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ESTABLISHMENT OF A KNITWEAR FACTORY IN LOBATSE

DP/BOT/86/002/11-03

BOTSWANA

Technical report: Assistance to the Tiro Ya Diatla Knitwear Factory*

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

Based on the work of Roger Gerard O'Neill
Knitting Machine Mechanic

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United Nations Industrial Development Organization
Vienna

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ABBREVIATIONS

| | |
|--------------------|---|
| TYD | Tiro Ya Diatla - the organisation |
| The factory | Tiro Ya Diatla Knitwear factory |
| The mill | Tiro Ya Diatla Woollen Spinning Mill |
| UNDP | United Nations Development Programme |
| UNIDO | United Nations Industrial Development Organisation |

ABSTRACT

The consultant spent 8 months (1 September 1987 - 21 April 1988) attached to the Tiro Ya Diatla Knitwear factory, Lobatse, Botswana, during which time he participated in the installation, setting and initial operation of the knitting machines, and trained the local counterpart in machine maintenance and adjustment.

The staff in general are willing, enthusiastic and creative and the counterpart mechanic, in particular, is very handworking and a very good choice for the post.

The main conclusions and recommendations are that the first priority must be a major improvement in the quality of the yarns being supplied to the factory by the spinning mill.

This consultant also echoes the need for (as expressed in Per Nordbys report on the "Marketing follow-up trip in Europe February 1988") a more appropriate design input.

Overall, the factory is running very well and the consultant believes that it will flourish due to the expertise and professionalism of Peter Coyle.

INTRODUCTION

UNIDO/UNDP involvement - historical

The Tiro Ya Diatla was established in 1976 in Lobatse, Botswana, with funds provided by the Norwegian Agency for International Development (NORAD). Initially it was a small craft organisation engaged in hand spinning and weaving using Karakul wool and other fibres.

Since then its activities have expanded and in 1982 a woollen spinning mill was opened.

In mid 1985 Mr P. Walker conducted a feasibility study under UNDP/UNIDO technical assistance (SI/BOT/84/801) to examine the viability of high quality knitwear production in Lobatse, taking into account the opening of the mill. The study concluded that such an undertaking was financially sound and economically viable. The factory was then established. The intended product is a high fashion coarse gauge sports knitwear.

1 STATUS OF FACTORY ON ARRIVAL

The following equipment was present in the factory when the consultant arrived:

- 10 Immea three-gauge vee bed knitting machines
- 2 Protti intarsia two-and-a-half-gauge knitting machines
- 9 Exacta "mini-linker", six-gauge, linking machines
- 1 Spenser Major milling and dry cleaning machine
- 2 Poney self-contained steam pressing tables.

The factory employs 25 people:

- 1 General supervisor
- 3 Supervisors
- 1 Mechanic
- 10 Operatives

(along with Linkers, embroidery personnel and operatives of Spenser Major dry cleaning machine)

A The Knitting Machines

The Immea vee bed three-gauge knitting machines

The Immea knitting machines were installed (by the Immea technician) in accordance with the feasibility study prepared by Mr P. Walker. They had been very poorly erected and set.

The consultant used this situation to instruct Mr Arthur Duiker (counterpart mechanic) to erect and set them. The machines were also rearranged, under instruction from Mr Peter Coyle, to achieve a better production-flow through the factory.

The machines were supplied and fitted with automatic take-down mechanisms but without manual take-down weights and combs. The automatic take-down system is virtually useless in the manufacture of fully-fashioned hand-loomed knitwear. It is normal to receive manual take-down weights and combs together with the automatic system as the automatic system is an extra to the manual machine. This was corrected but it took Immea until the end of November to get the parts to TYD which caused considerable difficulties in the training of knitting machine operatives. Immea's explanation for the poor setting of the machines was that they do not use precision measuring instruments in the assembly or setting of the machines. For future reference the consultant recommends that the Dubied machine or equivalent be employed for this type of project.

The Protti intarsia knitting machines

The Protti intarsia knitting machines were also installed and with the exception of one broken yarn guide were correct and well set.

At the time of arrival the operatives had received some instruction on these machines, but had no concept of the correct techniques required for the production of spiders-web intarsia.

During the first two months the consultant instructed one operative in these skills and he learned to develop and produce patterns of his own.

These machines are two-and-a-half-gauge and are being used to produce fancy-patterned fronts for the production from the three gauge Immea machines. This causes special difficulties when making knitting specifications and when matching backs and fronts and make-up (because of gauge difference, fabrics produced are different). All of the machines are available in both two and a half gauge and three gauge. Therefore, these difficulties were unnecessary and avoidable.

The Linking Machines

There were nine Exacta "mini linker" six-gauge linking machines supplied and installed, in line with the feasibility study.

These machines are more suited to a domestic situation than a production floor. They are slow, small, and difficult to operate. Six gauge is not compatible with the manufacture of coarse-gauge knitwear especially where tuck stitch patterns are being produced. These machines have been replaced by five industrial coarse-gauge machines, of which four machines are in four-gauge and one machine in three-

guage. These machines only arrived in the last three weeks of the consultants contract and were installed within three days. The consultant went through the maintenance and setting of these with the counterpart mechanic before leaving the factory.

These machines will certainly give a professional high-quality finish to the garments. They are faster and easy to use and maintain.

The Spencer Major dry cleaning machine

The Spencer Major dry cleaning machine was in the factory but had not yet been installed when the consultant arrived. The Neil and Spencer technician arrived at the end of September and installed the machine. Mr A. Duiker received instruction on the machine maintenance, programming, and use. The technician instructed the machine operators in same.

This machine required a compressed air supply, a water supply, and a steam supply.

The compressed air supply

The factory received a small second-hand compressor from the mill. This is adequate.

Water supply

A water supply was required to cool the perchlorethylene vapour in the condenser after distillation. Approximately five hundred litres of water per hour was requested. There had been no provision made in the feasibility study for this water to be recycled.

Funds were arranged by Mr Coyle and the consultant designed and built a cooling tower. Prior to the construction of the tower the factory used fifty four thousand liters of water per month. It now uses two thousand litres per month.

Steam supply

Prior to the arrival of Mr Coyle and this consultant, the coordinator at the time (Mr Per Nordby) engaged Boilers International (pty) Ltd., Gaborone, to supply and install a steam boiler for the Spencer Major dry cleaning machine.

Mr Nordby supplied Boilers International with the technical data for the dry cleaning machine. The technical data had been supplied to Per Nordby by Neil & Spencer, the Machine Manufacturers and Mr Nordby accepted

their advice regarding the most appropriate type and size of boiler to purchase.

The boiler as supplied was inadequate. Mr Nordby then made a new and acceptable agreement with Boilers International to supply and install a second-hand boiler with spare capacity and to take the first boiler in part payment.

The replacement boiler arrived at the plant in middle of January without any export/import forms. These are required by the banks for exchange controls clearance. Their absence caused considerable difficulties for TYD.

At the time of this consultants departure the new boiler had not yet been installed and Boilers International were refusing to carry out the installation, on the grounds that they had lost enough money on the job already.

The Poney steam pressing tables

The Poney self-contained steam pressing tables were installed in accordance with the feasibility study. However, due to some other changes on the factory floor, it was necessary to move them. They are now installed against the end wall of the factory with the blow-down pipes and vacuum pipes going out through the wall.

The water treatment plant

The water treatment plant was there on arrival but was broken during installation. It has been repaired and is fully operational.

11 CONCLUSION AND SUMMARY OF PROBLEMS

The knitwear factory project is running according to schedule and problems relating to installation, setting and maintenance have been dealt with successfully.

The counterpart mechanic, Mr Duiker, is very competent and has received adequate instruction in machine maintenance and machine repair.

The machine operatives are willing, enthusiastic and creative.

Mr Coyle's professionalism and expertise is a major factor in the success of the project to date, and continued success of the project.

The major problem relates to the poor quality of yarn being supplied by the mill to the factory:

- weak yarn
- knops
- lack of twist
- shading, foreign bodies and stains in yarn
- weak and unsuccessful splices
- dramatic count variations.

111 RECOMMENDATIONS

The quality of the yarn supplied to the factory must be addressed immediately. The poor quality is largely a result of the continual breakdown of the equipment in the mill/carding unit.

This consultant recommends that this is an area with which he is already familiar and that he would be interested in providing the necessary technical expertise should a project of assistance be funded.

ANNEX I - PROJECT DOCUMENT AND TERMS OF REFERENCE



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

30 April 1987

PROJECT FOR THE GOVERNMENT OF THE REPUBLIC OF BOTSWANA

JOB DESCRIPTION

DP/BOT/86/002/A/01/37/11-03/J-13102

Post title Knitting machine mechanic

Duration 8.0 m/m

Date required May/June 1987

Duty station Lobatse

Purpose of project To assist the Tiro Ya Diatla Woollen Spinning factory to expand its production into fashionable woollen knitwear

Duties Under the overall supervision of the Executive Coordinator of the project the knitting machine mechanic will participate in the installation, setting and initial operation of the knitting machines* and train local counterparts in machine maintenance and adjustment.

* Immea G4 knitting machines
Protti Intarsia knitting machines
Exacta linking machines

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

BACKGROUND
INFORMATION

The Government of Botswana in its National Development Plans has placed emphasis on the establishment of industrial projects utilizing indigenous raw materials and providing employment, particularly for women. Karakul wool produced in the extreme south-west of Botswana is such a raw material. A number of studies have been carried out in the past to determine the feasibility of using the Karakul wool to produce high quality knitwear. All these studies report favourably. In addition the establishment of woollen spinning mill at Tiro ya Diatla (TyD) in 1980 now capable of producing yarns suitable for the manufacture of knitwear added a new dimension to the question of producing knitwear in Botswana.

TyD was established in 1976 in Lobatse, 70 km from Gaborone with funds provided by the Norwegian Agency for International Development (NORAD). Initially it was a small craft organization engaged in hand-spinning and weaving using Karakul wool and other fibres. Over time its size and activities have expanded, though still remaining small, and the most recent development is the woollen spinning mill opened in 1982.

A feasibility study was conducted in mid 1985 under UNDP/UNIDO technical assistance (SI/BOT/84/801) to examine the viability of high quality knitwear production in Lobatse taking into account the above new development. The study concluded that such an undertaking is financially sound and economically viable. The financial internal rate of return at 19.58% compares well with an assumed cut-off rate of 12%. The economic rate of return and project exchange rate are also good. The project will provide employment for 221 Batswana at the full capacity of whom the majority will be women. It will contribute towards diversification of the economy and provide an opportunity for Batswana to acquire new skills and experience.

Upon completion of the study, the Government reviewed the report and agreed to implement the project as proposed in the feasibility study report. The Government will be committed to a capitable contribution of P 148,000 and P 174,000 subsidising sales augmentation and unskilled labour costs respectively during the first 5 years of the production phase. NORAD and UNDP have been approached for co-financing of remaining major project cost components.

TyD presently receives NORAD assistance in various managerial training and investment fields for the spinning and weaving mill. The forward integration into knitting operation would require additional expertise from the pre-production phase particularly to ensure the sound erection for the plant.

Viability of the operation will require effective managerial capabilities to market the products and operate the plant, if the high quality products are to penetrate the Southern Africa, and European markets. Strengthening these capacities at the pre-production and start-up phases is indispensable to ensure the profitable operation in the long term.

The total investment costs amount to approximately US\$ 750,000, 46% of which are the fixed investment costs and the rest, pre-production capital expenditure, e.g. training costs and working capital. Without a firm equity participation, or grant to cover these fixed investment and pre-production expenditures, the project would remain financially vulnerable.

With this background, UNDP and NORAD agreed early 1986 to pursue the possibility of sharing integral project costs in pre-production and in the early start-up phases. The UNDP contribution will cover the training and expert/consultancy costs during the pre-production and 1st year of production phase, while the Norwegian Government cost sharing contribution will finance the fixed investment not covered by the Botswana Government, and experts costs.

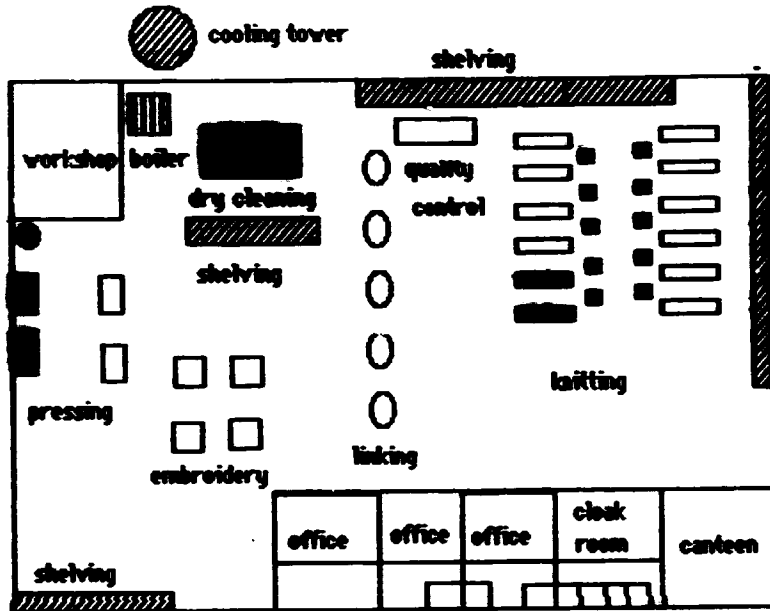
Approval in principle has been obtained from Barclays Bank for a loan of P 200,000 which will constitute the working capital for the project.

Lobatse was chosen as the location for the knitting plant. The plant will be close to TyD which will supply the input of yarn and the close proximity of the two organizations will lead to appreciable economies. Lobatse has adequate supplies of utilities and of labour, some of it already beginning to acquire knitting skills. Communications are good and it is a small pleasant town which expatriate staff would find quite attractive.




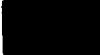

The project will require a plot of 3,000 sq. metres upon which a factory of 630 sq. metres will be erected.

ANNEX II

FINAL FLOOR PLAN FOR TIRO YA DIATLA KNITWEAR



Tiro Ya Diatla Knitwear unit final floor plan

-  INTARSIA KNITTING MACHINES
-  YEE BED KNITTING MACHINES
-  LINKING MACHINES/VES
-  THE DRY CLEANING MACHINE
-  PRESSING TABLES

ANNEX III

The Spinning mill

The consultant provided assistance to Mr Gunnar Holmen at the spinning mill in the early part of 1988 in order to try and alleviate some of the problems which were resulting in poor quality yarn being sent by the mill to the factory. In order to bring the machinery in the mill up to production standard the consultant re-designed and installed the electric control panel for the new card set hopper control. It is now possible for the parts to be purchased locally. It also prevents maladjustment to the hopper.

The consultant also carried out repairs to the electronics which controlled the conveyor drive on the old card set hopper. He completely reset the blending machine and made two combing bars for it. He carried out repairs on the compressor and reconditioned three pneumatic splicing machines. He also carried out repairs to two air humidifiers. Major repairs to the new (second hand) card set main motors speed control panel were also carried out. The consultant carried out time and motion studies to quantify the extent of the bottle neck at hank to cone winding and supervised production and despatch.

There is still a great deal to be done (see recommendations) and it is vital to the success of the project that this be tackled as soon as possible.

ANNEX IV

The sewing machine technicians workshop

UNDP Botswana, together with the Department of Supply, identified a maintenance need within the small sewing industries in Botswana. Mr N. Magard, UNDP, Botswana, asked the consultant for help. The consultant was delighted to help and subsequently gave three lectures to personnel from the sewing industry. These lectures were held on Saturdays, 5, 19 and 26 March in Gaborone (35 people), Lobatse (20 people) and in Francistown (23 people) respectively. Up to that point the machines were being sent to South Africa for maintenance (even minor repairs) and this was causing serious delays and loss of valuable production time.