
Small-scale manufacture
of footwear

IV.2 Specialisation and organisation of production

Small-Scale Manufacture of Footwear (ILO - WEP, 1982, 228 p.)

CHAPTER IV. FRAMEWORK FOR PROJECT EVALUATION

The previous two chapters described alternative techniques for producing various types of shoes and sandals at four different scales of production. They provided, in addition, detailed technical data on labour, equipment and materials inputs needed for each type of footwear and scale of production. The purpose of this chapter is to show how the above data may be used to estimate the feasibility of various footwear manufacturing projects and/or to identify technologies suitable for local conditions and circumstances.

I. Factors influencing the choice of technology

The choice of footwear manufacturing technologies is a function of a number of factors. The most important ones are briefly described in this section. Howe, ver, it is first important to better define the expression "footwear manufacturing technology" in the context of this technical memorandum.

It may be recalled that, depending on the type of footwear, the overall manufacturing process included a number of process stages, this number varying from one stage for moulded plastic sandals to seven stages for more intricate footwear. Furthermore, each stage is subdivided into a number of operations. For example, for type 1 footwear, the seven process stages include a total of 31 operations. Finally, each operation may be carried out with one out of a number of available techniques. A footwear manufacturing technology may therefore be defined as any particular combination of techniques needed to produce a given type of footwear.

Given the total number of operations underlying the overall manufacturing process (e.g. 31 operations as for type 1 footwear) and considering that two or more techniques may be

adopted for each operation, the total number of technologies (or combination of techniques) available for each type of footwear will, by necessity, be very large (e.g. thousands or millions of technologies depending on the type of footwear). Obviously, it would not be feasible to evaluate all these technologies in order to identify the one which is most suitable to local conditions and circumstances. Nor would this be necessary for the following reasons.

Firstly, the stages of production and, to a large extent the operations, are not interdependent. In other words, one operation within a given stage should not, generally, affect the choice of technique for another operation within the same stage or subsequent stages. Thus, one may identify the appropriate technique for each operation and evaluate only those technologies which combine these techniques in the manufacture of a given type of footwear. The number of technologies to be evaluated will generally be a function of the number of types of footwear and/or the scales of production which are considered.

Secondly, within a given operation, one need not evaluate all available techniques. In many cases, some of the available techniques may never be appropriate at given scales of production. For example, a lining stamping machine may never be justified for scales of production of 8 or 40 pairs per 8-hours day. Thus, the choice of technique for a given operation should not, in many cases, require extensive evaluations.

As stated earlier, the choice of footwear manufacturing technology is a function of a number of factors. The most important ones include the following:

- the type of footwear,
- the adopted quality standard,
- the scale of production,
- the prices of the factors of production (e.g. wages, interest on capital, materials) and,

- the retail price of the output.

The type of evaluation needed to identify the most appropriate production technology will depend on whether the choice of footwear type and quality and/ or that of scale of production are fixed or not. Depending on the latter, the evaluation may take one of the following forms:

(i) <u>Partial evaluation in cases where the footwear type and quality and the scale of production are pre-determined.</u> In some cases, the market conditions and the financial means at the disposal of the shoe manufacturer are such that both the footwear type and quality and the scale of production are pre-determined. Under these circumstances, a number of cost items do not vary with the choice of technologies. These are: materials costs per unit of output, working capital, management costs and building costs.[1] Furthermore, revenues from the sale of the output are the same for all alternative technologies since these yield the same type of footwear and quality standard. Consequently, these costs and revenues need not be taken into consideration when the purpose of the evaluation is limited to the identification of the most appropriate footwear manufacturing technology.

(ii) <u>Full evaluation of alternative footwear manufacturing techniques.</u> Whenever the type and quality of footwear and/or the scale of production are not pre-determined by market or financial constraints, a full evaluation of alternative technologies should be undertaken with a view to identifying the one which is most suitable to local conditions and circumstances. Such an evaluation takes into account all costs and revenues since these[2] will generally vary with the adopted technology.

[1] Small differences in building costs may be experienced between two alternative technologies. However, these differences should, in general, be negligible.

[2] Materials costs per unit of output should vary with the adopted scale of production even if the type and quality of footwear are pre-determined since the wholesale price of materials is generally function of the quantity sold, and therefore of the scale of production.

The following section will describe an evaluation framework for the evaluation of alternative footwear manufacturing technologies.

II. Evaluation methodology

A number of evaluation methodologies may be used in the process of comparing alternative technologies. The one presented here should be easily applied by potential shoe manufacturers or project evaluators, and should yield reliable estimates of the profitability of alternative technologies.

The same methodology may be applied whether one is intending to carry out a partial or full evaluation of alternative projects. The only difference between these two evaluations concerns the types of costs and revenues which should be taken into consideration.

The purpose of the evaluation exercise is to identify the technology which minimises costs per unit of output (partial evaluation) or which maximises profits (full evaluation) depending on whether the scale of production and the type/quality of footwear are predetermined or not. It will now be shown how costs and revenues may be estimated to achieve the above goals.

II.1 Estimation of cost items

The estimation procedure used in this memorandum yields cost estimates for a typical year in a project life. It differs to some extent from a similar estimation procedure which yields the present value of costs incurred over the project life. However, it should be

reliable enough for our purpose (i.e. to identify the most appropriate footwear manufacture technology). Total production costs include the following cost items:

- **Equipment costs (depreciation + interest)**
- **Interest on working capital**
- **Labour costs (production workers)**
- **Management costs**
- **Materials costs**
- **Building costs (rental value)**
- **Energy costs, and**
- **Maintenance costs (of building, equipment).**

It will now be shown how the above cost items may be estimated.

(a) Equipment costs

The cost of equipment may be subdivided into two items: the interest paid on invested capital and equipment depreciation cost. These two cost items are function of the equipment purchase price (K), the useful life of the equipment (n years), the prevailing interest rate (r), and the salvage value of the equipment at the end of the project (S).[1]

[1] In equation form, the annual cost of equipment (D) is equal to:

$$D = K\left[\frac{r(l+r)^n}{(l+r)^n - 1}\right] - S\left[\frac{r}{(l+r)^n - 1}\right]$$

If the salvage value of equipment is assumed to be equal to zero, the annual equipment cost may be easily obtained with the help of Appen. V by dividing the purchase price of equipment by the present worth of the annuity factor (F) for the given interest rate and

the useful life of equipment. Let us, for example, assume that the purchase price of a piece of equipment is 1,000 dollars, that its useful life is 15 years and that the interest rate is 10%. Then the annual equipment cost is:

$$D = \frac{K}{F} = \frac{\$1{,}000}{7.606} = \$131.48$$

where the number 7 606 corresponds to the present worth of the annuity factor for a 10% interest rate and a useful life of 15 years (see in App. V the number corresponding to the intersection of the 10% column with the 15 years row).

In many cases, the salvage value may be substantial and may lower significantly the annual equipment cost. In this case, one should use the following formulation:

$$D = \frac{K}{F} - \frac{S}{F(l+r)}n$$

Let us assume that K and F have the same value as in the above example and that the salvage value (S) is equal to 10% of K or $100. Then we obtain the following annual cost of equipment:

$$D\frac{\$1{,}000}{7.606} - \frac{\$100}{7.606(1.1)}15 = \$131.48 - \$3.15 = \$128.33$$

The value of $(l+r)^n$ may be easily calculated for given values of r and n or may be obtained from available financial tables.

(b) <u>Interest on working capital</u>

Depending on the scale of production and the local conditions which determine the supply of various materials inputs (e.g. whether materials are imported or produced locally), a footwear manufacturer may need to keep a certain inventory of materials inputs (e.g. a

one month or three months supplies) in order to avoid discontinuing production while waiting for new shipments of materials. The cost of these inventories is either paid out of the manufacturer's own funds or through a bank loan. In either case, th cost of maintaining capital idle is equal to the interest accrued over the average inventory period.

The same reasoning applies to the value of sold output whenever payments are not made on the day of the sale. In many countries, payments are made one to three months after the sale date, and the manufacturer should thus take into account the interest (on the value of the sale) paid or foregone during the one to three months period.

(c) Building costs

Annual building costs may be estimated in the same way as in the case of equipment costs, taking into consideration the cost of the infrastructure and that of the land. Alternatively, a simpler approach may be used by assuming annual building costs equal to the annual rent which would be paid for a similar building located in the project area.

(d) Management costs

Management costs should include the salaries of the plant manager (in some cases, the owner of the factory) accountant, marketing agents, maintenance staff, etc. (i.e. the staff which is not directly involved in the production process).

(e) Estimation of variable costs

Variable costs include the wages paid to production workers, the cost of materials, energy costs and the maintenance cost of building and equipment. The last two cost items usually represent a very small fraction of total costs and may, in most cases, be neglected unless the plant is highly mechanised.

II.2 Estimation of total annual costs and of gross profits

Once the various annual cost items have been estimated, one may calculate the total annual cost associated with alternative footwear manufacturing technologies by simply adding the various cost items Annual revenues from the sale of the output may then be estimated for the given scale of production and type of footwear, taking into consideration the estimated unit retail price. Finally, gross profits associated with each alternative technology may be calculated by substracting the yearly total costs from the estimated yearly revenues.

The evaluation should be repeated for all relevant scales of production and types and quality of footwear, given market conditions and the financial means at the disposal of the footwear manufacturer. The adopted scale of production, manufacturing technology and type and quality of footwear should be those which maximise gross profits.

Alternatively, whenever a single type and quality of footwear and a single scale of production are being considered, one may limit the evaluation to the estimation of those annual costs which are a function of the adopted technology. The adopted technology should, in this case, be the one which minimizes production costs since annual revenues are the same for all technologies.

The following section will indicate how to obtain the necessary technical and economic data in order to apply the above evaluation procedure.

II.3 Sources of technical and economic data

(a) <u>Sources of technical data</u>

Technical data needed to evaluate alternative footwear manufacture technologies include the following: type and number of pieces of equipment, number of skilled-semi-skilled and

unskilled labour, energy inputs, factory floor plan, materials input per unit of output, and maintenance needs and frequency. This data is needed for various types and qualities of footwear' and scales of production whenever the latter are not predetermined, and for alternative production techniques available for each operation.

Chapters II and III provide the above technical data for six types of footwear and four scales of production. However, as already stated in Chapter I, this data does not cover all possible combinations of techniques or technologies. Instead, the authors have selected those technologies which, on the basis of data collected from a number of developing and developed countries, seem particularly suitable for conditions prevailing in developing countries. In other words, the technologies suggested in chapters II and III for each particular type of footwear/scale of production may be considered least-cost technologies.

This being said, there may be some special circumstances whereby these technologies may not prove to be the most cost-effective. Thus, the reader may wish to investigate other combinations of techniques on the basis of information contained in Chapters II and III or other available technical publications.

The types of footwear and the scales of production described in the previous two chapters do not either cover all possible alternatives. Obviously, no publication could cover the thousands of combinations of footwear type/scale of production. However, those covered in these two chapters should provide a sufficient basis for estimating the equipment and labour requirements for other types of footwear and/or scales of production. The same remark applies to the estimation of the required floor area for scales of production/technologies not specifically covered in Chapters II and III.

Table I.4 in Chapter I, describes the materials needed for each type of footwear. As already stated, in this chapter, the amount of materials per unit of output is the same for

all technologies and scales of production. The table does not provide estimates of the actual amounts of materials needed for each type of footwear as these amounts are function of the exact shoe or sandal design, and footwear size. The reader should therefore estimate the average amount of materials per unit of output once a decision has been made on footwear design and sizes to be produced.

No information is provided on maintenance needs arid frequency for various pieces of equipment as such information is equipment-specific and may be easily obtained from equipment manufacturers. The same remark applies to energy inputs: information on the latter should also be obtained from equipment manufacturers or brochures which describe the equipment.

(b) Sources of economic data

Economic data needed to evaluate alternative footwear manufacture technologies include the following: prices of imported and local equipment, cost of buildings, unit price of various materials, wages for various types of labour, unit price of energy (mostly electricity) rental value of land, unit cost of packaging materials, prevailing interest rate (for the estimation of equipment depreciation cost and interest on working capital), estimated retail price of output, and income or corporate tax rates for a full evaluation of alternative projects.

Chapters II and III provide estimates of FOB (Free On Board) international prices for the pieces of equipment which may need to be imported. These are 1980 average international prices which could be different from the actual price which would eventually be paid once the equipment has been ordered. The reader wishing to obtain an estimate of the cost of imported equipment should use the following steps:

(i) Whenever possible, to obtain from local importers of equipment or from equipment manufacturers the actual FOB price of the equipment. If only an

approximate estimate is needed, the FOB prices provided in Chapters II and III may be adjusted for inflation at, for example, a 10% rate starting from the 1980 prices,

(ii) To add to the FOB prices the shipping and insurance costs (to obtain the GIF price) and custom duties, if any. This information is country-specific and may be obtained from local importers or custom officials,

(iii) It is advisable to add to the cost of equipment that of spare parts which may be needed over a 3 to 5 years period in order to avoid the disruption of production for lack of spare parts.

Estimates of the prices of equipment which may be produced locally are also provided in the preceeding two chapters. However, these estimates are highly tentative, and the reader is urged to obtain more precise estimates from local workshops or engineering firms.

An estimate of the cost of buildings may be obtained from local contractors on the basis of the estimated floor plan.

Cost estimates for materials, wages, energy, etc., are country-specific and may be easily obtained from wholesalers of various materials, footwear manufacturers, etc.

An estimate of the retail price of the output should be based on the actual retail price of similar footwear either produced locally or imported.

II.4 Hypothetical examples of the application of the evaluation methodology

This section provides hypothetical examples of the application of the evaluation methodology described in section 1.2.2. The following section will provide real life

examples from Ghana and Ethiopia.

The identification of the least-cost technique at the operation level may be illustrated by the following example in which two techniques are distinguished (see Table IV.1). The capital-intensive technique uses as equipment machine A having a total useful life of 20 years, and is used in combination with 9 full-time workers. The labour-intensive technique uses a less expensive and simpler machine B, having a useful life of 10 years (it must therefore be replaced for a second 10 years period, for a total project life of 20 years), and is used in combination with 15 full-time workers. The type and quality of footwear, and the scale of production (40 units per day, or 12,000 units per year based on 300 working days) are the same for both techniques. Therefore, all materials inputs and overheads may be assumed to be the same for both projects and may therefore be omitted from the analysis.

Similarly, the expected revenues from the sale of the output need not be estimated since the type and quality of footwear are the same for both techniques.

The pieces of equipment and annual wages are provided in units of account as follows:

- **Machine A: 1,000 units**
- **Machine B: 300 units**
- **Annual wage: 10 units (the same for both techniques)**

Table IV.1 Selection of a least-cost technique for an operation handling 40 pairs per day

Cost item	**Technique**	
	Capital-intensive A	Labour-intensive B
1. Equipment purchase price	1,000 (20 years life)	300 (10 years life)
2. Labour	9 workers at 10 units per year	15 workers at 10 units per year

3. Annual cost method	117.45	48.82
- Annual equipment costs		
- Annual labour costs	90	150
- Total annual costs	207.45	198.82
- Unit production cost	0.0172	0.0165
4. Present value method	1000	415.65
- Present value of equipment		
- Present value of labour	766	1,277
- Present value of total costs	1,766	1,692.65

The adopted interest rate is 10%, and the salvage value of equipment is assumed to be equal to zero.

Two variants of the evaluation methodology described in section 1.2 will be used in this example: one yielding an estimate of annual costs for a typical year in the project life, and one yielding the present value of costs accruing over the project life (20 years). It will be shown that both variants yield the same conclusion with respect to the cost-effectiveness of the two production techniques.

(a) Estimation of annual cost

- Annual cost of equipment; Using the relationship shown in section I.2 ($D = \frac{K}{F}$) where D is the annual cost of equipment, we obtain:

$$D_A = \frac{1{,}000}{8.514} = 117.45 \text{ for machine A}$$

where 8.514 = present worth of the annuity factor corresponding to a 10% interest rate

and 20 years period.

Similarly, the annual cost for machine B is equal to:

$$D_B = \frac{300}{6.145} = 48.82$$

where 6.145 = the present with of the annuity factor for 10% and 10 years period.

- Annual labour costs These are equal to:

9 x 10 = 90 units for technology A, and
15 x 10 = 150 units for technology B

- Annual total costs These are equal to:

117.45 + 90 = 207.45 units for technology A
48.82 +150 = 198.82 units for technology B

- Cost per unit of output: Considering that both technologies yield 12,000 units of footwear per year, the cost per unit of output is equal to 0.0172 monetary units for technology A and to 0.0165 monetary units for technology B. In this case, technology B is the least-cost technology.

(b) Estimation of the present value of costs

In this second variant of the methodology described in section 1.2, all costs incurred during the project life are discounted to the present at the appropriate discount rate (in this case 10%)

- Present value of equipment costs

For Technology A, the present value of equipment cost is equal to the purchase price of equipment, that is 1,000 units.

For Technology B, the present value of equipment is equal to:

$$300+\frac{300}{(1+0.1)^{10}}=300+\frac{300}{2.594}=415.65\,\text{units}$$

The second disbursement (300) which takes place 10 years after the start of the project is discounted to the present at a 10% discount rate. Financial tables are available to facilitate this kind of calculations.

- Present value of labour costs

In order to estimate the present value of labour one must discount the stream of labour costs over the project life. This may be easily accomplished with the help of Appendix V by multiplying the annual labour cost by the relevant present worth of the annuity factor F. In this case, F is equal to 8.514, corresponding to a 10% discount rate and a 20 years period.

The present value of labour costs for Technology A is equal to:

90 X 8.514 = 766 units, and for Technology B:
150 X 8.514 = 1,277 units.

- Present value of total costs

The present value of total costs is equal to the sum of the present value of equipment costs and labour costs.

The present value of total costs for Technology A is equal to:

1,000 + 766 = 1,766 units

while that of Technology B is equal to:

415.65 + 1,277 = 1,692 units.

Thus, the present value method yields the same conclusion as that yielded by the annual cost method (i.e. technology B is the least-cost technology).

The above example constitutes a partial evaluation of alternative technologies whereby costs and benefits common to the two technologies are not taken into consideration. In cases where either the scale of production and/or the footwear type and quality are not predetermined, the same approach may be used for the full evaluation of projects. The annual cost method may be easier to apply in this case since most of the cost items (e.g. materials, labour, maintenance and energy costs/and the rental value of premises) do not constitute investment costs and may be used as such without further calculations. The latter are needed for the estimation of annual equipment cost and interest cost on working capital only. Should the annual cost method be applied, the most appropriate technology/ project would be the one which maximises the difference between the annual revenues from sale of the output and total annual costs.

III. Evaluation of technologies adopted by established footwear factories in developing countries

This section evaluates a number of footwear projects in Ghana and Ethiopia. The evaluations relate to various combinations of scales of production, technologies, and footwear types. The conclusions yielded by these evaluations are country-specific and time-specific (Ghana and Ethiopia, 1972), and may not be generalised to all developing countries at the present time.

III.1 Alternative technologies for type 1 footwear: A Ghanaian case study

Chapter II contains an extensive description of manufacturing methods and equipment for type 1 footwear men's leather-upper, cement-lasted shoes with cemented-on unit soles. Being the standard method of construction of most types of footwear dealt with, the description is most detailed and includes most of the operations that can be meaningfully distinguished at the sub-process level. Particular attention will therefore be paid to technological alternatives to manufacture this type of shoe before discussing those of other types of footwear.

Following the methodological framework explained in the previous section, a least-cost technology as well as the most labour- and machine-intensive alternatives to manufacture 1,200 pairs per day of men's cemented-on, leather-upper shoes in a proposed Ghanaian shoe factory were evaluated. A complete description of the calculations is included in McBain (1977).

As shown in Table IV.2, annual production costs, fixed capital requirements and working capital are differentiated into (1) a local cost and foreign currency component, and (2) costs which are common to all technologies and those which vary with the technology adopted. The extent to which various cost items refer to locally produced or imported materials and equipment depends on the country concerned, in particular with regard to the availability and processing of hides and skins and the presence of a specialist machinery manufacturing sector, and project-specific circumstances. To obtain the local price of imported commodities, (country-specific) import duties must be added to the import price. Information on the extent to which costs vary with the technology adopted is derived from the technical data at the operations or production stage level. The actual valuation of cost items will depend on the prevailing system of local factor and commodity prices. Details of the supporting tables for production and investment are included in McBain (1977 , Appendix 1. Data and calculations for Bench Mark Factory Appraisals) The

general methodology to estimate the various cost figures is treated in standard texts on feasibility studies such as the UNIDO Manual (1978).

A summary of the major characteristics of the most machine-intensive, most labour-intensive and least-cost technology to manufacture 1,200 pairs per day of type 1 footwear is presented in Table IV.5. The data confirm that differences in technology to manufacture type 1 footwear mainly refer to fixed capital requirements and the number and composition of direct production workers. Fixed capital per direct production worker in the most machine intensive case is almost three times as high as in the most labour-intensive case. Variations in fixed capital requirements itself are of a comparable magnitude. Although variations in labour requirements are less pronounced, the data suggest that the overall possibilities for technological choice are nevertheless substantial. The nature of capital-labour substitution appears to be such that capital substitutes to a larger extent for skilled than for semi-skilled and unskilled labour. The labour-intensive case not only entails a larger number of skilled workers, but its proportion in the total number of direct production workers increases as well.

Table IV.2 Annual total production costs at full capacity, year 10, Ghana, machine-intensive factory (¢ thousand)

Cost item	Origin			Total	Technology	
	Imported	Duties	Local		Fixed	Variable
1. Direct materials	789	351	46	1,186	1,186	
2. Electricity			1	1	1	
3. Spares, tools, equipment	10	1		11		11
4. Direct production workers			54	54		54
4.1 Skilled			27	27		27

4.2 Semi-skilled			17	17		17
4.3 Unskilled			10	10		10
Factory costs	799	352	101	1,252	1,187	65
5. Office overhead costs	2	2	25	29	29	
6. Office and supervisory staff			70	70	70	
Operating costs						
7. Financial costs (interests)	801	354	196	1,351	1,286	65
8. Depreciation			22	22	3	19
Production costs	801	354	218	1,373	1,289	84
9. Interest on total initial capital at 10% (excluding item 7)			145	145	94	51
Total production costs	801	354	363	1,518	1,383	135

Note: Depreciation and interest on total capital are based on Tables IV.3 and IV.4. Cost estimates assume a 50% capacity utilisation at year 2, 85% at year 3 and 100% from year 4 to year 26 (end of project).

Table IV.3 Fixed investment cost schedule, Ghana, machine-intensive factory (¢ thousand)

Period	**Construction**				**Start-up and full capacity**				**Closure**
Year	**1**				**2, 18, 14, 20**			**7, 13, 19**	**27**
Origin	**Imported**	**Duties**	**Local**	**Total**	**Imported**	**Duties**	**Total**	**Local**	**Local**
1 . Land			1	1					(1)
2. Site works			3	3					(1)

3. Fixed buildings			26	26					(15)
4. Variable buildings			37	37					(27)
5. Furniture	2	2		4					O
6 . Workshop equipment			2	2					O
7 . Compressor	1	1		2					O
8. Variable production machine, tools	313	138	4	455					(3)
9. Vehicles					7	5	12	(2)	(1)
10. Formation and pre-start-up training			10	10					0
Fixed investment	316	141	83	540	7	5	12	(2)	(48)
Fixed with technology	3	3	42	48	7	5	12	(2)	(18)
Variable with technology (4+8)	313	138	41	492					(30)

Table IV.4 Working capital schedule, Ghana, machine-intensive factory (¢ thousand)

Period	**Start-up**		**Full capacity**		**Closure**
Year	**2**	**3**	**4**	**5-26**	**27**
Production programme	**50%**	**85%**	**100%**	**100%**	**0%**
1. Raw materials (5 month's usage of direct materials)	247	420	494	494	
2. Work-in-progress (0.6 month's work of direct materials)	30	50	59	59	
3. Finished goods and credits (3 month's of operating costs)	189	293	338	338	
4. Cash reserves (1 month's wages)	10	10	10	10	

Working capital	476	773	901	901	0
Imported items			568		
Duties			252		
Local items			81		
Fixed with technology			880		
Variable with technology			21		
Increase in working capital	476	297	128	0	(901)

To appraise the attractiveness of the different technologies distinguished in Table IV.5, either of the three cost-effectiveness methods explained in section II can be applied because revenues are equal for all technologies (300,000 pairs of shoes per annum sold at a wholesale price of ¢ 6 per pair) . Because of the latter, measures of financial profitability such as the net present value of the project's cash flow (NPV) can be calculated as well. Of the cost-effectiveness method, both the annual costs and unit costs were calculated, differentiating cost . figures into variable and non-variable (fixed) costs with regard to the adopted technology. Thus, the estimated annual depreciation charge (approximated by taking 4% of the <u>fixed</u> capital investment) and annual interest charge (10% of the total capital investment) were added to the annual operating costs to obtain the total production costs. As shown in Table IV.5, as well as in more detail in Table IV.2, the costs common to all technologies amount to a substantial 1.383 ¢ thousand. When this amount is substracted from the total production costs, the annual costs specific to each alternative technology are obtained. By dividing the annual cost figures by the annual output, one may calculate the unit footwear cost for each technology. A comparison of the results for the three technologies suggests that the least-cost technology is fairly labour-intensive.

<u>Table IV.5 Economic characteristics of producing 1,200 pairs per day of men's cemented-shoes with different technologies in Ghana (0 thousand in 1972 prices and relative to sale,</u>

unless indicated otherwise)

Cost or benefit item	Most machine-intensive Value Ratio		Most- labour-intensive Value Ratio		Least-cost Value Ratio	
1. Direct materials, electricity and overhead costs (fixed)	1,216	0.675	1,216	0.675	1,216	0.675
2. Spares, tools and equipment (var .)	11	0.006	5	0.003	5	0.003
3. Total wages	124	0.069	154	0.086	143	0.080
• Office, supervisory staff (fix.)	70	0.039	70	0.039	70	0.039
• Skilled production workers (variable) .	27	0.015	50	0.028	45	0.025
• Other production workers (var.	27	0.015	34	0.019	29	0.016
Operating costs (1+2+3)	1,351	0.751	1,375	0.764	1,364	0.758
4. Depreciation (variable*)	22	0.012	9	0.005	11	0.006
5. Corporate tax	213	0.118	208	0.115	212	0.118
Production costs (1+2+3+4)	1,373	0.763	1,384	0.769	1,375	0.764
Net profit after tax (6-1-2-3-4-5)	214	0.119	208	0.116	213	0.118
Value added (6-1-2)	573	0.319	579	0.322	579	0.322
6. Ex-factory sales	1, 800	1.000	1,800	1.000	1, 800	1.000
7. Fixed capital (variable) *	552	0.307	233	0.130	269	0.150
8. Working capital (fixed*)	901	0.501	910	0.505	906	0.503
Total capital (7+8)	1,453	0.800	1,143	0.635	1,175	0.653
9. Staff (no.)	36		36		36	

10. Skilled production workers (no.)	49		90		91	
11. Other production workers (no.)	70		92		68	
Total employed (9+10+11)	155		218		195	
Fixed capital/produc. worker (¢)	4,643		1,281		1,694	
12. Interest on total capital at 10% per annum	145	0.081	114	0.063	118	0.065
Total prod, costs (1+2+3+4+12),	1,518	0.843	1,498	0.832	1,493	0.829
of which: fixed with technology	1,383	0.768	1,383	0.768	1,383	0.768
variable with techn.	135	0.075	115	0.064	110	0.061
Net profit at 10% (6-1-2-3-4-12)	282	0.157	302	0.168	307	0.071
Net profit after tax/total capital (%)		14.7		18.2		18.1
Unit cost per pair (¢) of which;	5.06		4.99		4.98	
- fixed with technology	4.61		4.61		4.61	
- variable with technology	0.45		0.38		0.37	

*** To a large extent.**

Source: Calculated from McBain (1977). See also Tables IV.2, IV.3 and IV.4.

At this stage, one may ask how the least-cost solution shown in Table IV.5 (which reflects Ghanaian economic conditions in 1972) is related to the technical data for type 1 footwear provided in Chapter II. As mentioned before, the combination of techniques reported in Chapter II is indicative of a least-cost technology typical for developing country

conditions. The actual specification of production methods and equipment in a particular situation will therefore invariably differ, though not substantially in most cases, from the stylised tabulations in Chapter II. Despite these differences, the latter can fairly easily be related to the methods and equipment specification underlying the technology in the least-cost solution of Table IV.5 through the following steps:

(1) Select scale 4 in Chapter II (1,000 pairs per day) as the scale of output closest to that in Table IV.5.

(2) Identify the corresponding technology (methods and specifications of equipment for type 1 footwear at scale of production 4)

(3) Tabulate the number of direct employees and the fixed capital equipment for the identified technology (see technical tables in Chapter II to obtain estimates of direct production workers by skill and the cost of equipment). Indirect employees required and production floor area can be considered common to all technologies for a given scale.

(4) Estimate the annual unit cost of direct labour and equipment as shown in the example of Table IV.1 The resulting unit cost figure, which includes most of the cost elements relevant for the identified technology, is now comparable with the unit cost per pair of the least-cost technology in Table IV.5 (0.37 (¢ in 1972 prices).

Although the partial cost-effectiveness method is an effective instrument to select least-cost technologies, it should be kept in mind that application of a full cost-effectiveness method does exactly the same, but gives, in addition, information on the total cost structure.[1] This information is essential if, in addition to the selection of technology, the financial feasibility of a proposed project must also be appraised. In Table IV.5, the overall

profitability of the proposed shoe factory is shown by the annual net profit and by the ratio of after-tax profit to capital. Instead of calculating the NPV over the life-time of the project, the annual equivalent of the NPV called "net profit" in Table IV.5 was calculated by subtracting the annual capital charge (depreciation and interest) plus the annual current operating costs (i.e. the annual total production costs) from the annual sales. All technologies show a positive annual net profit, implying that they all earn a rent income (i.e. they add a surplus to society over and above the attributed 10% return to capital reflecting the rate of discount). Hence, at the prevailing system of prices, the proposed project is financially profitable irrespective of the technology adopted. Obviously, the least-cost technology maximises the annual project surplus.

> **[1] When the time involved in differentiating cost items into fixed and variable costs for each technology is substantial, application of the partial cost-effectiveness method might be more time-consuming than that of the complete method.**

It should be emphasised that technological alternatives can be mutually exclusive. Consequently, the net present value (NPV) of a project is the correct selection criterion. Criteria other than those derived from cost-effectiveness or discounted cash flow analysis such as the use of operating costs, production costs excluding the proper capital charge, value added, and different concepts of profits or profit-ratios are, by nature, incomplete measures of the attractiveness of technological alternatives or entire projects, and therefore unsuitable as selection criteria. This can be illustrated for the case of operating costs, production costs and net profit after tax, according to which the most machine-intensive technology would seem to be the most attractive alternative. Similarly, when value added and net profit after tax to capital are used as selection criteria, the most labour-intensive alternative is wrongly identified as the most appropriate technology. Thus, it is preferable to use, in all cases, the NPV criterion.

Because operating costs, and hence working capital, are largely invariant for different

techniques, production costs, value added and profits vary only slightly across technologies. As working capital requirements account for the larger part of total capital, variations in profitability are confined within a rather narrow range. For a government strongly concerned with the creation of more employment, this might be reassuring because it indicates that a more labour-intensive technology than the least-cost one can be adopted at little extra cost. By the same reasoning, however, entrepreneurs forego little profit when they adopt a more capital-intensive technology.

III.2 Comparison of alternative types of footwear at fixed levels of scale: Ethiopian case study

When the shoe manufacturer faces no particular demand constraint in terms of type and quality of footwear, the selection of the most attractive type(s) of shoes to be marketed becomes as important as the selection of the most attractive combination of techniques. The comparison and appraisal of alternative combinations of techniques to manufacture a different type of footwear, can, in principle, be undertaken in the same way as indicated for the case of the type 1 men's cemented-on, leather-upper shoes. Once a least-cost technology for each type of footwear has been identified and selected, the attractiveness of manufacturing different products with a least-cost technology can be compared by calculating the overall profitability of alternative projects.

For five of the six types of footwear distinguished in this study, the major characteristics of the least-cost combinations of techniques to manufacture 1,200 pairs of shoes or sandals per day are summarised in Table IV.6. The data was obtained from a number of footwear projects located in Ethiopia and is based on 1972 prices. The type 3 shoe with stitched-on leather soles is not included because its characteristics do not differ substantially from the type 1 shoe with synthetic soles.

Details of the calculations for the different types of footwear can be found in McBain

(1977). The results presented in Table IV.6 can only be partly related to the tabulations included in Chapters II and III, because the latter largely refer to that part of the cost that varies with the technology.[1] As the choice between different types of footwear is necessarily based on a comparison of product profitability, variable and fixed costs are estimated separately in this case study.

[1] See technical tables in Chapter II for type 1 footwear and technical tables in Chapter III for footwear types 2, 4, 5 and 6.

Table IV.6

Economic characteristics of producing 1,200 pairs of different footwear per day with a least-cost technology in Ethiopia (in thousand 1972 Ethiopian dollars)

Cost or benefit item	Stitched leather, cemented-on shoes (Type 1)		Stitched leather moulded-on shoe (Type 2)		Welded PVC moulded-on shoes (Type 4)		Stitched PVC cemented-on sandal (Type 5)		One-shot, moulded PVC sandals (Type 6)	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
1. Intermediate inputs	2,145	0.715	1,913	0.671	937	0.679	649	0.541	344	0.662
2. Wage and salaries	270	0.090	277	0.097	125	0.091	233	0.194	52	0.100
3. Depreciation	26	0.009	34	0.012	17	0.012	17	0.014	27	0.052
Production costs (1+2+3)	2,441	0.814	2,224	0.780	1,079	0.782	899	0.749	423	0.814
Net operating	559	0.186	626	0.220	301	0.218	301	0.251	97	0.186

profit (4-1-2-3)										
Value added (4-1)	855	0.285	937	0.329	443	0.321	551	0.459	176	0.338
4. Ex-factory sales	3,000	1.000	2,850	1.000	1,380	1.000	1,200	1.000	520	1.000
5. Average price per unit ($)	10		9.5		4.6		4		1.3	
6. Fixed capital	660	0.220	842	0.295	423	0.307	417	0.348	295	0.567
7. Working capital	1,591	0.530	1,424	0.500	677	0.490	512	0.427	169	0.325
Total capital (6+7)	2,251	0.750	2,266	0.795	1,100	0.797	929	0.775	464	0.892
Net profit at 10% (4-1-2-3-10% of cap.)	334	0.111	400	0.140	191	0.138	208	0.173	51	0.098
Net oper. profit cap.		24.8		27.6		27.4		32.4		20.9
8. Staff and skilled production workers (no.)	86		93		29		71		22	
9. Other production workers (no.)	81		77		12		52		6	
Total No. employed (8+9)	167		170		41		123		28	
Fixed	3,952		4,953		0,324		3,393		10,536	

capital/employee ($)											

Source: Calculated from McBain (1977).

One of the most striking features observed from the figures in Table IV.6 is that the variation in labour requirements across different types of footwear is substantial ranging from 28 and 41 employees for synthetic footwear types 6 and 4 to 167 and 170 employees for leather footwear types 1 and 2. However, as labour and fixed capital requirements are, to some degree, proportional to output, variations in capital-intensity are considerably less marked as shown by the estimated fixed capital per employee. The highest capital-labour ratio estimated for type 6 footwear is approximately three times higher than that for type 5 footwear (the lowest capital-labour ratio). The range of fixed capital-labour ratios across products manufactured with a least-cost technology is to a large extent similar to that across technologies for the type 1 footwear (see Table IV.5). Interestingly, the skill composition of labour across products shows a tendency for capital-intensive products to be associated with a high relative share of skilled labour in total labour requirements .

The figures in Table IV.6 show that if effective demand for footwear would be such as to justify only one type of shoe or sandal to be marketed at a time (mutually exclusive products), the higher-priced varieties would be preferred because they generate the highest surplus to the economy (type 2 shoes and type 5 sandals show the highest net profit, the annual equivalent of the NPV). Compared with the synthetic and inexpensive type 4 shoes and the very cheap one-shot plastic sandals (type 6), the higher priced varieties also appear to be considerably more appropriate in terms of resource allocation. The economic and social implications of these findings will be further considered in the next chapter.

III.3 Effects of scale on manufacturing technology for type 1 footwear: Ghanaian and Ethiopian case studies

Empirical findings on the effects of scale in footwear production show that advantages of large-scale production are significant up to a level of 1,000 pairs per shift and per day. Generally, the effects of the scale of production are primarily of importance for the mechanised operations. An examination of the production rates of process equipment at various scales of production for 237 different types of machinery produced by the British United Shoe Machinery Company Limited shows that, in machine-intensive footwear plants, the minimum spare machine capacity is experienced at output levels of about 1,000 pairs per shift. Plants producing substantially more than 1,000 pairs per shift normally group their machines in such a way as to form separate production units specialising in different types of footwear. For manual operations, scale is less important because production operatives with related skills may be employed on capacity sharing, dividing their time between different tasks.

To illustrate the effects of scale, the Ghanaian case study for type 1 men's cemented shoes is extended to three scales of production: 200, 1,200 and 7,200 pairs per shift and per day. Full information on these scales of production was available in the country. For each scale, a most machine-intensive, a most labour-intensive and a least-cost technology are distinguished by applying the methodological framework described in subsection IV.2. The least-cost technology for output levels of 1,200 pairs per day can be related to the technical data and tabulations in Chapter II as indicated in the general treatment of type 1 footwear in section III.1. As the output level of 200 pairs per day coincides with scale 3 in chapter II, the technical data from this latter chapter can be considered indicative of the combination of techniques underlying the least-cost technology. As in the case of product comparisons, the overall profitability criteria (NPV or its annual equivalent, net profit) must be employed when appraising the effects of different scales of production.

A number of economic characteristics of the alternative combinations of techniques at different scales of production are presented in Tables IV.7 and IV.8.

The results confirm that returns, as indicated by the profitability criteria, increase rapidly between output levels of 200 and 1,200 pairs per day. This is mainly due to a marked reduction in fixed capital and labour requirements, in particular staff and skilled labour. Between output levels of 1,200 and 7,200 pairs per day only marginal changes occur, although returns still improve slightly. It should be stressed that the possibility of increased unit transportation cost of materials, equipment and footwear as a result of higher output levels has not been accounted for in Tables IV.7 and IV.8. Differences in returns may therefore somewhat overstate the effect of differences in scale.

Table IV.7 Economic characteristics of producing men's cemented shoes with different technologies at three scales of production in Ghana (thousand, unless otherwise stated)

Pairs per shift	**200**			**1,200**			**7,200**		
Technology	**MM**	**ML**	**LC**	**MM**	**ML**	**LC**	**MM**	**ML**	**LC**
1. Total number employed	35	45	45	155	218	195	845	1,233	1,073
Office and supervisory staff	13	13	13	36	36	36	143	143	143
Skilled production workers	19	26	26	49	90	91	291	540	486
Other production workers	3	6	6	70	92	68	411	550	444
2. Fixed capital	249	72	72	552	233	269	3,125	1,275	1,489
3. Working capital	157	158	158	901	910	906	5,362	5,404	5,365
Total capital	406	230	230	1,453	1,143	1,175	8,487	6.679	6,854
4. Ex-factory sales	300	300	300	1,800	1,800	1,800	10,800	10,800	10,800
5. Value added	92	94	94	573	579	579	3,461	3,489	3,498

6. Total wages	39	44	44	124	154	143	626	773	660
7. Depreciation	10	3	3	22	9	11	125	51	60
Net operating profit (5-6-7)	43	47	47	427	416	425	2,710	2,665	2,778
8. Direc taxes	21	23	23	213	208	212	1,355	1,332	1,389
Net profit after tax	22	24	24	214	208	213	1,355	1,333	1,389
9. Net cash flow (5-6-8)	32	27	27	236	217	224	1,480	1,384	1,449
10. Net present value at 10%	(89)	24	24	834	944	976	6,073	6,666	7,168
11. Internal rate of return (%)	7.0	11.3	11.3	17.5	20.6	20.7	19.	4 23,	23.7
12. Net profit at 10% (5-6-7-10% of capital)	3 .	24	24	282	302	307	1,861	1,993	2,093

MM = Most machine-intensive - ML = Most labour-intensive - LC = Least-cost technology

Table IV.8 Economic characteristics of producing men's cemented shoes with different technologies at three scales of production in Ghana (ratios)

Pairs per shift	200			1,200			7,200		
Technology	**MM**	**ML**	**LC**	**MM**	**ML**	**LC**	**MM**	**ML**	**LC**
1. Index total employed	100	100	100	100	100	100	100	100	100.
Office and supervisory staff	37	29	29	23	17	18	17	11	13
Skilled production workers	54	58	58	32	41	47	34	44	45
Other production workers	9	13	13	45	42	35	49	45	42
2. Fixed capital/sales	0.829	0.240	0.240	0.307	0.130	0.150	0.289	0.118	0.138
3. Working capital/sales	0.524	0.526	0.526	0.501	0.505	0.503	0.497	0.500	0.497
Total capital/sales	1.353	0.766	0.766	0.808	0.635	0.653	0.786	0.618	0.635

Total capital/sales	1.333	0.766	0.766	0.808	0.655	0.655	0.786	0.618	0.655
4. Fixed capital/production worker (¢ thousand)	11.309	2.247	2.247	4.643	1.281	1.694	4.452	1.170	1.600
5. Pairs/shift/production worker	5.71	4.44	4.44	7.74	5.50	6.15	8.52	5.84	6.71
6. Value added/sales	0.308	0.315	0.315	0.319	0.322	0.322	0.321	0.323	0.324
7. Wages/sales	0.131	0.148	0.148	0.069	0.086	0.080	0.058	0.072	0.061
8. Net operating profit/sales	0.144	0.157	0.157	0.237	0.231	0.236	0.251	0.247	0.257
9. Net operating profit/capital	10.7	20.5	20.5	29.4	36.4	36.1	31.9	39.9	40.5
10. After tax profit/capital	5.3	10.3	10.3	14.7	18.2	18.1	16.0	20.0	20.3
11. Net cash flow/capital	7.8	11.5	11.5	16.2	19.0	19.0	17.4	20.7	21.1

MM = Most machine-intensive - ML = Most labour-intensive - LC = Least-cost technology

Although the results presented in the above tables do not seem to favour small-scale production of footwear in the modern sector, one should be careful not to generalise these findings, because the data do not include establishments in the informal or traditional sector using artisanal production techniques and employing only a few workers. An attempt to broaden the effect of scale to include artisanal production techniques was undertaken in Ethiopia.[1] Table IV.9 provides a summary of the findings from the Ethiopian case study.

[1] For more information on this case study, see Me Bain and Pickett (1975).

Output levels in the modern sector are 200, 1,200 and 7,200 pairs of type 1 shoes per day whereas in the very small enterprises in the informal sector 3 workers are assumed to produce 6 pairs of shoes per day. For each scale of production, the least-cost combination of techniques was identified at 1972 Ethiopian factor prices. The least-cost technology for

producing 6 pairs of shoes per day is based on the combination of techniques specified for scale 1 in Chapter II.

The artisanal production units (alternative D) show by far the lowest capital-intensity as measured by the annual fixed capital charge per employee. Alternatives A and B employ a relatively capital-intensive technology and alternative C a relatively labour-intensive combination of techniques. Thus, the decrease in the capital-intensity figure between alternatives B and C.

The evaluation of the four alternative scales of production show that the combined net present value of the very small enterprises, each producing 6 pairs of shoes per day, is such that it would make them clearly preferable to the 200 pairs per day production units in the modern sector, though not to the extent that they would be able to compete successfully with the larger enterprises producing 1,200 pairs per day or more. However, since the artisanal production units sell directly to the public at retail prices (thus, no tax payments are due) and since wages are often lower than in the modern sector, returns can be satisfactory.

Table IV.9 Comparison of four scales of production of type 1 footwear for a total volume of 7,200 pairs per day - Ethiopian case study (1972 prices)

Characteristic		Scale of production			
		A	B	C	D
1.	Output in pairs per shift per day for a single enterprise	7,200	1,200	200	6
2.	Total number employed per enterprise	904	167	42	3
	Total number employed to produce 7,200 pairs of shoes	901	1,002	1,512	3,600
3.	Total fixed capital excluding replacement[1] (Ethiopian $ thousand)	3,439	3,961	5,054	5,940

4.	Annual fixed capital charge at 10% (Eth. $ thousand)	378	436	556	967
	Annual fixed capital charge per employee (Eth. $)	418	435	368	269
5.	Net present value at 10%[2] (Eth. $ thousand)	14,055	10,646	(2,340)	3,450

[1] Project life of A, B and C is 25 years and of D is 10 years. The corresponding capital charge at 10% therefore amounts to 11% and 16% respectively.

[2] For D at retail prices without profit tax.

IV. Concluding remarks on the choice of technology and specialisation

IV.1 Need for preliminary marketing investigations

As suggested all along in this memorandum, potential footwear manufacturers will generally need to make two types of choices: choice of production technology and choice of the type and quality of footwear, the choice of technology being made concurently with that of scale of production. These choices determine whether a footwear project will be profitable or not. The wrong choice of technology may lower profits or lead to the closing-down of a plant for lack of price competitiveness. This is even more so the case if one were to make the wrong choice of footwear type and quality. Thus, the importance of undertaking a serious investigation in marketing with a view to identifying which footwear types and quality to produce and the scale of production.

Footwear manufacturers contemplating large-scale production of footwear (e.g. thousands of pairs per day) should use the services of a specialised firm for the conducting of a full-fledged marketing investigation: investments in large-scale footwear plants are such that one may not base investment decisions on limited marketing research undertaken by non-specialists. The same remark applies to the choice of technology: the latter should be

made by a reputed engineering firm. However, since the majority of such firms tend to base their plant designs on conditions prevailing in industrialised countries, investors in developing countries should request that appropriate alternative techniques be considered. The technical and economic information contained in this memorandum should be useful in assessing plant designs prepared by foreign engineering firms.

This memorandum is, however, mostly intended for small-scale producers and artisans producing as few as 8 pairs per day to as many as 1,000 to 2,000 pairs per day. Such producers may not afford to hire the services of marketing or engineering firms with a view to identifying the appropriate type and quality of footwear, the scale of production and the manufacturing technology. The choice of the scale of production and that of technology having been already dealt with in earlier sections of this memorandum, this section provides a few suggestions regarding the choice of footwear type and quality through a limited market investigation. The latter may be undertaken according to the following steps.

Firstly, the potential footwear manufacturer may obtain information on the volume and growth of imports of various types of footwear from the country's trade statistics. If the latter indicate a steady growth of imports, the potential investor should obtain samples of such imports and determine whether he is capable of producing close substitutes at competitive prices (i.e. prices equal or lower than the retail prices of imported footwear). In the affirmative, he should visit a few retail stores and obtain the views of the owners on the marketing of locally produced footwear (e.g. what should be the retail and wholesale prices? Will the clientele accept to buy the local substitute footwear or does loyalty to the foreign brand constitute an important constraint?). Information from trade statistics and retail stores should generally be sufficient to decide whether the production of import substitutes should be undertaken.

Secondly, the potential producer may investigate the production of footwear similar to

that produced by locally established large-scale manufacturers (e.g. a subsidiary of a multinational firm). The investigation, in this case, should focus on production costs: it is essential that these be much lower than those obtained by the large-scale plants since retail prices should be lower than those of footwear produced by these plants. This is an essential condition since a relatively large difference in retail prices will be needed if customers were to shift from a well-known brand name to a less-known brand. Such a condition will require the adoption of a technology which is more cost-effective than that used by the large-scale plants.

Thirdly, the potential footwear manufacturer may consider the production of a type and quality of footwear particularly appropriate for selected income groups (e.g. in terms of retail price, design, etc.) and which is not available on the market. For example, such a footwear could be intended for the rural population (e.g. footwear appropriate for field work) or high income groups (e.g. fancy footwear worn on special occasions). The production of such footwear is more risky than that of already marketed footwear since information on their marketability does not exist. On the other hand, high returns may be expected whenever an appropriate choice of footwear type and quality is made.

IV.2 Specialisation and organisation of production

Apart from the special market conditions under which small-scale enterprises operate and the possibility of employing non-mechanised, labour-intensive technologies, small firms can successfully increase their profitability in footwear production by specialising in a limited number of operations, or by using common facilities centres. A few examples of such schemes are briefly described below.

(a) Use of specialist suppliers

An enterprise that specialises in certain stages of manufacture converts raw materials into semi-finished components and supplies them to other enterprises. The semi-finished

product might be soles and heels ready for assembly to the lasted upper, or closed uppers ready for lasting. This type of market structure is widespread in countries with industrially developed market economies and usually involves medium-scale component manufacturers supplying medium-scale enterprises that assemble and market the completed footwear. In developing countries, village shoemakers may purchase closed uppers from large factories and use these in the production of finished footwear. The purchase price of these uppers is generally lower than the cost of producing them by the village shoemakers.

(b) Sub-contracting of intermediate production stages

In this scheme, a footwear manufacturing enterprise issues raw materials or footwear components to subcontracting enterprises which carry out some production stages before returning the work to the footwear manufacturer. In this case, the latter is often a medium-scale enterprise while the sub-contracted enterprises are often very small firms. Generally, the stitching and lasting operations are sub-contracted in such a scheme.

(c) Manufacturing cooperatives

Several forms of footwear production cooperatives exist. For example, independent enterprises, which purchase their own materials and sell their completed footwear may share common manufacturing facilities in a central workshop where specific operations are carried out. This is akin to sub-contracting, except that the shared equipment may be operated by the individual members of the cooperative. Such a system might, for example, be organised by a few very small-scale producers sharing a sole stitching machine. Another arrangement would be for a group of very small producers with an output of 8 pairs per day to have the stitching work carried out in a central unit with a daily output capacity of two hundred pairs, and have the closed uppers returned to them for lasting, finishing and marketing.

The use of specialist component suppliers, subcontracting and manufacturing cooperatives are some of the ways used in order to benefit from technical and administrative economies of scale. These economies are usually obtained at manufacturing stages where the returns to scale are substantial, while the other manufacturing stages continue to be carried out at smaller scales.

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Small-Scale Manufacture of Footwear (ILO - WEP, 1982, 228 p.)

CHAPTER V. FRAMEWORK FOR NATIONAL DECISIONS

In Chapter IV, the nature of technological choice and the selection of least-cost (combinations of) techniques in footwear manufacture were explored for various types of footwear and/or scales of production. Where necessary, the overall feasibility of alternative footwear projects in terms of financial requirements and private profitability was indicated.

In this chapter, the analysis of alternative production technologies, scales of production and product choice is placed in the broader framework of national decision making. The financial appraisal of alternatives in terms of domestic market prices, relevant to the private entrepreneur, is therefore extended to a so-called economic and social appraisal emphasising the use of accounting prices. The latter should better reflect the true scarcity of the factors of production (e.g. labour, capital) and development objectives than market prices, which, in many developing countries, may be distorted as a result of taxation, protection, monopolies and other market imperfections.

Prior to evaluating the economic and social impacts of technological alternatives, least-cost combinations of techniques used to produce the different types of footwear covered by this study are analysed in depth in section i. Special attention is paid to the impact of the choice of various types of footwear, resources allocation and the satisfaction of basic

needs.

Section II deals with the appraisal of footwear projects on the basis of economic and social accounting prices rather than domestic market prices, and illustrates the effect of using different prices on the choice of appropriate, least-cost combinations of techniques. It also includes a brief discussion of the data required to conduct such evaluations, and shows how the social feasibility of various footwear projects may be affected by changes in accounting prices.

The last section of the chapter briefly outlines various aspects of a national footwear manufacturing strategy on the basis of the findings of chapters IV and V. Various factors which may influence such a strategy are discussed, and their effect on product choice, scale of production and technology choice is indicated. As this chapter is mainly concerned with national as distinct from private sector decision making, it is primarily addressed to planners, and policy makers in national or local government departments, development organisations and financial institutions.

I. Comparison of alternative footwear products

I.1 Capital and labour requirements for different technologies and types of footwear

The major conclusions reached in Chapter IV with regard to the nature of technological choice in footwear manufacture can be summarised as follows: (1) Generally, the choice of technology affects the number and required skill of production employees (direct labour) and the volume and composition of plant and machinery (fixed capital). (2) Capital-labour substitution in manufacturing a particular type of footwear is characterised, to a large extent, by the substitution of skilled labour, rather than unskilled labour for capital. Thus, labour-intensive technologies are characterised by both a large number and a high proportion of skilled workers. (3) When comparing least-cost technologies for different types of footwear, variations in labour requirements across products are substantial, but

variations in fixed capital per employee are comparable to those found for technologies used to produce a given type of footwear. The nature of capital-labour substitution across products is such that capital-intensive products tend to be associated with a high proportion of skilled labour. (4) At low scales of production, the least-cost technologies are relatively labour-and skill-intensive.

Table V.I provides estimates of the capital requirements per employee for the most labour-intensive, most capital-intensive and least-cost technology used in the production of different types of footwear. These estimates are summarised from the Ethiopian case study reported in Chapter IV. The capital-labour ratios for the least-cost technology are the same as those included in the last line of Table IV.3 in Chapter IV.

Table V.I Fixed capital per employee for manufacturing 1,200 pairs per day of different types of footwear with different technologies in Ethiopia (in 1972 Ethiopian dollars)

Type of footwear	Most labour-intensive	Least-cost	Most capital-intensive
Stitched leather, cemented-on shoes - type 1	1.856	3,952	5,100
Stitched leather, moulded-on shoes - type 2	2,650	4,953	6,016
Welded PVC, moulded-on shoes - type 4	8,158	10,324	10,828
Stitched PVC, cemented-on shoes - type 5	2,305	3,393	4,343
One-shot moulded PVC sandals - type 6	10,536	10,536	17,140

Source: McBain (1977)

Table V.1 shows that for leather upper shoes, opportunities for capital-labour substitution

are greater between alternative technologies for a particular type of footwear than between different types of shoes. The reverse is true, however, in the case of footwear made of synthetic material. When all types of footwear are considered together, variations in capital-intensity are definitely greater across products than across technologies used for the manufacture of a particular type of footwear.

I.2 Product choice, resource allocation and the satisfaction of basic needs

When discussing the results of Table IV.3, it was concluded that, if effective demand for footwear would be such as to justify only one type of shoe or sandal to be marketed at a time, the higher prices varieties would be preferred. Compared with the synthetic and inexpensive type 4 shoes and the very cheap one-shot plastic sandals (type 6) the higher-priced type 2 shoes and type 5 sandals appear to be considerably more appropriate in terms of resource allocation and scale of production. Several reasons may be advanced to explain why product choice based on the latter two factors leads to this result.

First, whereas the higher-priced footwear types require more capital, returns are sufficiently high to justify their production when measured against competing investment possibilities. Second, the higher-priced types generate, proportionally, much more employment than the less expensive varieties. Although the latter require an absolute number of skilled labour that is far below that needed for the higher-priced types, it is likely that the type of skills required for footwear types 4 and 6 is far more scarce in developing countries than the type of skills necessary for the other, more craft-based products. Consequently, the factor requirements corresponding to the labour-intensive, high-priced products seem a priori much more in line with relative scarcity of factors of production in developing countries than do factor requirements associated with less expensive footwear. Third, the damage caused to existing small-scale footwear production could be substantial if footwear types 4 or 6 were to be marketed, because these products must, by necessity, be produced in large-scale enterprises. Finally, insofar as the high-

priced types of footwear use leather materials, important backward linkages to domestic leather tanneries may take place. Such linkages are likely to be absent in the case of synthetic materials which, in most developing countries, will have to be imported. Thus, in terms of resource allocation, employment creation, surplus generated and backward linkages, the higher-priced footwear types 2 (or 1) and 5 appear most attractive.

Viewed from the demand side, however, the expensive type 2 or 1 shoes and type 5 sandals are typically suited to serve the higher income brackets and export markets. In terms of price and product characteristics (appearance, durability, comfort, protection, repairability, maintenance and cleaning) these types of footwear are not likely to suit the means and needs of the majority of low-income consumers in developing countries. In contrast, the inexpensive type 6 sandals have very low status and wear out faster than the price differential with other types would justify, but are the only low-priced type of footwear that may be afforded by a large majority of people. Type 5 sandals are of better quality than type 6 sandals, and their production makes use of a technology well suited to the resource endowments of the majority of developing countries. However, their price clearly puts them beyond the reach of the poor consumer.

A low footwear price suited for the purchasing power of low-income groups may therefore create an effective barrier to the production of relatively inexpensive footwear that can be considered appropriate in terms of product characteristics and production technology. Currently, no simple alternative that may fit both requirements (i.e. use of an appropriate technology to produce an appropriate type of footwear) can easily be suggested. To this effect, a market survey would have to be conducted to ascertain effective demand for inexpensive footwear, the effect of threshold prices, and the consumer's appreciation of product performance characteristics.

Next, it should be investigated whether labour-intensive technologies which make use of local raw materials can be applied. In the affirmative, the unit cost of production should

match the threshold price,, and the footwear quality be such as to make the latter competitive with type 6 sandals. If these conditions do not apply, a policy decision will have to be taken with a view to reaching a balance between the satisfaction of basic needs on the one hand and the efficient use of local resources on the other.

II. Economic and social appraisal of alternative technologies and products

II.1 Social versus private benefit-cost analysis

Thus far, the analysis of footwear manufacture technologies and that of. alternative types of footwear and scales of production have been conducted in terms of resource costs and sales revenues valued at actual or expected market prices. As a rule, this is the common practice followed by private entrepreneurs, and the obtained results are therefore primarily of interest to them. Applying conventional discounted cash flow (DCF) analysis, the technology and/or type of product which add most to the firm's net present worth (i.e. maximises the net present value (NPV)) are generally adopted and may be considered the best technology or type of footwear from the viewpoint of the firm.

For a number of reasons, however, the best technology from the firm's point of view is not necessarily the appropriate technology from a society's point of view. First, the development objectives of a national, regional or local government usually differ from the objectives of a firm, in particular with regard to employment and income distribution. Second, a number of effects which matter to the government are not or are considered differently by the firm (certain indirect effects, external effects such as skill formation or pollution). Third, market prices actually paid or received do not often properly reflect the scarcity of products and factors of production. Fourth, direct taxation is a cost to the firm, but not to society for which it is a transfer to the government.

When the private and government views on appropriate technology may be expected to differ, the application of social benefit-cost analysis becomes mandatory. Starting from a

financial DCF analysis, a social benefit-cost analysis aims at measuring the social benefits and costs of alternative technologies and/or products in terms of their contribution to development objectives and of their use of scarce resources at the actual proposed project location. The evaluation methodologies used in social benefit-cost analysis emphasise the use of accounting prices, not only to correct for distorted market prices but also to reflect development objectives, in particular growth, employment creation and income distribution.

In a number of cases, accounting prices can simply be expressed as conversion factors, with a view to adjusting the market values derived from the financial analysis into social values used in benefit-cost analysis. Similarly, the social net present value can be considered the selection criterion: the technology or product showing the highest social NPV is defined as the "appropriate" technology or type of product. However, as the actual selection mechanism may include more elements than can be taken care of in a NPV criterion, some additional criteria may have to be considered as well.

The substantial progress made in the derivation of consistent sets of accounting prices for investment appraisal is reflected, among others, in the work of Little and Mirrlees (the OECD Manual (1968) and its successor volume (1974)), the UNIDO Guidelines (1972) , the World Bank study of Squire and Van der Tak (1975), and, most recently, in the UNIDO Guide (1978). The latter suggests that project appraisal be broken down into five stages, each of which can be considered a measure of the net benefit of the investment proposal. According to the Guide (1978, p. 3), the five stages consist of:

1. Calculation of the financial or commercial profitability at market prices, using conventional cash flow analysis,

2. Conversion of the standard cash flow table into accounting prices to obtain the net benefit at economic or efficiency prices.

The next steps attempt to adjust the economic value of the net benefits for distributional impacts, viz.:

3. Adjustment for the impact on saving and investment,

4. Adjustment for the impact on income distribution,

5. Adjustment for the production or use of goods whose social values are considered less than or greater than their economic values (luxury consumer goods and basic needs goods, respectively).

Starting from the standard financial analysis (stage 1) the use of accounting prices and adjustment factors permits a complete economic (stage 2) and social appraisal (stages 3-5) by appropriately correcting the original market value of benefits and costs.

Prior to applying social benefit-cost analysis to alternative footwear manufacture technologies or to alternative types of footwear, two remarks should be made about the nature of accounting prices. As long as project alternatives are located in the same area, accounting prices will be the same for each alternative. However, if project alternatives are located in different areas, as may be the case when comparing small-scale alternatives to a large-scale firm, accounting prices are likely to differ from one location to another location. This may be particularly true for the social cost of labour (i.e. the shadow wage rate) since the opportunity cost of the latter is not the same for all locations.

The use of accounting prices with a view to influencing the choice of project and/or technology, reflects policy objectives such as the reduction of unemployment or the focus of development efforts on special groups or regions. Project selection is, of course, not the only instrument to achieve certain development objectives, and its efficiency will have to be weighted against other policy measures. The extent to which a government may wish to use project selection as an instrument of development policy therefore co-determines

the actual value of accounting prices. For example, if income distribution is of no interest to a government, social accounting prices will coincide with economic accounting prices.

Accounting values of benefits and costs may be adjusted with a view to improving income distribution (see stages 3 and 4 above). This may be illustrated with respect to the shadow wage rage (SWR). Considering stage 3, if a marginal addition to savings and investment to sustain future growth is considered more valuable than a marginal addition to consumption, if wage income entails a greater commitment to consumption than non-wage income, and if the government considers project selection as an instrument to influence the relation between aggregate consumption and investment, then part of the commitment to consumption which arises from employing more labour can be considered a social cost to society, necessitating an upward revision of the SWR.

Considering stage 4, if wage payments resulting from a project accrue in particular to low-income groups or if the project is located in a depressed area, and if the government is committed to improve the interpersonal and interregional distribution of income through the selection of projects, part of the wage payments is considered a social benefit to society, and will result in a downward adjustment of the SWR. Depending on a project's location, its impact on special socio-economic groups, and commitment to additional consumption, the SWR in the economic analysis will thus require adjustments in the social analysis to reflect various distributional concerns.

II.2 Appraisal of alternative technologies for type 1 footwear

(a) <u>The data base</u>

Following the approach indicated above, the social appraisal of alternative technologies and/or types of footwear can in practice be applied in two steps. First, an <u>economic</u> appraisal is undertaken by converting benefits and costs in the financial analysis into accounting values expressed in economic or efficiency prices. The latter are meant to

reflect the real scarcity of commodities and factors of production and serve a purely allocative purpose. Differences between the economic and financial analysis therefore include the effects of correcting for market distortions and imperfections, external effects and taxation.

Next a social appraisal is conducted by adjusting the accounting values of benefits and costs in the economic analysis with a view to reflecting the impact on income distribution and the production or use of goods to which a special social value is attached. The actual conversion of economic into social values can be achieved either by the use of social accounting prices (which convert financial values directly into social values) or by the application of social adjustment factors.

An example of the conversion of benefits into accounting prices is presented in Table V.2 with respect to the machine-intensive type 1 shoe factory reported in chapter IV. Following the Little-Mirrlees approach, the accounting price for imported goods is simply obtained by removing all import duties and surcharges from their market value. The adjustment for the market value of unskilled labour reflects the prevailing unemployment rate, and yields a shadow wage rate which is lower than the market wage. Locally produced inputs are adjusted to allow for the accounting value of labour and imports. As the domestic market for shoes is protected against imports, the extent of protection is removed from the sales value. Due to the corrections needed to bring domestic prices in line with the equivalent of world market prices, no exchange rate adjustment needs to be made. For the sake of convenience, the discount rates are assumed to be the same in both analyses.

Because import duties on most intermediate inputs and equipment are relatively high in Ghana (approximately 40 and 45 per cent, respectively), and import duties on competing types of shoes are reported to be relatively low (around 10 per cent), value added and net operating profit are negatively protected. Net profits and the profit ratio are therefore

substantially higher at accounting than at market prices as shown in the last column of Table V.2. The corresponding input structure also appears more in line with the earlier sectoral data mentioned in Chapter IV.

Table V.2 Conversion of cost and benefit items from market prices into accounting prices, Ghana, machine-intensive factory (¢ thousand)

Cost or benefit item		Market value	Import duties	Conversion factor	Accounting value
1.	Direct materials	1,186			828
	Imported	1,140	351		789
	Local	46		0.85	39
2.	Electricity	1		0.69	1
3.	Spares, tools and equipment	11	1		10
4.	Office overhead costs	29			24
	Imported Local	4 25	2	0.85	2 22
	Intermediate inputs (1+2+3+4)	1,227			863
5.	Staff and skilled labour	97		1.0	97
6.	Other labour	27		0.75	20
7.	Depreciation	22			16
	Net operating profit (8-1 through 7)	427			624
	Value added (8-1 through 4)	573			757
8.	Ex-factory sales	1,800		0.90	1,620
9.	Fixed capital	552			394

	Imported	469	146		323
	Buildings	63		0.85	53
	Other local	20		0.90	18
10.	Working capital	901			641
	Imported	820	252		568
	Local	81		0.90*	73
	Total capital (9+10)	1,453			1,035
	Net profit at 10% (8-1 through 7-10% of capital)	282			520
	Net operating profit/ capital %	29.4			60.3

*** Weighted average**

<u>Source:</u> Calculated from McBain (1977) using additional assumptions.

(b) <u>Economic and social appraisal of alternative footwear manufacture technologies</u>

The full economic appraisal of alternative technologies to produce 1,200 pairs of men's cemented shoe per day is summarised in Table V.3. Whereas the most machine- and most labour-intensive technologies are the same as in Table IV.2 (although their valuation is, in this case, different), the least-cost combination of techniques at accounting prices differs from that at market prices as shown by the number and composition of production workers. As in the case of the financial appraisal, differences in the attractiveness of the three technologies, as indicated by the net annual profit, are relatively minor, and the conclusions reached in Chapter IV apply for the economic analysis as well.

A comparison of the characteristics of the least-cost technology identified on the basis of market prices (Table IV.2) with those identified on the basis of economic accounting

prices (Table V.3) shows, somewhat unexpectedly, that the social least-cost technology uses 12 fewer production workers than the least-cost technology identified on the basis of market prices. This interesting result, in a labour-surplus economy, illustrates, in a seemingly unusual fashion, the sensitivity of the least-cost mix of techniques for changes in relative factor prices. First, the high rates of import duty on capital equipment and the relatively small difference between market and accounting wage costs makes the machine-intensive processes relatively less attractive in financial than in economic terms. As a result, the least-cost technology is nearer to the labour-intensive end of the range of technologies when appraised in market instead of economic accounting prices.

Second, as observed in Chapter IV, capital substitues to a large extent for skilled rather than for semi- and unskilled labour when technological alternatives available for a given type of footwear are considered. Hence, at accounting prices, the relatively more capital-intensive combination of techniques implies a shift in the skill mix in favour of processes employing less skilled and more unskilled labour. This shift in the skill mix is reinforced by the lower shadow wage rate for unskilled relative to skilled labour. As a result, the reduction of the total number of production workers by 12 is accompanied by a substantial change in the skill mix of workers: in the economic appraisal, 30 fewer skilled production workers but 18 more semi-and unskilled production workers are employed. The reduction in the number of workers is therefore concentrated in the category of skilled labour. This result is consistent with the assumptions underlying the accounting price determination of labour, viz., that in a labour-surplus economy, unemployment is mainly concentrated among the semi- and unskilled labour and skilled labour can generally be considered a scarce factor of production.

<u>Table V.3</u> Economic characteristics of producing 1,200 pairs per day of men's cemented shoes with different technologies, in Ghana, valued at accounting prices (¢ thousand in 1972 prices and relative to sales, unless indicated otherwise)

Technology	Most machine	Most labour	Least-cost at

Technology	Most machine-intensive		Most labour-intensive		Least-cost at accounting prices	
Cost or benefit item	**Value**	**Ratio**	**Value**	**Ratio**	**Value**	**Ratio**
1. Intermediate inputs	863	0.533	857	0.529	857	0.529
2. Total wages	117	0.072	146	0.090	129	0.080
Staff and skilled labour	97	0.060	120	0.074	104	0.064
Other labour	20	0.012	26	0.016	25	0.016
3. Depreciation	16	0.010	7	0.004	10	0.006
New operating profit (4-1-2-3)	624	0.385	610	0.377	624	0.385
Value added (4-1)	757	0.467	763	0.471	763	0.471
4. Ex-factory sales	1,620	1.000	1,620	1.000	1,620	1.000
5. Fixed capital	394	0.243	184	0.114	249	0.154
6. Working capital	641	0.396	649	0.400	649	0.400
Total capital (5+6)	1,035	0.639	833	0.514	898	0.554
Net profit at 10% (4-1-2-3-10% of capital)	520		527		534	
Net operating profit/ capital %		60.3		73.2		69.5
7. Staff (No.)	36		36		36	
8. Skilled production workers (No.)	49		90		61	
9 . Other production workers (No.)	70		92		86	
Total employed (7+8+9)	155		218		183	
Fixed capital/production worker	3,311		1,011		1,694	

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<u>Source</u>: Calculated from McBain (1977), using additional assumptions.

II.3 Data requirements and sensitivity analysis

The data required for the financial, economic and social appraisal of projects can be distinguished in two groups. The first group consists of data which refer to the physical characteristics in terms of inputs and outputs of the proposed project and to their valuation at actual or expected market prices. These data are obtained from engineering studies and actual quotations for the financial analysis reflecting the local conditions under which the project is expected to be constructed and operated. In the actual project preparation activities, such data are normally prepared by project engineers and financial analysts.

Most of the additional information for the economic and social analysis refers to "national parameters", such as the social rate of discount, and are, in principle, applied to all projects. These data, mainly accounting prices, are usually prepared by government planners at a central or regional planning office and require the expertise of project economists. In addition, project-specific circumstances may require adjustment or even separate estimation of some of the accounting prices. For example, a nationally determined SWR may have to be adjusted to account for local circumstances, or the accounting price of a special type of footwear be estimated separately if only the accounting price for an "average" type of footwear is available. Such estimates can usually be made independently by professional economists familiar with social benefit-cost analysis.

Even when a project has been properly prepared and appraised, it should not come as a surprise that, in reality, plant performance never turns out exactly as originally foreseen due to such factors as changes in the cost of major inputs, in the rate of capacity

utilisation, in the pattern of learning, in the scale of operation, etc. A number of these factors were considered separately for the case of the 1,200 pairs per day men's cemented shoe factories in Ghana and Ethiopia by McBain (1977). The results of this analysis confirm several findings reported for products other than footwear. Low wages and high capital costs, underutilisation of capacity, and small-scale production tend to favour labour-intensive least-cost mixes of techniques. Economies of scale and higher product quality standards introduce a bias towards more machine-intensive techniques. Finally, shift working, changes in labour productivity, in the cost of direct materials and in working capital requirements have little effect on the composition of the least-cost mix of techniques.

III. Towards a national footwear manufacturing strategy

III.1 Factors influencing a national footwear strategy

A national footwear strategy concerns primarily the footwear manufacturing sector as a whole rather than individual projects. It therefore involves a number of factors which are not necessarily relevant to each individual project (linkages, organisation of production, training, price and market policies, tariff policies). However, as sectoral policies directly affect individual investment decisions, the analysis of individual projects is an indispensable input in the formulation of a sectoral strategy. For example, if changes in the least-cost combination of techniques arising from the use of accounting instead of market prices are of a systematic nature in most footwear projects, this finding should have important implications for sectoral, and possibly overall economic and fiscal policies. Another example refers to the existence of various fiscal policies (e.g. high protective tariffs against imports of footwear, exemptions of duties on import of intermediate inputs) biased in favour of large-scale footwear manufacturers, and which discriminate against small-scale producers. If such biases are confirmed at the project level, it is through sector-wide, and possibly economy-wide policy measures, that such a situation can be

reversed at the project level.

Findings from this and the previous chapters suggest the following, non-exhaustive list of factors which may influence a national footwear strategy, in particular with regard to product choice, level of scale, and production technology. The interaction between sectoral and project considerations is briefly mentioned whenever this is relevant.

(1) Size and composition of the market. Analysis of domestic and export markets is an integral part of project analysis. Sectoral studies could indicate which sections of the domestic market can best be supplied by home production and which should be supplied through imports (if at all). Export possibilities, by type and quality of product, should be investigated. As far as the domestic market is concerned, its regional dispersion will affect transportation costs and the scale of production.

(2) Purchasing power of various economic groups, with a view to determining the type and quality of footwear for both the home and export market. The identification of the various sub-markets is part of the financial analysis. When certain types of footwear are considered a basic necessity, a (differential) social premium can be attached to the output of special types of footwear so that social benefits will exceed economic benefits when appraising an investment proposal. If preference for the domestic production of basic needs is very strong, cost-effectiveness analysis may suffice.

(3) Size of the initial capital investment. If the profitability of the footwear factory which exhausts the overall investment budget of the footwear manufacturing sector is relatively high, there is a case for requesting more investment funds to be allocated to the footwear sector at the expense of other, less profitable sectors of the economy. The present value of capital costs should be estimated on the basis of the social discount rate.

(4) Availability of material inputs, mainly finished leather. Whether domestically produced or imported, the accounting price of the major raw materials should be used in order to ensure that the true scarcity of these materials is effectively taken into consideration.

(5) Backward linkages (tanneries, local production of machinery and equipment). Expansion of the footwear sector may cause additional demand for finished leather, other intermediate inputs, and capital goods. Such linkages should be considered at the project level once it has been shown that no alternative marketing opportunities for supplying sectors outside the proposed footwear project exist. At the sectoral level, the estimated additional demand generated by backward linkages could serve as useful information for the respective supplying sectors.

(6) Employment and income generation for unskilled labour. These factors depend on the rate of expansion of the footwear manufacturing sector and the nature of the technology adopted. The consequences of policies to foster employment and income generation for unskilled labour can best be analysed at the project level through a low shadow wage rate.

(7) Availability of key skills. These are reflected in the corresponding accounting price, and partly determine the most appropriate technology. Changes in the availability of local skills can be brought about by special training programmes and should be reflected in a relative decrease in the future accounting price of skilled labour.

(8) Foreign exchange savings. Information on the foreign currency component follows from the financial analysis. The valuation of foreign exchange earnings or uses is taken care of in the economic analysis through the choice of a proper accounting price of foreign exchange.

(9) Scale of production. The choice of a scale of production follows from considerations under (1), (2), (3), (6) and (7), as well as sectoral policy preferences regarding centralisation or decentralisation of production.

(10) Organisation of production. It determines the extent of product and process specialisation in separate production units.

(11) Sectoral price, tariff and fiscal policies. These follow, ideally, as implementation measures to ensure successful operation of existing and new footwear projects and should be consistent with national policies.

Some of these factors will be considered in more detail below. As countries differ considerably in size, resource endowments and stage of development, the best combination of products, scale of production and technologies is likely to be different for different countries. The presentation of a strategy for a particular country seems therefore of limited usefulness and will not be attempted in this study.

III.2 Comparative advantage, social considerations and product choice

In terms of resources, especially materials and labour, many developing countries are well placed to expand their production of footwear. Where basic skills are available and the necessary materials are of sufficient quality (either from domestic tanneries or imported, see sub-section III.3 below), the present level of wages in most developing countries gives them a distinct cost advantage over high-income countries. The high level of labour productivity resulting from machine-intensive methods of production in the developed countries is more than offset by the high level of wages, so that labour costs per unit of output are substantially higher than in most of the less-developed countries, even though labour productivity in the latter countries could be relatively low.

Because of the variety of footwear products which can be produced at competitive prices,

developing countries are faced with two major options with respect to potential markets to be served: (1) The development of a domestic industry, the market for which can be initially based on import substitution, and subsequently on increasing per capita incomes.[1] (2) The development of an export industry based on the considerable comparative advantage which developing countries can be shown to possess. Whereas the cost advantage will generally be sufficient to face international price competition, quality aspects are equally crucial for a successful penetration of the export market. Hence, the level of skills, management and quality control necessary to enter the international markets will generally be high, and is likely to be very different from the lower technical levels at which domestic products are manufactured. In the absence of

> **[1] Being a basic needs good, the demand for footwear increases relatively fast with increasing incomes among low-income groups. experience in modern footwear assembling methods, the development of production units for the domestic market seems therefore essential to acquire the technical and managerial experience necessary to compete successfully in the export markets.**

As shown in Chapter IV and Section I , the manufacture of high-quality leather-uppered footwear appears very attractive. The use of valuable leather materials for the production of the more expensive types of footwear is justified by the high price these products command, the favourable economic surplus and private profitability, the high level of employment creation resulting from the generally labour-intensive way in which these products are manufactured, and the type of craft-based skills required. By contrast, the most inexpensive types of footwear, which are meant to serve the large majority of the population, are based on synthetic materials and require large-scale, capital-intensive production units, which create very few jobs, require specialised technical skills, have less backward linkages, if any, and are a potential threat to small-scale producers of low quality leather footwear. It is therefore suggested that future research and investment be

directed towards the development of those low-priced, medium-quality footwear products that can be produced in a more labour-intensive way, make use of local, inexpensive materials and are complementary to rather than competitive with existing small-scale producers.

In cases where certain types of footwear are favoured because they constitute basic needs goods (e.g. plastic sandals), such a preference may be expressed by adding a (differential) social premium to their economic value when appraising alternative footwear projects. This is particularly relevant when low-income consumers cannot afford the initial expense to buy high-quality footwear, but the product price of the cheaper substitute matches the threshold price for low-income groups. Obviously, such a social premium will be difficult to establish in actual situations. In such a case, a practical device is to estimate the switching value of the premium, i.e. the amount by which the economic benefits of producing a particular type of footwear will have to be raised in order to make the project socially preferable to other types of footwear. In this way, the social cost of satisfying certain basic needs (employment forgone, less use of local materials, fewer foreign exchange savings) can be ascertained and be weighted against other alternatives.

III.3 Backward linkages and availability of raw materials

(a) Backward linkages

The major backward linkages resulting from the operation of footwear factories refer either to finished leather (used for the production of leather footwear) or to synthetic materials, mainly plastics, used in the manufacture of synthetic footwear. Minor backward linkages include the production of various tools and pieces of equipment used in footwear manufacturing and that of intermediate inputs such as nails, glue, fabrics, etc.

Backward linkages are of interest in the only case where these tools, equipment and materials can be produced locally since imports do not contribute to an increase of the

national value added. Furthermore, the footwear manufacturing sector may need to compete against other sectors and/or exports in order to acquire the needed inputs (e.g. leather) whenever the supplying sectors cannot expand their production (supply constraint). In this latter case, benefits derived from backward linkages would be limited. The use of leather in the local manufacture of footwear instead of exporting it does not yield backward linkages with the leather producing sector.

(b) Raw materials

The decision as to which raw materials should be favoured is not an easy one to make. This may be illustrated by the following examples. If a country has no local capacity to supply plastics suitable for footwear production, but does have a number of leather tanneries producing semi-finished (wet blue or crust) and finished leather of different quality, the decision to manufacture leather types of footwear may seem obvious at first sight, but could nevertheless be premature, or even incorrect, when based on the availability of local leather only. First, if local production of plastics used for footwear is not competitive with imports, the decision not to produce plastics locally is a rational one: the foreign exchange impact of an inefficient production unit would certainly exceed the foreign exchange savings through import substitution. However, the production of sandals with imported plastics may still be economically or socially feasible (i.e. no project should be penalised for its using imported synthetic materials). Second, when leather has a potential export market, the use of locally produced finished leather in domestic footwear production implies that potential foreign exchange earnings are foregone. Under these circumstances, it should first be ascertained which alternative use of leather yields the highest return. This factor may further justify the import of plastics for the production of sandals.

The quality of locally produced leather, reflecting both the quality of hides and skins and local tanning capabilities, is an equally important factor. If high-quality hides and skins

are locally available, but tanning capabilities are yet insufficient to produce high-quality finished leather, a decision must be taken regarding the stage at which leather can best be processed (wet blue, crust or finished). In such a situation, it could well be rational to export semi-finished leather and, at the same time, import finished leather for domestic purposes. Meanwhile, the local capacity to finish leather could be gradually built up. If, on the other hand, hides and skins are of a medium to poor quality and export prospects for leather are therefore less favourable, local processing up to the stage of finished leather could be justified when the leather can be used for the manufacture of medium-quality leather footwear meant to serve local markets.

III.4 Employment, technological choice and skill requirements

For typical conditions in developing countries, the least-cost combination of techniques to manufacture footwear products turns out to be labour-intensive in terms of fixed capital per worker. Thus, the adoption of the latest developed-country technology cannot be generally recommended for a less-developed country.

Savings in capital costs and the creation of additional employment can be substantial when employing a labour-intensive or intermediate technology instead of a machine-intensive technology. Both the Ghanaian and Ethiopian case studies show that application of the most machine-intensive instead of the most labour-intensive technology implies almost a doubling of fixed capital requirements, a reduction of total employment of about 30 per cent, and hence an increase in the capital-labour ratio by a factor of 3. However, the effect on overall profitability of choosing least-cost technologies, though positive, is less pronounced. This finding carries two important implications: (1) it explains why firms adopting latest developed country technology easily survive in an environment of low wages and high capital costs, and (2) a strong concern with employment creation need not imply important sacrifices in other areas, although the implementation of labour-oriented development strategies may face serious problems in view of the first

implication.

It may also be recalled that the nature of capital-labour substitution in manufacturing a particular type of footwear product appears to be such that capital substitutes to a larger extent for skilled than for unskilled labour (i.e. labour-intensive technologies are characterised by both a large number and a high proportion of skilled workers). When comparing least-cost technologies for different types of footwear, variations in labour requirements across products are substantial, but variations in fixed capital per employee are comparable to those amongst technologies for the same type of footwear. The nature of capital-labour substitution across products is such that capital-intensive products tend to be associated with a high proportion of skilled labour.

As far as leather-upper shoes are concerned, opportunities for substitution are greater between alternative technologies for a particular type of footwear than between different types of shoes. The reverse is true, however, when footwear made of synthetic material is considered. When the various types of footwear made of different materials are considered simultaneously, variations in capital-intensity are definitely greater across products than between technologies to produce a particular type of footwear.

The higher priced leather-upper shoes generally demand an absolute number of skills far higher than that for the less expensive varieties made of synthetic materials. It is likely, however, that the type of skills required for the manufacture of synthetic footwear (both in production and maintenance activities) is far more scarce in developing countries than the type of skill necessary for the other, more craft-based products.

III.5 Other factors

A number of additional factors should be taken into consideration when formulating a national footwear production strategy. These factors, already mentioned under points (7) to (11) in section III.1 are briefly discussed below.

(a) Foreign exchange savings

In general, the majority of developing countries -especially small to medium size countries - do not yet have a strong capital goods sector. Thus, equipment used in many industries - including the footwear industry -must generally be imported. The foreign exchange component of fixed capital equipment used in footwear manufacturing will generally be high whenever one or more of the following conditions apply:

- use of machine-intensive processes instead of labour-intensive ones to produce the same type of footwear,

- choice of capital-intensive footwear products (e.g. plastic sandals) instead of labour-intensive products (low quality leather shoes),

- adoption of large scales of production.

The choice of raw material may also increase the fraction of foreign exchange in total production costs.

On the other hand, the production of footwear may generate substantial foreign exchange earnings through exports to neighbouring developing countries and/or developed countries. Whenever exports are intended for developed countries, the required footwear quality and the volume of exports should generally be such as to 'require the use of capital-intensive technology and the adoption-of large scales of production, thus offsetting a relatively large proportion of foreign exchange earnings (especially if quality leather must also be imported). In general, foreign exchange earnings should be larger than foreign exchange expenditures. However, the difference may not always be so large as to justify the export of footwear to developed countries.

On the other hand, export of footwear to neighbouring developing countries could be

particularly attractive since the required footwear type and quality should be similar to those in demand at home, and since the volume of exports need not be too large. Consequently, labour-intensive or intermediate technologies and small scales of production may be adopted for the production of this type of exports. In general, these exports should have a large positive impact on the balance of payments than would exports of footwear to industrialised countries.

(b) <u>Skill requirements</u>

Whereas the machine-intensive production processes and products require fewer skills than do the more labour-intensive alternatives, the <u>nature of the skills</u> differ considerably from the more craft-based skills traditionally used in the labour-intensive methods of production. At higher scales of production, this effect will be reinforced, both at the technical and managerial levels. Large-scale, machine-intensive footwear factories will therefore normally require special training programmes and/or availability of expatriate personnel.

(c) <u>Scale of production</u>

Least-cost combinations of techniques tend to become more labour- and skill-intensive at low scales of production. In the modern, organised sector, economies of scale through savings in fixed capital, staff and skilled labour favour the set-up of larger production units. Compared with small- and medium-scale producers in the modern sector (employing up to 50 workers), however, artisanal or handicraft production of footwear in the traditional, unorganised ("informal") sector appears more attractive. Compared with producers in the large-scale modern sector, artisanal production of footwear, usually carried out in units employing less than 10 or even less than 5 workers, is less profitable, but creates considerably more employment (in the Ethiopian case 3 to 4 times as much). Policies which favour the profitability of small footwear production units (e.g. through

improvement of techniques, training) in markets where they can be expected to remain competitive, should therefore be encouraged. Policy measures may include the creation of better marketing facilities, better access to and conditions for obtaining credit, ensured supply of essential inputs, improvement of production methods to increase productivity, etc.

In addition to these measures, policies which encourage specialisation by small-scale and artisanal enterprises can substantially improve their profitability. Details of such policies were discussed in Chapter IV.

(d) <u>Sectoral price, tariff and fiscal policies</u>

When contrasted with an analysis based on local market prices, the analysis of alternative technologies based on economic and social accounting prices has important policy implications for sectoral <u>price and trade policies</u> and overall <u>fiscal policies.</u> In general, these policies should be designed in such a way as to induce the selection of those least-cost combinations of techniques that suit a particular country best in terms of its development objectives and real scarcity of factors of production. To this effect, (selective) price and tariff measures and various incentive schemes will have to be utilised. For instance, if the prevailing system of market prices is such that, in a labour-surplus environment, no appreciable labour-intensive techniques are selected, but rather machine-intensive varieties are preferred, the following measures to redress this situation may be applied: (1) high import tariffs on imported capital goods, (2) no application of low interest rates "to stimulate investment" indiscriminately, (3) wage subsidies, implemented through fiscal exemptions, to encourage the use of labour-intensive methods and equipment, (4) no excessive tariff protection which would remove incentives to become competitive and enable machine-intensive technologies to survive easily. Although the specific measures to be taken will differ from country to country, the examples mentioned serve as an illustration of the type of measures conducive to the

adoption of more labour-intensive technologies.

Home"" """"> ar.cn.de.en.es.fr.id.it.ph.po.ru.sw

Small-Scale Manufacture of Footwear (ILO - WEP, 1982, 228 p.)

APPENDICES

Appendix I - Glossary of technical terms

Adhesive	- A substance used to hold materials together by surface attachment. The term is used interchangeably with cement.
Attaching	- Fastening of sole unit or sole and heel to a lasted upper.
Back-seam	- The seam down the back of a closed upper which is often covered by a vertical strip called a 'back strap'.
Backpart	- The rear of the shoe

Backpart - The rear of the shoe.

Binding - The leather or tape strip that is used to cover the top line of some uppers.

Bottom - The part of the shoe below the foot.

Bottom filling - Cork, leather or felt used to fill the cavity between the sole and insole on the forepart and seat.

Brogue - A lacing shoe with a closed front and serrated and punched upper.

Casuals - Low heels footwear, produced without fasteners .

Cement - See 'adhesive'.

Cement shoe - A shoe in which the sole is cemented to the lasted upper.

Cement lasting - The attaching of the upper to the insole by cement.

Chain stitch - A stitching configuration which uses a bottom thread only. It is rarely used for closing uppers (See Fig. A.1)

Chappal - Open backed sandals with cross-over straps on the forepart.

Clicking - The cutting of upper components from skins or sheet material.

Closing - Assembling the components of the upper by stitching or other fastening methods.

Conditioning - See 'Mulling' .

Counter - A sheet component, usually with skived edges, which is inserted into the back of the upper to add rigidity.

Court shoe - Low cut shoe for women, with medium height heels and no fastenings.

Dress shoe - Although originally the term only referred to shoes for formal wear, it is now used for any shoe which is not a casual, sport or work shoe or slipper.

Embossing - A method of printing in or raising up ornamentation on a surface by heat and pressure.

Feather - The edge of the insole.

edge

Fibreboard	- Sheet material made from long vegetable fibres, used for insole, stiff e-ners, etc.
Finishing	- Final cleaning, polishing and inspection operations.
Flash	- Plastic attached to a moulding down the mould parting line.
Folded edge	- The edge of a skived upper which has been turned over to give a neat finish.
Forepart	- The front of a shoe.
French binding	- Finishing the top edge of the upper with fabric binding (this process is explained in the text) .
Heel	- The rear portion of the bottom of a shoe .
Hide	- The skin of a large animal.
Injection moulding	- A technique in which pre-heated plastic is forced into a cool cavity where it adopts the shape of the cavity before solidifying.
Insole	- The layer of sheet material between the foot and the sole.
Last	- A mould of wood or plastic on which the shoe is built. Lasts may be
Lasting	solid or hinged in the middle.- The moulding of the upper material to the shape of the "last. Often, the lasting margin is attached to the insole bottom.
Leather finishing	- The final processing of the surface of the leather after lasting.
Lining	- Quarter and vamp linings are of lightweight leather or other leather substitute.
Lock stitch	- A stitching configuration which uses a top and bottom thread. It is the most popular method of stitching together upper components (see Fig. A. 1) .
Making	- A term used to describe lasting and associated processes.
Marking	- The printing or stamping of sizes and other details on linings.
Mocassin	- Shoes in which the vamp is a single piece of leather passing completely under the foot.
Moulding-on	- Injection moulding of a sole to its finished shape directly to a lasted upper.
Mulling	- The application of water or water vapour to leather in order to temporarily increase

Mulling	- The application of water or water vapour to leather in order to temporarily increase its flexibility.
Pattern	- Sheets of metal or board shaped to the outline *to* which the upper component will be cut.
Pattern grading	- Scaling sizes up and down from a standard sized pattern.
PVC	- Polyvinyl Chloride, a thermoplastic compound which has outstanding resistance to water, alcohols, acids and alkalis. It is widely used for shoe uppers and soles.
Pulling over	- It often constitutes the first making operation in which the upper is pulled over the last.
Quarters	- The part of the upper above the vamp line.
Roughing	- See 'Scouring'.
Rubbing down	- The flattening of seams to reduce their bulk.
Scouring	- Removal of the grain and finish on the lasted margin of the upper by wire brush or abrasive so that it may receive cement for attaching.
Seat	- The area of the shoe under the wearer's heel.
Shank piece	- Bridge of wood, metal or plastic which is attached to the bottom of the insole. It is often referred to as the 'shank' .
Size	- A code number which distinguishes a particular shoe length.
Skiving	- Thinning and tapering the edge of upper components to reduce the bulk of seams and to increase wearer comfort (see Fig. A.2 which illustrates various skiving methods) .
Sock	- Inner sole partially or completely covering the top of the insole.
Sole	- The part of the shoe in contact with the ground.
Splitting	- Dividing leathers into two or more layers.
Style	- Usually, a particular design of footwear available in a variety of sizes, fittings and colours.

Stitch marking	- Marking stitch guide-lines on the upper with chalk, crayon, etc.
Suede	- Leather having a nap surface.
Tabs	- The front part of the quarters on Derby lacing shoes which carries the eyelets and covers the tongue.
Tack lasting	- Lasting uppers to insoles using tacks as fasteners.
Toe puff	- Sheet stiffener attached inside the toe of the upper.
Top piece	- The layer of the heel in contact with the ground. It is also called the 'top lift'.
Trimming	- The removal of surplus material from the upper or from the edge of the sole and heel.
Unit sole	- Combined sole and heel prefinished before attachment to the shoe. Also called 'unit'.
Upper	- The part of the shoe that covers the top of the foot.
Vamp	- The lower part of the upper which is attached to the sole between the toe-cap and the quarter.
Vulcanising	- A chemical process used to melt, mould or attach rubber soles to lasted uppers by heat or pressure in a closed cavity.
Welding	- A method of joining thermoplastic footwear components by the application or generation of heat.
Welt	- A leather strip stitched to the margin of the upper in welted footwear. The welt is also stitched to the top surface of the sole.
Width	- A letter coding for measuring shoe girths .

Figure A.1 Stitching Configurations

STITCH TYPES

Lock

Chain

SEAM TYPES

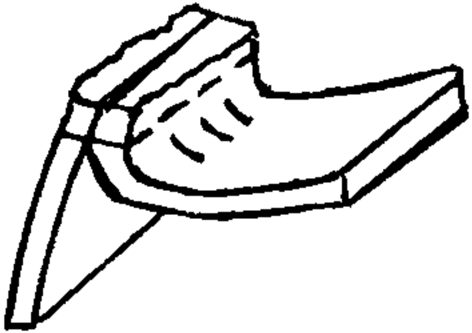
Closed seam opened

Butted seam

Corded seam

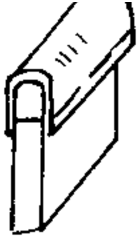
Silked seam

Lapped seam

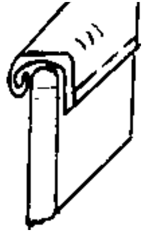


Open mocassin seam

BINDING TYPES



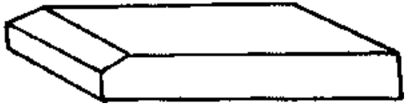
Flat



French

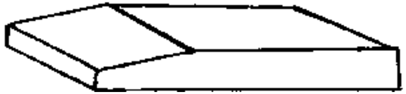
Figure A.2 Various skiving methods

Raw edge and closed seam edge



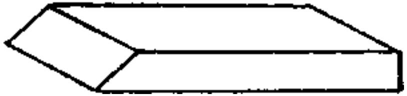
Figure

Lasting edge



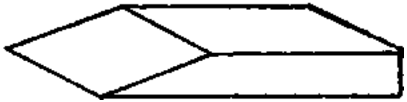
Figure

Skive for heated iron edge



Figure

Skive for cemented and folded edge



Figure

Lapped seam edge

Figure

Appendix II - List of equipment suppliers

Annex II.1: Key to suppliers' numbers given in Annex II.2

Equipment Ref. No.	Operations	Suppliers (see list of names and addresses in Annex II. 2)
1	Upper cutting	18, 74, 78, 79, 124, 41, 138, 111, 64
2	Leather splitting	5, 27, 78, 29, 17, 4, 125, 149, 150, 151.
3	Lining marking	
4	Stitch marking	5, 84, 144
5	Hole punching	78, 120, 124, 4, 55, 139, 64, 115
6	Sock embossing	105, 5, 18, 77, 78, 124, 35, 101, 62
7	Leather skiving	18, 78, 35, 125, 4, 16, 104, 11, 70, 57, 19, 3
8	Edge folding	78, 126, 4, 16, 136, 11, 55, 115
9	Upper	129, 22, 67, 98, 31, 68, 123, 103, 69, 16, 85, 73, 46, 137, 70, 89, 71,

	stitching	142, 72, 114, 115, 107, 110
10	Seam reducing	97, 78, 37, 126, 11, 64
11	Taping	78, 106, 118
13	Eyeletting	95, 5, 6, 119, 27, 79, 121, 4, 16, 136, 106, 58, 3
15	Puff attaching	32, 124, 11, 64
16	Upper trimming	32, 124, 11, 64, 78
17	Insole cut and bevel.	5, 78, 4, 135, 67, 59
21	Upper conditioning	118, 24, 28, 33, 34, 16, 86, 61, 88, 143
22	Lasting	21, 118, 94, 5, 23, 28, 78, 30, 33, 7, 122 124, 83, 129, 130, 4, 16, 104, 47, 11, 48, 136, 88, 139, 108, 109, 62, 56, 14, 91, 15, 59, 64, 60, 66, 141
23	Tack removal	66, 59
24	Heat setting	78, 138, 139, 15, 91, 115
25	Bottom roughing	78, 129, 135, 136, 52, 12, 139, 91, 64
29	Sole laying	21, 25, 78, 99, 79, 127, 4, 132, 134, 44, 47, 91, 116
31	Upper finishing	24, 76, 32, 124, 35, 102, 16, 134, 43, 109, 92
35	Sole	1, 2, 78, 99, 38, 122, 81, 39, 131, 42, 104, 50, 52, 13, 140, 65, 3

	moulding	
37	Sole preparation	78, 124, 136, 91, 64
44	Sole stitching	78, 124, 36, 37, 80, 45, 91, 64
46 and 47	Seat and heel nailing	96, 26, 78, 4, 16, 136, 47, 138, 91, 64, 92
49 and 50	Heel and edge trimming	28, 78, 32, 79, 8, 40, 4, 104, 138, 143, 92
51	Bottom finishing	5, 78, 121, 124, 100, 102 , 16, 133, 135, 136, 51, 138, 91
52	Upper welding	79, 101, 132, 137, 53, 55, 139, 90, 60 113, 115
54	Last string attaching	39, 82, 112
62	Injection moulding	122, 38, 125, 81, 39, 128, 42, 9, 10, 50, 13, 63

Annex II. 2: Names and addresses of equipment suppliers

Supplier number	Name and address
	BELGIUM
1	ACEC, 52 Dok, GHENT, B-9000
	CANADA
2	BATA ENGINEERING. c/o BATA INTERNATIONAL. Don Mills. Ontario

3 USM Ltd., 2610 Bennet Ave., MONTREAL H1V2T8

CZECHOSLOVAKIA

4 INVESTIA, Praha 10, KODANSKA, Dept. 921

FRANCE

5 ANVER S.A., 4, rue Suchet, 92470 MAISONS-ALFORT

6 V. BERAUD, 1 avenue Duchesne, 26104 ROMANS

7 R. FAVRAUD, Route de Vars-Roffit, GOND-PONTOUVRE

8 P. GOUDIN, 49 ST-PIERRE, MONTLIMART

9 MAUSERIET, B.P. 16, LES HERBIERS - 85500

10 MOURALT et Cie., 63, rue d'Allonville , NANTES

11 Ets. OMIC, 10, rue Barbanegere, 75019 PARIS

12 PROST-DAME, 94-100 rue Baraban, LYON

13 SEFOM, 19 rue Thodore de Banville, 75017 PARIS

14 SOFRAGRAF, 5, rue Marx-Dormy, 94230 CACHAN

15 SUTEAU, M. DUTEAU, rue de Cholet 49, ST MACAIRE-EN-MAUGE

HUNGARY

16 KAEV K.G.V., 1064 BUDAPEST VI ROZSA FU55

INDIA

17 HINDUSTAN ENGINEERING WORKS, 1328/2 Jawahar Nagar, KOLHOPUR 416001

18 APPEX MACHINERY, 37/209 A Saran Nagar, Dayalgaghrd,- AGRA-

19 CHENS BROTHERS, 50 S. Tangra Rd, CALCUTTA 700046

20 M/S BATA INDIA Ltd., Batanagar, 24 PARGANAS, W. Bengal

ITALY

21 ALBE DI ALBELLI Giuseppe, 51015 Monsummara Terme, VI Via Francesca Nord

182

22 ALFA FIAM, Via Ampere 104, MILANO 20131

23 ARNERI Franco, SS494 Localita S. Antonio di Parona, 27020 PARONA

24 T. DI BALASSO, Via Albini 3, 27029 VIGEVANO

25 BANF, Viale Rafaelo Sanzio,106, 27036 MORTARA

26 BETA, Via Giacomo 8 27029 VIGEVANO

27 BOMBELLI, S. Lorenzodi Parabiago, 20015 MILANO

28 BRUGGI S.A., C. So. Torino 114, 27029 VIGEVANO

29 CAMOGA S.A., Via Oroboni 27, 20161 MILANO

30 CERIM, C. So Novara 218, 27029 VIGEVANO

31 CMCI, Via G. da Mogliano 1, FERMO

32 COLLI F.G.B., Via Gioberti 17, 27029 VIGEVANO

33 DEROV, Via Gambolina 19, 27029 VIGEVANO

34 ELECTTRO, Via P. Luigi Albini 3, 27029 VIGEVANO

35 EELEGI Spa, Via Beccaria 22, 27029 VIGEVANO

36 FALAN, Via Trieste 6, 27029 VIGEVANO

37 FIMAE , Via Bellini 23, 27029 VIGEVANO

38 FERRARI and Figli, Piazza Duca d'Aosta 12, 20124 MILANO

39 GESTA, Via Silvio Pellico 12, 20027 RESCALDINA

40 GUATTEO TERENZIO, Via Carlo Alberto 160, 27023 CASSOLNOVA

41 LOMBORDO, Via S. Cecilia 6/24, 27029 VIGEVANO

42 LORENZIN, Strada Adriatica, 35020 ALBIGNOZEGO

43 MANTEGAZZA, 20089 ROZZANO MILANO

44 MEC-VAL, Via V. Bellini 21, 27029 VIGEVANO

45 MINO LA, Via Baldrini 20, 27029 VIGEVANO
46 NECCHI Spa., Via Rismondo 78, 27100 PAVIA
47 NIEVE, Via della Gioia 46/A, 27029 VIGEVANO
48 OMAV, Via M. Gianolio 15, 27029 VIGEVANO
49 OMSA, Via Sabotino 19, 27029 VIGEVANO
50 OTTOGALLI, Zona Industrials 9A Strada, 35100 PADOVA
51 PISARONI G., Via Manzoni 7, 20019 SETTING MILANESE
52 PLASTIMATIC, Via Alessandria 7, LEGRANO
53 POLETTO, F., Via Marzabotto 27, 27029 VIGEVANO
54 REMAC N., Via Gianolio 35, 27029 VIGEVANO
55 SAGITTA, Via Farini 43, 27029 VIGEVANO
56 SILVA FAUSTINO, Via Rosmini N. 10, 27029 VIGEVANO
57 SPILOTTI and Figli, Via Aguzzafame 14, 27029 VIGEVANO
58 S.P.S., Via Sesia 14, 27029 VIGEVANO
59 TECNO-2, Via Orto 70, 27029 VIGEVANO
60 TORTI and BOCCA, Via M. Gianolio 33, 27029 VIGEVANO
61 RINALDI E. , Via 24 Maggio 38, P.O. Box 61, 20015 PARABIAGO
62 SICOMEC, Via Mameli 16, 27024 CILAVEGNA
63 TOMAYER E., Via Bornassa 24, 28066 GALLIATE
64 TORIELLI, Via L. da Vinci 130A, 20090 ZINGORE DI TREZZANO S/N
65 UNION S.A., Via Pierobon 47, 35010 LIMENA
66 Valente V., Via G. Modera 3, 20129 MILANO

JAPAN

67 BROTHER IND. 35-9 Chome , Horita-Dori ,. Mizuho-ku, NAGOYA

68 CONSEW INTERNATIONAL, Yamajin Bldg. I Chome, Higashi-ku, OSAKA

69 TOKYO JUKI INDUSTRIAL CO., 23 Kabuki-cho, Shinjuku-ku, TOKYO

70 SEIKO SEWING MACHINE Co., 6 Asakusa Yoshino-cho, 1 chome, Taito-ku, TOKYO

71 SINGER SEWING MACHINE, 25, 2-Chome, Azabu-Ichibeicho, MINATO-KU

72 SUPER-ROLL Mfg. Co, 11-18, 2 chome, Harakawa, Nishiyodogawa-ku OSAKA

NETHERLANDS

73 MUVA, Valkenburg 5110, Postbus 33, CREMERSTRAT 10

UNITED KINGDOM

74 ART PATTERN and KNIFE Co., Bedford St., LEICESTER LE1 3JP

75 G. BARNSLEY Ltd., Cornish St. SHEFFIELD S6 3AD

76 BINKSBULLOWS Ltd., Pelsall Rd. BROWNHILLS, Staffs

77 BLOCKMASTER, 56 Benwell Road, LONDON N7 7BA

78 BUSM Co., Ltd., Belgrave Road, LEICESTER LE4 5BX

79 COX AND WRIGHT Ltd., P.O. Box 27, Wellingborough Rd., RUSHDEN

80 FOOTWEAR PLANT AND EQUIPMENT Co., 10-14 Roman Road, BRISTOL BS5 6EB

81 FOSTER-FINCH Ltd., Greengates, ACCRINGTON, Lanes.

82 GILTSPUR INDUSTRIES, Egypt Road, NOTTINGHAM NG7 7GU

UNITED KINGDOM

83 INTERNATIONAL SHOE MACHINERY Ltd., Radnor Road, WIGSTON, LE82XY

84 LIVINGSTONE and DOUGHTY, 17 Mandervell Road, CADBY Leicester

85 G. MACPHERSON Ltd., 2/4 Bridgford Road, WEST BRIDGFORD, Nottingham

86 PROCESS EQUIPMENT DEVELOPMENTS, 35 Strode Road, WELLINGBOROUGH NN81JU

87 REMPSTONE ENGINEERING Ltd., Bakewell Road, LOUGHBOROUGH Leicester

88 SALIENT ENGINEERING Ltd., 4 Oak Lane, BRISTOL BS5 1JY

89 SINGER CO., Ltd., 91 Coleman Road, LEICESTER LE54LE

90 STAFFORD TOOL and MACHINERY CO., St. Patrick Place, STAFFORD

91 STANDARD ENGINEERING CO., Evington Valley Road, LEICESTER LE5 5LZ

92 TRUE BROS. Ltd, 98 Cannock St. LEICESTER LE4 7HR

USA

93 ACKERMAN-GOULD Co., 10 neil Court, OCEANSIDE, L.I. N.Y. 11572

94 AMERICAN SHOE MACHINES, 30 Nashua St. WOBURN, Mass.

95 AMERSHOE, 456 Nordhoff Place, ENGLEWOOD, N.J. 07631

95 AUTO SOLER Co., ATLANTA, Georgia

97 BOSTON MACHINE WORKS, 7-17 Willow St., LYNN, Mass. 01903

98 CAMATRON MACHINES, 155 West 26th St., NEW YORK

99 COMPO SHOE MACHINERY Co., 125 Roberts Road, WALTHAM, Mass.

100 DIAMOND MACHINERY Co., River Road, LEWISTON, Maine

101 T.J. EDWARDS Inc., 25 William St, P.O. Box 8, BOSTON, Mass. 02130

102 L. FREEMAN Co., 1819 Freeman Ave., CINCINNATI, Ohio 45214

103 H. JAFFE, 40-11 Skillman Ave. LONG ISLAND CITY, N.Y. 11104

104 LUDLOW ENTERPRISES Inc., 333 Scholes St., BROOKLYN, N.Y. 11206

105 MARKEM MACHINE CO., P.O. Box 480, KEEN, New Hampshire

106 PRIME MFG. Co., 545 Washington St., LYNN, Mass. 01901

107 REECE FOLDING M/C Co, P.O. Box 279, WOBURN, Mass.

108 M. SCHWABE M/C's, 147 Prince St., BROOKLYN N.Y. 11201

109 SENCO PRODUCTC INC., 8485 Broadwell Road, CINCINNATI, Ohio 45244

110 SINGER Co., 275 Centennial Ave., PISCATAWAY, N.J. 08854

111 SOUTHERN SHOE M/C's, 450 Allied Drive, NASHVILLE, Tenn. 37204

112 STITCH-RITE Corp., Locust Str. IPSWICH, Mass 01938

113 THERMATRON, 60 spence St., BAYSHORE, N.Y. 11706

114 UNION SPECIAL M/C Co., 400 N. Franklin St. CHICAGO, Ill. 60610

114 UNION SPECIAL M/C Co., 400 N. Franklin St. CHICAGO, Ill. 60610
115 USM CORP., 181 Elliott Str., BEVERLEY, Mass.

USSR

116 TECHMASH EXPORT, Mosfilmovskaja 35, MOSKOW 117-330

FEDERAL REPUBLIC OF GERMANY

117 ADLERMASCHINEN WERKE, 4800 BIENEFELD Pf. 103/lo5
118 ALBEKO SHOE MACHINERY, D-6000 FRANKFURT/MAIN, spf 119180
119 BERNING AND SOHNE, 56 Wupper Tal 2, OBERDORNEN
120 BIMA, 7450 HECHINGEN, P.O. Box 1205
121 DESCO, 607 Langen bei Frankfurt, Pittlestras. 46
122 DESMA, 28074 CHIM BEI BREMEN, Desmastr. 3/5
123 DURKOPPWERKE, 4800 BIELEFELD , Niederwall 29
124 DVSG, 6 FRANKFURT/MAIN, 13/31 Fredrich-Ebert Anlag
125 FORTUNA, 6000 FRANKFURT/MAIN 70, Dreieccstr., 59
126 G. FRANK, 678 PIRMASENS, Haupstr. 16
127 Dr. Ing. FUNCK, MUNCHEN-PASING, Haidelweg 20
128 GOD MASCHINENBAU 8 MUNCHEN 2, Sonnenstr. 27
129 w. GUTH, 6780 PIRMASENS-RUHBANK, Erlenbrunner St. 51
130 E.G. HENKEL, 6078 NEU ISENBURG, Pf. 365
131 HESTIKA WERKZ, D-7140 LUDWIGBURG, Pf. 580
132 KIEFEL-KORTING, D-8228 FREILASSING, Sude erstr. 3-7
133 LIBA, 8671 NAILA OBERKLINGENSPORT
134 T. LIEBROCK, 678 PIRMASENS-ERLENBRUNNER, Kettrighofstr 34
135 E MOHR ACH, 6661 RIESCHWEILER, Nunschweilerstr. 3-5

136 MOENUS, P.O. Box 1367A, FRANKFURT/MAIN, West 13

137 G. PFAFF, 675 KAISERSLAUTERN

138 J. SANDT, 678 PIRMASENS, Lembergerstr. 82, Pf 940

139 SCHON and Cie., 5 PIRMASENS, Pf. 115

140 R. SCHLICHT, 2 HAMBURG 70, Brauhaussteeg 12

141 SIECK INTERNATIONAL, 8580 BAYREUTH, Pf. 2928

142 SINGER A.G., FRANKFURT/MA IN 6, Gutleutstr 42-44

143 STEIN, 678 HINTERWEIDENTHAL, Turnstr. 5

144 J. STROBEL and SOHNE, 8000 MUNCHEN W. 12, Heimeranstr. 68-70

DENMARK

145 V. PEDERSEN, DK-4270

SPAIN

146 ALVAREY-VALLS , Consejo di Ciento 360, BARCELONA 9

147 P. FREIRE, Paulino Freiro Pineiro 26, BONZAS (Vigo)

SWEDEN

148 RIWI-MASKINER, Nya Agnesfridsvagen 186, MALMO

149 AB TEXOTAN, Box 132, S-431-22 MOLNDAL 1

BRAZIL

150 Industria de Maquinas Enko Ltda., Ave Pedro Adams, Filho 795, Caixa Postal 24, NOVO HAMBURGO, RS

151 Maquinas SEIKO Ltda., Caixa Postal 86, NOVO HAMBURGO, RS

Appendix III - Selected bibliography

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UNIDO: Guide to Practical Project Appraisal. Social Benefit-Cost Analysis in Developing Countries (New York, United Nations, 1978).

Appendix IV - Selected list of technical institutions

ALGERIA	- Socit nationale des Industries des Peaux et Cuirs (SONIPEC), Sige-social Alger, 100, rue de Tripoli, Hussein-Dey.
ARGENTINA	- Camara Industrial Marraquinera Argentina, 1219 Buenos Aires
AUSTRALIA	- Footwear Manufacturers Association, 65 York St. Sydney, N.S.W.
AUSTRIA	- Verband der Schuindustrie, Bavernmarkt 13, 1011 Vienna 1.
BELGIUM	- Federation beige de l'Industrie de la Chaussure (FEBIC), 91-97 Boulevard M. Lemonnier, 1000 Bruxelles
BRAZIL	- Associaco Brasileira dos Quimicose Techicos da Industria do Couro, Rua Urugai 155, C.P. 2075 Port Alegre , R.S .
BULGARIA	- Scientific and Technical Institute for Leather and Shoe Industry, Str. "Industrialna", No. 11, Gabrovo.

CANADA	- Footwear and Leather Institute of Canada, 14 Eiffel-Mark, P.O. Box 355, Place Bonaventure, Montreal, Quebec H5A IB5
COLOMBIA	- Comite Sectorial de la Industria del Cuero y del Calzado y sus. Carrera 13, 27-00 Piso 10, Bogota.
CZECHOSLOVAKIA	- Shoe and Leather Research Institute (VUK) 762 65 Gottwaldov.
DENMARK	- T.I. Leather Research Laboratory, Bronshojvej, 17 2700 Copenhagen
GERMAN DEM. REP.	- Forschungsinstitut fr Schuhtechnologie, 485 Weissenfels, Am Muhlberg 9
IRELAND	- Federation of Irish Footwear Manufacturers, Confederation House, Kildar St., Dublin 2
ETHIOPIA	- National Leather and Shoe Corp., Box 2516 Addis-Ababa
FINLAND	- State Institute for Technical Research, Leather Investigations Laboratory, Lnnrotinkatu 37, HELSINKI 18.
FRANCE	- Federation Rationale de l'Industrie de la Chaussure de France, 30 avenue Georges V, 75005 Paris.
GREECE	- Greek Shoe and Leather Organisation, Paneplstimiou 64, Athens TT 141.

GUATEMALA	- Institute Centroamericano de Investigacion y Tecnologia Industrial (ICAIT), Avenida la Reforma 4-47, Zona 10, Guatemala City
HUNGARY	- Research Institute of the Leather, Artificial Leather and Footwear Industries, 1047 Budapest Paksi Jozsef u43.
INDIA	- All India Footwear and Rubber Goods Manufacturers' Association, 15A Horniman Circle, Fort, Bombay.
INDONESIA	- Indonesia Leather Institute- The Academy of Leather Technology, Djl. Di Ponegoro 101, Djakarta.
ITALY	- Institute Tecnico Industriale di Stato del Cuoio e Derivati, Corso Cirie 7, 10152 Turin
JAPAN	- Japan Shoe Manufacture Federation, 3 Kajicho 1- Chome, Kanda, Chiyodaku, Tokyo 101
MEXICO	- Asociacion Mexicana de Quimicos y Tecnicos del Cuero A-C., Tehuantepec 255, Despachos 101-102, Apdo. Postal 27-227, Mexico 7.
MOROCCO	- Syndicat des Fabricants de Chaussures, 262, boulevard Mohamed V, Casablanca.
NETHERLANDS	- Institute for Leather and Shoe Research TNO. Mr. van Coothstraat 55. 5141 ER

Waalwijk.

NEW ZEALAND	- New Zealand Leather and Shoe Research Association, Private Bag, Palmerston North, 82-108 Palmerston North
NIGERIA	- Leather Research Institute, P.B. 1052, Zaria.
PAKISTAN	- Pakistan Leather Goods Manufacturers' and Dealers' Association, 6 Badshahi Rd., Garden West, Karachi.
PANAMA	- Asociacion de Industriales del Cuero y Calzados de Panama, c/o Fabrica de Calzado CODA, Panama City
POLAND	- Institute of Leather Industries, Ulzgierska, 73 Lodz 11
RUMANIA	- The Institute of Hide and Shoe Research, Bella Breiner St., 93, 74259 Bucharest 4
SOMALIA	- Hides and Skins and Leather Development Centre, P.O. Box 24, Mogadiscio.
SPAIN	- Asociacion Quimica Espanola de la Industria del Cuero, Av. Jose Antonio 608, Barcelona 7.
SRI LANKA	- Ceylan Leather Products Corp., 141 Church Rd.., Mattakkuliya, Colombo 15
SUDAN	- Hides. Skins and Leather Institute. P.O. Box 8. Khartoum South.

SWEDEN	- Shoe Suppliers' Association, Grevgatan 34, Box 5512, S-114 85 Stockholm.
SWITZERLAND	- Verband Schweiz Schuhindustrieller, Rotel St. 84, PF 8042 Zurich.
TUNISIA	- Centre national du Cuir et de la Chaussure (CNCC) 6, rue Djebel Mansour, Tunis.
TURKEY	- Turkish Leather Research and Training Institute, P.O. Box 26, Pendik, Istanbul.
UNITED KINGDOM	- Shoe and Allied Trades Research Association, Satra House, Rockingham Rd. Kettering Northants
U.S.A.	- Sole Leather Council, 321 Summer St., Boston 02210., Mass.
U.S.S.R.	- Central Scientific Research Institute for the Leather and Footwear Industry, Ulitsa Piatnitskaia, 74, Moscow.
VENEZUELA	- Asociacion nacional de Industriales del Cuero, Esquina Puente Anauco, Apdo Postal 6974-2860, 3020 Caracas.
FED. REP. GERMANY	- Haupverband der Deutschen Schuhindustrie, Stresemannstr. 12, D-4000 Dusseldorf.
YUGOSLAVIA	- Institute for Leather Footwear and Rubber, Visenjicka 94, Belgrad.

Appendix V - Present worth of an annuity factor

How much 1 received or paid annually for X years is worth today

Year	5%	6%	8%	10%	12%	14%	15%	1696	18%	20%	22%	24%	25%	26%	28%
1	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833	0.820	0.806	0.800	0.794	0.78
2	1.859	1.833	1.783	1.736	1.690	1.647	1.626	1.605	1.566	1.528	1.492	1.457	1.440	1.424	1.39
3	2.723	2.673	2.577	2.487	2.402	2.322	2.283	2.246	2.174	2.106	2.042	1.981	1.952	1.923	1.86
4	3.546	3.465	3.312	3.170	3.037	2.914	2.855	2.798	2.690	2.589	2.494	2.404	2.362	2.320	2.24
5	4.330	4.212	3.993	3.791	3.605	3.433	3.352	3.274	3.127	2.991	2.864	2.745	2.689	2.635	2.53
6	5.076	4.917	4.623	4.355	4.111	3.889	3.784	3.685	3.498	3.326	3.167	3.020	2.951	2.885	2.75
7	5.786	5.582	5.206	4.868	4.564	4.288	4.160	4.039	3.812	3.605	3.416	3.242	3.161	3.083	2.93
8	6.463	6.210	5.747	5.335	4.968	4.639	4.487	4.344	4.078	3.837	3.619	3.421	3.329	3.241	3.07
9	7.108	6.802	6.247	5.759	5.328	4.946	4.772	4.607	4.303	4.031	3.786	3.566	3.463	3.366	3.18
10	7.722	7.360	6.710	6.145	5.650	5.216	5.019	4.833	4.494	4.192	3.923	3.682	3.571	3.465	3.26
11	8.306	7.887	7.139	6.495	5.938	5.453	5.234	5.029	4.656	4.327	4.035	3.776	3.656	3.544	3.33
12	8.863	8.384	7.536	6.814	6.194	5.660	5.421	5.197	4.793	4.439	4.127	3.851	3.725	3.606	3.38
13	9.394	8.853	7.904	7.103	6.424	5.842	5.583	5.342	4.910	4.533	4.203	3.912	3.780	3.656	3.42
14	9.899	9.295	8.244	7.367	6.628	6.002	5.724	5.468	5.008	4.611	4.265	3.962	3.824	3.695	3.45
15	10.380	9.712	8.559	7.606	6.811	6.142	5.847	5.575	5.092	4.675	4.315	4.001	3.859	3.726	3.48
16	10.838	10.106	8.851	7.824	6.974	6.265	5.954	5.669	5.162	4.730	4.357	4.033	3.887	3.751	3.50
17	11.274	10.477	9.122	8.022	7.120	6.373	6.047	5.749	5.222	4.775	4.391	4.059	3.910	3.771	3.51
18	11.690	10.828	9.372	8.201	7.250	6.467	6.128	5.818	5.273	4.812	4.419	4.080	3.928	3.786	3.52
19	12.085	11.158	9.604	8.365	7.366	6.550	6.198	5.877	5.316	4.844	4.442	4.097	3.942	3.799	3.53

20	12.462	11.470	9.818	8.514	7.469	6.623	6.259	5.929	5.353	4.870	4.460	4.110	3.954	3.808	3.54
21	12.821	11.764	10.017	8.649	7.562	6.687	6.312	5.973	5.384	4.891	4.476	4.121	3.963	3.816	3.55
22	13.163	12.042	10.201	8.772	7.645	6.743	6.359	6.011	5.410	4.909	4.488	4.130	3.970	3.822	3.55
23	13.489	12.303	10.371	8.883	7.718	6.792	6.399	6.044	5.432	4.925	4.499	4.137	3.976	3.827	3.55
24	13.799	12.550	10.529	8.985	7.784	6.835	6.434	6.073	5.451	4.937	4.507	4.143	3.981	3.831	3.56
25	14.094	12.783	10.675	9.077	7.843	6.873	6.464	6.097	5.467	4.948	4.514	4.147	3.985	3.834	3.56

Questionnaire

1. Full name..............................

2. Address................................
..
..

3. Profession (check the appropriate case)

(a) Established footwear manufacturer ☐

If yes, indicate scale of production.............
...

(b) Would-be footwear manufacturer........... ☐

(c) Government official .... ☐

If yes, specify position:..........
..

(d) Employee of a financial institution If yes, specify position:......... ☐

(e) University staff member- .... ☐

(f) Staff member of a technology institution...................... ☐

If yes, indicate name of institution.......................
...

(g) Staff member of a training institution....................... ☐

If yes, specify...................
...

(h) Other.................................... ☐

If yes, specify..........................

4. From where did you get a copy of this memorandum? Specify if given free or bought..................
..

5. Did the memorandum help you achieve the following (Check the appropriate cases)

(a) Learn about footwear manufacturing techniques you were not aware of.......... ☐

(b) Obtain names of equipment suppliers.......... ☐

(c) Estimate unit production costs for various scales of production/technologies. .... ☐

(d) Order equipment for local manufacture........ ☐

(e) Improve your current production technique.... ☐

(f) Cut down operating costs.................... ☐

(g) Improve the quality of footwear produced................ ☐

(h) Decide which scale of production/technology to adopt for a new footwear factory.......... ☐

(i) If a government employee, to formulate a national footwear manufacturing strategy..... ☐

(j) If an employee of a financial institution, to assess a request of a loan for the establishment of a footwear production unit.............. ☐

(k) If a trainer in a training institution, to use the memorandum as a supplementary training material..........................☐

(l) If an international expert, to better advise counterparts on footwear manufacture technologies..............................☐

6. Is the memorandum detailed enough in terms of:

- Description of technical aspects...... Yes No
- Names of equipment suppliers.......... Yes No

- Costing information................... Yes No

- Information on socio-economic impact.. Yes No

- Bibliographical information.......... Yes No

If some of the answers are "No", please indicate why below or on a separate sheet of paper

...

...

...

...

...

...

7. How may this memorandum be improved if a second edition were to be published?

...

...

...

...

8. Please send the Questionnaire, duly completed to:

Technology and Employment Branch INTERNATIONAL LABOUR OFFICE, CH-1211 GENEVA 22 (Switzerland)

9. In case you need additional information on some of the issues covered by this memorandum the ILO and UNIDO would do their best to provide the requested information.