kenya.

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## TECHNICAL DOCUMENTATION ON MAINTENANCE

Technical documentation on maintenance is a specialized skill involving preparation of adequate tender documents, maintenance plans with detailed specifications, reading and making correct interpretation for use of the manuals on plant and equipment installation, diagnosis and maintenance procedures, codification, classification and management of technical documents. These skills can be learned on the job or through a formal programme of technical education.

The importance and relevance of the technical documentation skills for maintenance is that plants and equipments are complex units incorporating many sub systems. Occasional reference to the technical documentation, facilitated by proper codification, classification and availability of the parts manuals, is critically important for effective maintenance programme. Indeed it is important that an organization or a nation, has a measure of this capability if it must cope with the modern pace of development, dominated by the use of technical equipments and rapidly changing technologies.

In Kenya, technical documentation skills for maintenance, are largely provided for through a variety of schemes. During the short period of industrialization in Kenya the development of local capability in these skills has been undertaken on a continuous basis, both at the project and national levels. Preparation of tender documents and maintenance plans are common activities attempted by the local engineers and technicians attached to locally based consultancy firms. And in the context of the Kenyan policy of the mixed economy the private and the public sectors consultancies have equal opportunity in undertaking the job.

The documentation on each item and blow up of the plant indicating parts and parts numbers, is normally a projects internal function. There is local evidence, that reading and interpretation of manuals on each item of the plant and components, installation procedures, fault diagnosis and maintenance procedures, are undertaken in some cases, where such manuals are available.

Maintenance plans and procedures for preventive and continuous maintenance and repairs skills, are available locally though not in sufficient quantities. External skills are occasionally called for to meet the local demand gap that is not satisfied.

Training engineers/technicians in codification, classification and management of technical documentation within an enterprise, is undertaken locally but in a small scale. This specialized training in technical documentation skills is undertaken externally, since local facilities for such programmes do not exist. Exploration for possible regional and international co-operation in this respect, could be very useful to Kenya and I believe to many other developing countries. Quite a part from the huge numbers of the technicians required in facilitating the national development process, many developing countries will have a financial constraint in training this type of manpower.

## SPARE PARTS MANAGEMENT

Spare parts management as a skill entails, identification of frequent of change determination of relative parts stock levels, ensuring the availability and supply, organization of the store, budgeting for and financing for, and the development of the contingency plans to deal with the incidence of unavailability of, the spare parts.

In Kenya, spare parts management is an important function in all industrial organizations and projects. The motor vehicle industry offers the best example in this respect. The spare parts management in this sector is fairly well developed, to a stage where quite a part from the handling of the logistics for importation, the sector has moved a step further, to encourage the local manufacture of these spare parts. In other industrial sectors, and because of the variety of the plants and equipments in use, the spare parts management is an individual unit concern dominated by the importation, financing and stock levels aspects.

To a very large extent, local projects have an integrated unit which services the plant and equipments in use. These units undertake fabrication and manufacture of basic standardized spare parts and components required. And in doing so complement in a way, the availability of such parts, which would have to be sourced locally or externally.

With respect to importation of the spare parts, the Kenya Government through its respective departments, facilitates the importation of spare parts, by placing them on a priority list, for foreign exchange allocation. Industrial projects, and commercial spare part dealers, are allowed to import sufficient stocks of spare parts regularly. The government is however keen that some attempt ought to be made in the promotion of the local manufacture of the spare parts.

Although spare parts management training is partially met by the on-the-  
job training at the project level, there exist a very large gap unsatisfied  
locally for highly qualified manpower in this field. At present the  
training of these skills is left to the individual organizations and  
rarely complemented through a national effort.

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## NEGOTIATION AND ACQUISITION OF THE PLANTS

This is a very important aspect of the industrial plants and equipments maintenance problem. At the introduction of this paper we did indicate that the variety of types and models of plants and equipment in use, generate an ending maintenance problem to the developing countries. Part of this problem, results from the lack of adequate skills for sourcing and negotiating, acquisitions of plants and equipments. The problem is further compounded, by the fact that developing countries are on the receiving end especially in cases of technical equipments supplied through technical aid schemes. These offer little or no opportunity for negotiation before delivery.

The accumulation of these types of the plants and equipments by the developing countries, creates a complicated problem of maintenance which often offsets the goodwill and the expectations of the development benefits, intended by the donor and the recipient countries. It is important that this subject matter be critically examined by both the suppliers and the recipient countries, preferably at a forum provided for by UNIDO.

Kenya as a developing country, has gone through the experience of the supply and acquisition of a variety of plants and equipments, which do present a complex problem of maintenance. The problem starts at the acquisition stage, and to cope up, the organizations employ both local and expatriate consultants, to ensure that after sales service, is adequately provided for in the purchasing contracts.

Similarly, at the government level care is being taken in the case of direct purchases of technical equipments. However, technical equipments donated or enjoying long term funding by a supplier, allow limited or no possibility of taking necessary precautions for maintenance.

## TRAINING POLICY FOR MAINTENANCE

The theme running through the discussion in this paper, is one of "training for maintenance of industrial plants and equipments". Training for maintenance or Human Resources Development for maintenance is identified in the paper, as being the critical deficiency, in the development process of the developing countries.

Human Resources Development in general and in specialized form, is expensive and a time taking process. Training and general education facilities both local and external are costly to develop and obtain. Yet the pace of the modern development of the developing countries, cannot be delayed to wait for the local development of adequate technical capability to plan and manage their ever changing development activities.

The discussion in the paper so far suggest that the development process in the developing countries is largely dependent on imports of technical equipments and skills. This approach to development has not been wholly, a negative effort. A measure of development and benefits has been realized. Physical infrastructures of economic significance have been developed. Industrial infrastructure has been developed, operated and sustained. Products and services have been produced locally to satisfy some basic needs. And lastly useful development lessons have been learned.

The short era of development in the developing countries, has been characterised by unplanned, wasteful and expensive experiences. It is common knowledge today that this approach to development is unsustainable both from the point of view of external and local support.



In the specific case of training local manpower for maintenance of industrial plants and equipments a national policy framework for maintenance must be evolved. A systematic assessment of HRD needs for industrial maintenance should be undertaken on a continuous basis and strategies aimed of satisfying those needs developed.

Training methods must be identified and developed. Efforts must be made to establish institutional infrastructure for training and research. And a sustainable financing approach designed to support these critical aspects of the national development effort.

In Kenya a close examination of the national development plans, indicate that there exist a technical training policy. The basic problem is to generate sufficient funding for the execution of the technical education system. At the organization level on the other hand, the problem is one of access to and availability of technical training facilities, that offer specialized training programmes.

These deficiencies tend to frustrate the execution of training programmes in the developing countries, thus compounding and prolonging the time within which problems of a technical nature can be managed. However, experiences of developed countries in this connection indicate that there is no short-cut to the process. Developing countries must therefore begin to tackle this problem now if they must achieve their expected levels of social and economic development. Hence the importance of HRD policy for maintenance as a critical component of their overall development strategy.

6th June 1986