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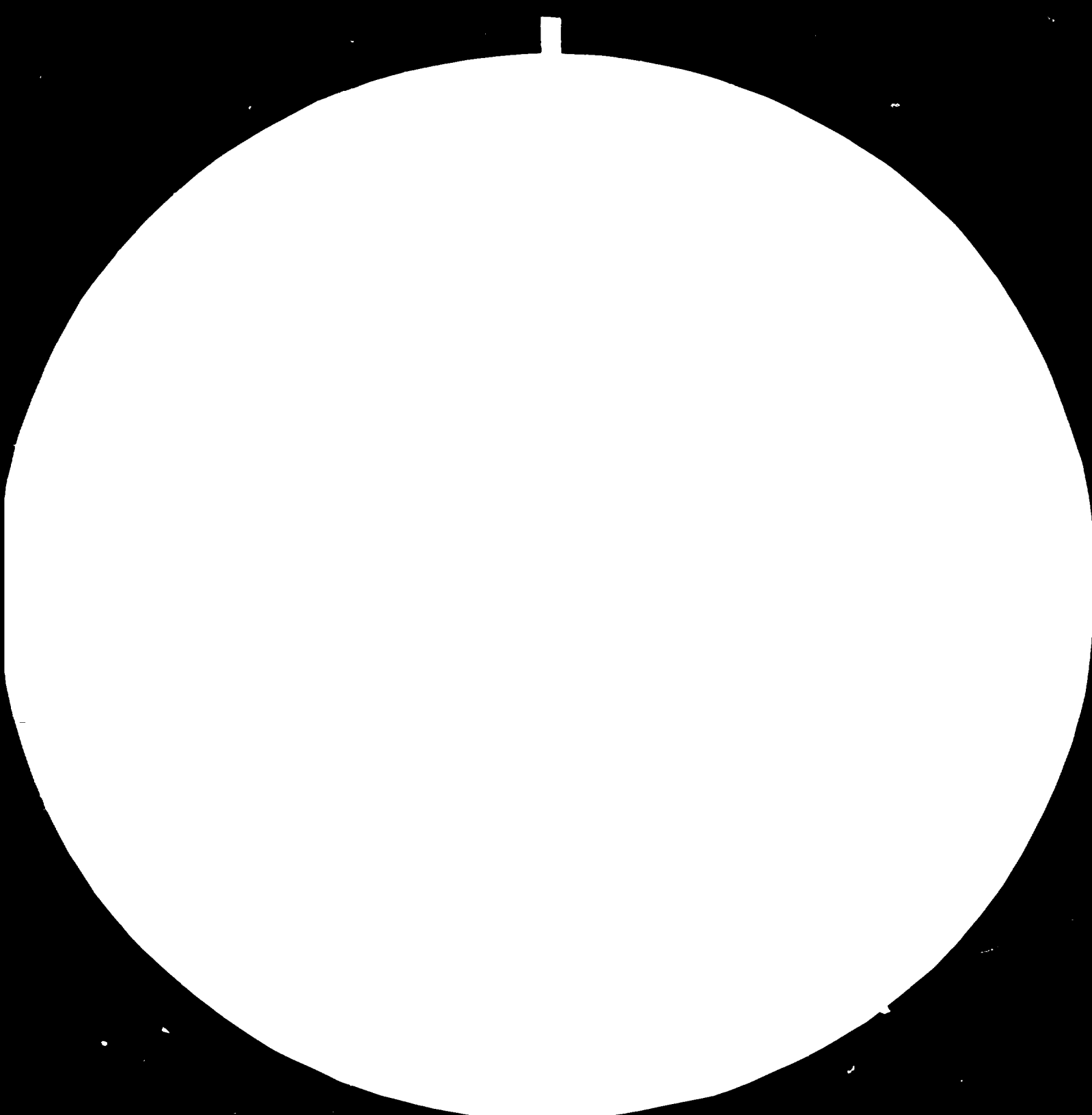
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5.0



Resolution Test Chart
NBS 1963-A
National Bureau of Standards
Washington, D.C. 20540

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DEVELOPMENT ORGANIZATION

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Tanzania. ESTABLISHMENT OF FOOD TESTING AND
QUALITY CONTROL LABORATORY

US/URT/79/202

UNITED REPUBLIC OF TANZANIA

Technical Report*

Prepared for the Government of the United Republic of
Tanzania by the United Nations Industrial Development
Organization

Based on the work of Gyorgy Harsanyi, expert in laboratory
instrumentation

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CONTENTS

1. INTRODUCTION..... Page 1

2. SUMMARY..... Page 1

3. FINDINGS..... Page 2

4. RECOMMENDATIONS..... Page 6

5. ACKNOWLEDGEMENTS..... Page 7

APPENDICES

Job Description..... Page 8/9

1. INTRODUCTION

The main overall immediate objective of the project Food Testing and Quality Control Laboratory, was to establish testing facilities to serve the existing food processing industry, by testing physical, chemical and biological properties and the composition of various food products and auxiliary materials and provide assistance to individual plants in solving their operational and technological problems. In addition to the food microbiologist and an expert in food testing and quality control, the expert in laboratory instrumentation was engaged for a period of one month. His main duties were to assist in setting up the laboratory, the installation of the equipment and training of counterpart personnel in the operation, adjustment and maintenance of the laboratory equipment. A more detailed description of the expert's duties is contained in the job description attached as Appendix I. The project was originally approved in June 1980, however its implementation was delayed due to the fact that the laboratory facilities within the Tanzania Bureau of Standards (TBS) were completed only at the beginning of 1982. Therefore, the expert could only be fielded in February 1982 after the electricity supply problem of the building had been solved.

The largest portion of the project funds represent a Special Purpose Contribution to UNIDO pledged by the Government of Hungary and used for the laboratory equipment and instruments. The Government of Sweden, on a bilateral basis, has also assisted TBS and the Swedish Assistance is complementary to UNIDO's and covers some other activities of TBS.

2. SUMMARY

The expert carried out his assignment basically in line with his duties as described in the job description. He has proposed that the new established facilities be used for the training of technical staff of the existing food processing companies and possibly for the participants from the South African Development Coordination Conference. In order to increase the contribution of the local food industry in the foreign exchange earnings and food self-sufficiency as well as to utilize installed capacities better, it is also proposed to organize a workshop on the technology transfer and training centres for rural development of agro-based industry.

- visible colorimeter:
 - colour of beverages, sugar, tea
 - nitrate, nitrites in meat
 - residual phosphatase in cream
 - water analysis
 - methanol in spirits
 - fusel oil in spirits, cordials and liquors
 - colouring matters on green coffee

- near infrared reflectance spectrophotometer:
 - quick determination of protein, oil and moisture in grains and oilseeds
 - new materials for experimental purposes; cashew-nut, millet, sorghum

- tristimulus colorimeter:
 - colour determination of coffee, cloves, tobacco, meat, fruits and vegetables, vinegars, tomato pulp
 - whiteness of sugar

- refractometer
 - determination of refractive indices
 - measurement of soluble solids
 - differentiation of oils
 - determination of added water in milk
 - ripeness of fruits and vegetables (sugar; acid ratio)
 - alcohol in beer and other beverages
 - fats and waxes as coating and glazing substances on coffee

- polarimeter:
 - sucrose content (sugar)
 - lactose in milk
 - sugar and dextrin coating and glazing substances on coffee

- insectophon:
 - detecting living insects in grains, nuts, etc

- aphrometer:
 - carbondioxide pressure measurements in bottles of beverages

- thin-layer chromatograph (TLC):
 - animal fats in vegetable oils

- drying oven: - moisture e.g. in butter
 - fiber
 - edible oils; stability against rancidity
 - soluble solids, e.g. in coffee
 - water extract of tea
 - extract of wines
 - dissolved oxygen in natural waters
 - chemical oxygen demand in waste water

- vacuum drying oven: - moisture

- sieve set: - screen analysis of spices, cloves
 - screening fractions; tea, sugar

- hygrometer: - areometer series; density

- water bath: - heating
 - organoleptic test of edible oils; flavour and odor

- hot plate: - smoke point of oils
 - chloride in meat
 - alcohol insoluble solids in fruits

- membrane filter: - extraneous matter; sediment test in milk
 - filter technique for counting bacteria

- muffle furnace: - ash
 - total solids in waste water

- luminescent tester: - fly eggs and larvae
 - TLC plates evaluation

- binocular microscope: - filth, gross contamination, extraneous matter
 - mould count
 - foreign fats in butter
 - cleanliness; spices
 - chicory infusion in coffee

- valorigraph: - dough making quality of flour

- colony counter: - microbiological counts
 - yeast as contamination

The microbiology equipment is applicable for:

- total plate count; product spoilage
- gas formers in canned, cured meats
- coliforms; post processing contamination
- gram positive or negative bacteria
- aerobic bacterial spores
- anaerobic bacteria count
- yeasts and mould count
- dye reduction test
- water, waste water; bacteriological control

For pathogen microorganisms tests to be taken in medical microbiological laboratories.

Many of the tests can help food processing technologies, e.g. the determination of free fatty acids in crude oils can serve deodorization control.

Real economic effects can be achieved by control of the product formulation, e.g. on the basis of fat, protein and moisture determination on raw materials, it is possible to compound products of preserved composition giving the least-cost formula for the production, not violating with fat or excess water e.g. find the possibility to increase the amount of ice in the formula if it is still far from the limiting quantity of water content.

It is possible to test the stability of products e.g. at dry milk products stability against heat, salt and acid. Enzyme inactivation control can be used for pasteurization control of milk and for preventing discoloration or off-flavour development in fruits.

There is equipment in the laboratory for precision measurement, e.g. pycnometer for density measurement or hygrometer for quick testing.

The equipment is applicable for the determination of foreign materials in foods, e.g. added water in milk, foreign fats in butter, colouring matters in green coffee.

The training counterpart personnel were as follows:

Food:	J L Bavu
	I Arley
Chemistry:	Mrs. Dias
Microbiology:	Mrs. Ahmedali
	Mr. M waja

Maintenance: Mr. Kadyanji
Mr. Mtawala

There is no university level education in food science and technology in the country; only some subjects at the Faculty of Agriculture, Morogoro.

A high degree of under-utilization of food processing capacities was identified, so that the contribution planned for the industry sector to the National Economic Survival Programme was not over 11.7 percent. The laboratory facilities installed can serve their quality control goals better, if the utilization of these capacities is increased.

At ELIMU Supplies Ltd., a definite interest in the establishment of a maintenance and assembly shop for laboratory equipment could be identified. Recommendations are under evaluation.

4. RECOMMENDATIONS

It is important that the training programme of the counterparts should be fully completed in the field of food testing and microbiology conducted by the other two experts.

Since there is no university level course in food science and technology, there is a real and urgent need for organizing food testing and quality control training for the technical staff of the existing food processing companies. The food testing and quality control laboratory established at TBS would be suitable for these purposes, after equipping it with some additional accessories, spare parts and reagents, and acquiring the assistance of experts to conduct the training. It is, therefore, suggested that a laboratory training programme on quality control of food-stuffs should be organized at the TBS laboratory.

Since the food processing capacities are under-utilized in the country, it is suggested that a workshop be organized to identify and propose effective steps to be taken for

- the development of raw-material production supporting industries
- to provide direct interaction between processing and raw material production.

Strengthening the rural development of small and middle-scale industries will strengthen the raw material production for food industry as it was achieved in some other countries recently. A network of

these industries all over the country could be strengthened by a network of technology transfer and training stations. This is suggested for discussion in a frame of a workshop with the local authorities, parastatal organizations and development offices.

5. ACKNOWLEDGEMENTS

All the suggestions, help and remarks are kindly acknowledged to Mr. B. L. Mwobahe, Director of TBS and his colleagues and also to Mr. Saad Henein, UNIDO/SIDFA.

UNITED NATIONS



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

26 September 1980

Request from the Government of the United Republic of Tanzania
for Special Industrial Services

INTERNAL

JOB DESCRIPTION

UC/URT/79/202/11-02/31.7.C

Post title Expert in Laboratory Instrumentation

Duration One month

Date required March 1981

Duty station Dar es Salaam

Purpose of project To assist in the establishment and operation of the food testing and quality control laboratory

Duties

In close co-operation with the personnel of the Tanzania Bureau of Standards (TBS) and other experts working within the project, the expert will specifically be expected to:

1. Assist in setting up the laboratory for food testing and quality control and in the installation of equipment primarily intended for instrumental analysis;
2. Conduct practical tests, operate equipment and instruments and make necessary adjustments;
3. Train counterpart personnel in instrumental analysis, operation and adjustment of equipment and its maintenance; training should cover the use of various pieces of equipment, such as analytical and electronic balances, digital absorption colorimeter, U.V. spectrophotometer, turbidity meter, centrifuges, ovens, furnaces, homogenizers, insect tester, mill, microscope, pH meter, refractometer polarimeter, saccharometer, recording dough mixer, etc.

The expert will also be expected to prepare a final report, setting out the findings of the mission and recommendations to the Government on further action which might be taken.

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Applications and communications regarding this Job Description should be sent to:
Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

QUALIFICATIONS Highly qualified instrument engineer or instrumental analytical chemist, with practical experience in food testing, laboratory instrumentation, its operation and maintenance

LANGUAGE English; Arabic an asset

BACKGROUND INFORMATION During a visit of a UNIDO Secretariat staff member to the country in June 1976, the Government expressed an interest in UNIDO's assistance for the establishment of laboratory facilities for the testing and quality control of food products. The project was selected from the portfolio of projects submitted by the LDC (Least Developed Countries) mission.

During the exploratory mission of a UNIDO consultant to the country in April 1979, a general assessment was made of the basic requirements in food testing and quality control and the testing methods, laboratory equipment and facilities required for this purpose were determined, according to the products to be tested.

The laboratory facilities for testing and quality control will be primarily intended to serve the existing and future food industry by providing basic services which individual plants are unable to establish themselves either because of their small size or because of the shortage of qualified personnel and facilities. The services to be provided by the laboratory will include the testing of raw and ancillary materials, semi-finished and finished products with regard to their composition and to their chemical, physical and nutritional properties, and will be directly related to the production process and processing technology. This will also include the testing of packaging material (such as tinfoil cans), control instruments, condition of some equipment and tools and will be directly involved in the development of new products and in the improvement of technological processes.

The equipment to be provided within the project includes analytical balances, colorimeters, centrifuge, muffle furnace, infrared analyser, incubators, Kjeldahl apparatus, micro mill, ovens, microscopes, pH meter, polarimeter, saccharimeter, refractometers, stirrers, autoclaves, water bath, U.V. spectrophotometer, turbidity meter, recording dough mixer, water distilling apparatus, Soxhlet extractor, colony counter, etc. Various pieces of glassware, chemicals, media, handbooks etc. will also be provided.





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