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16029

Distr.
LIMITED

IO.4
28 November 1986

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

PRACTICAL GUIDELINES FOR INCREASING THE USE OF LOCAL INPUTS IN THE MANUFACTURE OF LEATHER GOODS AND FOOTWEAR IN DEVELOPING COUNTRIES

Background paper *

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GLOSSARY

%	per cent
%-age	percentage
m	metre
m^2	square metre
cm	centimetre
ft^2	square foot
g	gram
kg	kilogram
sec	second
min	minute
hr	hour
h	hour
TMU	time-measurement-unit = 0.00001 hour
std.min	standard minute (see:- work study/work measurement)
$US	United States dollar
$	dollar
¢	cent
kWh	kilowatthour
MTM	methods-time-measurement (see:- work study/ work measurement)

BSI performance 100

standard performance of a worker on the rating scale of the British Standard Institution. This corresponds to "brisk, business-like performance, as of an average qualified worker on piecework: necessary standard of quality and accuracy achieved with condifidence; comparable walking speed being 6.4 km/hr."[22],

ILO	International Labour Office
UNIDO	United Nations Industrial Development Organization

SUMMARY

The aim of starting or improving leather and leather products industries in developing countries is to obtain added value on the indigenous raw materials. Several countries with limited raw material sources have succeeded in building up important leather and leather products industries in the last decades. This analogy makes one conclude that industrialization results are mainly due to human skills improvement inputs in countries possessing adequate infrastructural services. For this reason this paper not only outlines some leather products manufacturing processes for higher added value and employment, but also gives examples and guidelines concerning some aspects of modern management methodology to be learned, vital for the enhancement of local inputs in terms of human skills and motivation.

CONTENTS

1. INTRODUCTION

The aim of starting or improving leather and leather products industries in the developing countries is mainly to obtain added value on the indigenous raw materials. Traditionally, third world countries have been suppliers of raw hides and skins to the tanning industry of the industrialized countries. This situation has, however, changed in the past decades and is still in the process of changing. The recent UNIDO "Draft World-Wide Study of the Leather and Leather Products Industries: 1975-2000" established that the developing countries currently produce about 40 per cent of the total global supply of hides and skins, but which they only process partly and in limited quantities to manufactured leather products. The leather and leather products industries consist of several different sectors of which each can build an important industry. Although the basic raw materials, the raw hides and skins, are the common denominator and starting point of the industry, there are several examples that countries with relatively limited raw material sources have managed to build up important leather and leather products trade by using imported raw hides. The ideal situation is, however, if local raw materials are available so that the added value can be introduced from the beginning[20].

It is estimated that in Africa alone the losses due to non-recovery of potential raw material may be of the order of some $US 425 million annually. Down-grading of raw hides and skins due to employment of incorrect techniques during flaying and curing may incur annual losses of the order of $US 400 million. In addition further $US 2.9 billion added value could be yielded if all hides and skins produced within the continent were processed to leather products[1].

Developing nations have in past decades built up successful leather product industries, but significant industrial diversity in output is evident only in South America and the Far East. Everywhere else, including China, leather products other than shoes are peripheral; production of leather goods by artisans and craftsmen is universal but does not contribute significantly to exports, except via tourists[2].

Some countries, such as the Republic of Korea, Taiwan, Hong Kong and Singapore have a very limited supply of locally-available hides and skins, but have nevertheless created successful leather products export industries. This phenomenon shows that local inputs, in terms of locally-available materials, have not been a pre-requisite for development.

The analogy shows that the outcome of industrialization efforts are expected mainly through inputs to human skills improvement and motivation in countries or regions possessing adequate infrastructural services.

Since technology, in terms of leather products machinery and materials as well as finance, is relatively easy to obtain, the main emphasis of this paper is to outline and stress the importance of some human-inputs-related systems and processes to be learned and applied during the process of stimulating the fledgling industrial sector or of upgrading the traditional artisan sector, into a competent export industry.

The figures given in various examples in this paper are only indicative and are not related to any country in particular.

2. LEATHER PRODUCTS INDUSTRY

The term "leather products" covers a wide range of products. Leather is the basic material for these products, but the size, construction, production methods and supplementary materials differ so much that in actual practice there are several industries covering this field.

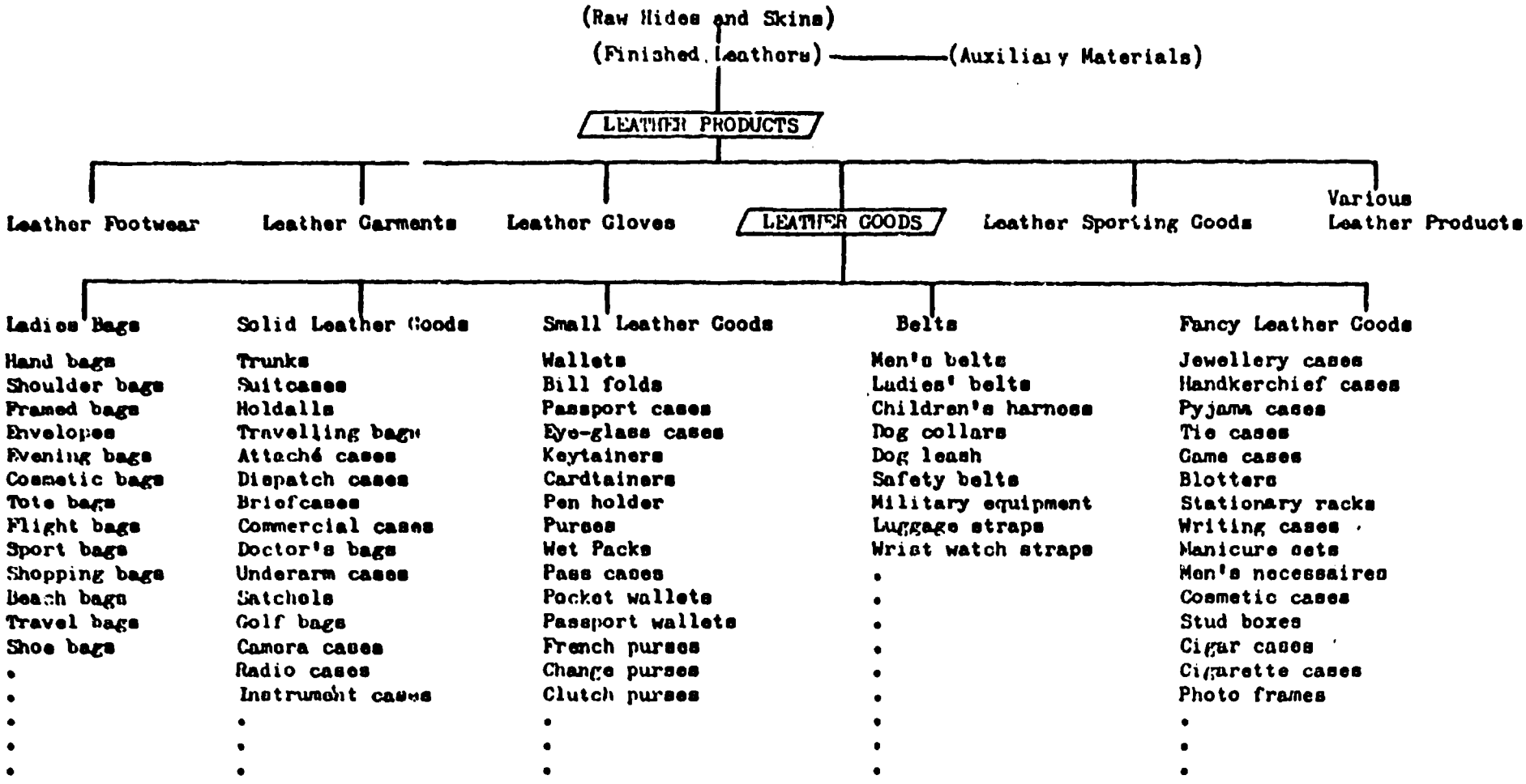
The most common types of leather products are outlined in Table 2-1. It should be noted that each product group can be divided into a number of sub-groups according to their market segment or technical characteristics.

Leather products are relatively labour-intensive products, and are produced both in modern factories and by semi-mechanized or non-mechanized home industries. This provides the possibility of a multilevel industrial structure.

A very brief introduction to the shoe industry and leather goods industry is given in the following. It must, however, be noted that there are other noteworthy industries such as the leather garments, leather gloves and leather sporting goods industries as potential added-value earners for the developing countries.

Countries which have a leather products industry and their own leather raw material base could possibly possess a strategic advantage in future years, in leather-shortage situations. It is anticipated that demand for leather will be growing faster than the supply of hides and skins.

Table 2-1, Classification chart of leather products[21]



Shoe manufacture

It is estimated that about 60 per cent of the world's total shoe consumption is made entirely of non-leather materials and that of the remaining 40 per cent, in most cases only the upper is made of leather. However, many of the production techniques available can be applied to both leather and non-leather materials.

The stages of manufacture of a common cemented-construction type of footwear are illustrated in Figure 2-1, and explained in more detail in Table 2-2.

Most leather shoes today are of cemented construction. The cut and stitched upper is lasted (formed) onto the last and attached to the insole. The sole is bonded by cement onto the lasting margin of the upper. This and some other typical bottoming constructions are illustrated in Annex 1.

The leather type of shoe (having a leather upper) production can be established in small-scale workshops, in larger workshops or in factories, as illustrated in Annex 2.

Figure 2-1, Stages in manufacture of a simple shoe of cemented construction[5]

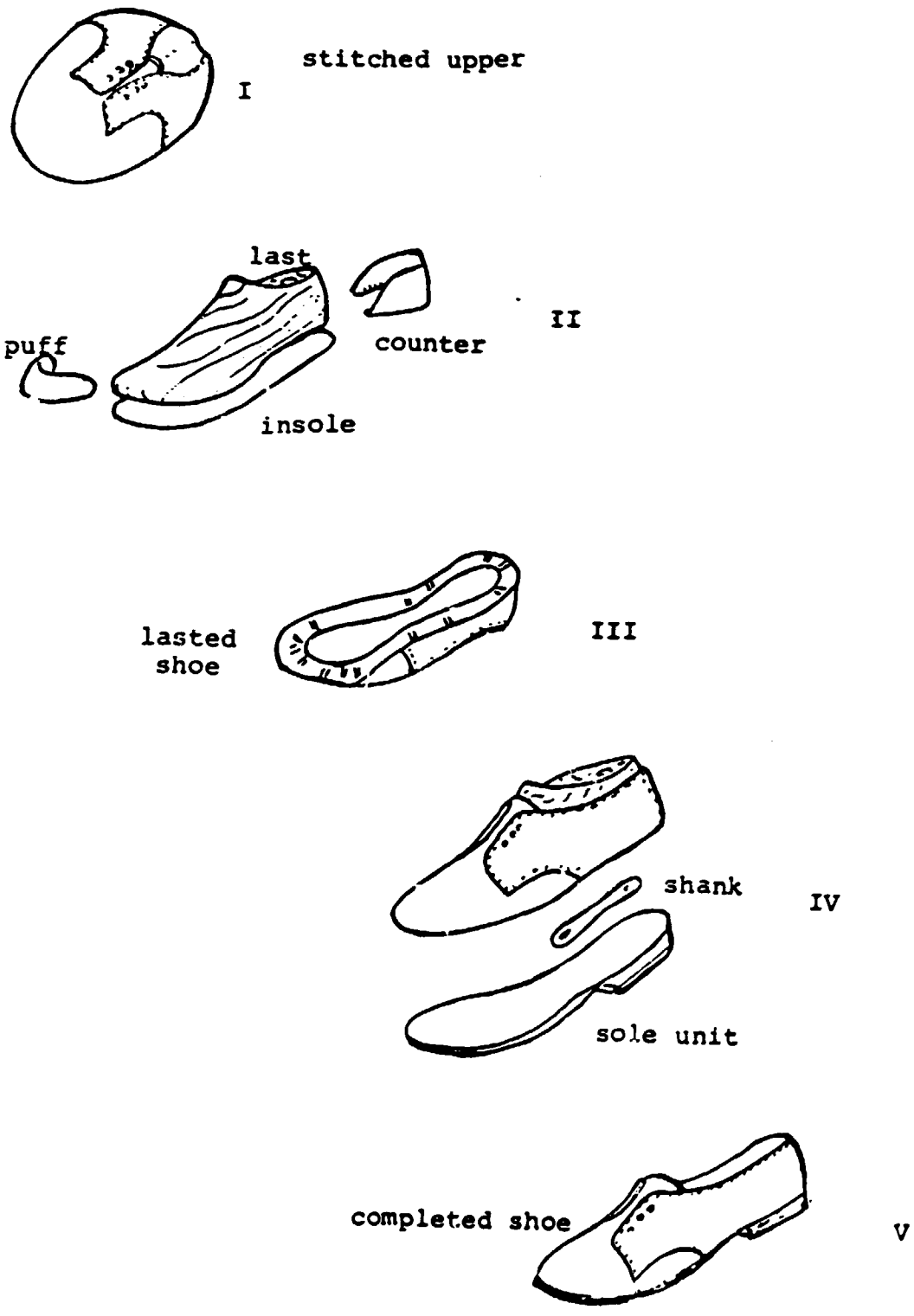


Table 2-2, Stages in the production of leather-upper with cemented-on unit soles[5]

Production stages	Op. Ref	Operations	Major materials
Upper-cutting	1.	Cutting upper components	Skins and lining materials
Upper preparation	2.	Leather splitting	
	3.	Lining marking	
	4.	Stitch marking	
	5.	Hole punching	
	6.	Sock embossing	
	7.	Skiving	
	8.	Edge folding and cementing	
Upper stitching	9.	Stitching of uppers	Threads, tapes
Stitched Upper finishing	10.	Seam reducing	
	11.	Taping	Tapes
	12.	Eyelet reinforcing	
	13.	Punching and eyelet insertion	Eyelets
	14.	Temporary lacing	String
	15.	General fitting and puff attaching	Trim, puffs
	16.	Upper trimming	
Bottom component preparation	17.	Insole preparation	Insole sheeting
	18.	Sole cementing and drying	Sole units
Making	19.	Insole tacking	
	20.	Stiffener insertion	Heel stiffeners
	21.	Upper conditioning	
	22.	Cement lasting	
	23.	Tack removal and inspection	
	24.	Heat setting	
	25.	Bottom roughing	
	26.	Shank attaching	Shanks
	27.	Bottom cementing	
	28.	Bottom filler insertion	Felt
	29.	Sole laying	
	30.	Last removal	
Upper finishing	31	Upper finishing operations and packing	Packing materials

However, the work content of various types of footwear varies considerably, so it is not possible to give exact specifications for labour, machinery and space needs without working out the exact specifications of the product mix and production rates. For space, investment and direct operative requirements, the rough guidelines given in Tables 2-3 and 2-4 should, however, give some useful indications.

Tables 2-3, Factory space requirements, including manufacturing, stores, offices etc. space[20].

Cemented footwear:

Production, pairs/day	500	1000	1500	2000
Space required, m^2/pair	2.50	2.00	1.60	1.50

Goodyear welted:

Production, pairs/day	500	1000	1500	2000
Space required, m^2/pair	3.50	3.00	2.40	2.10

California:

Production, pairs/day	500	1000	1500	2000
Space required, m^2/pair	2.00	1.60	1.50	1.40

Injection string lasted:

Production, pairs/day	1000	2000	3000
Space required, m^2/pair	1.50	1.00	0.90

Table 2-4, Needs of direct workers for different scales of production of a simple shoe of cemented construction (based on[5])

a Scale of production in 8 hours	Level of mechanization	b Total no. of direct workers	c Pairs per operative in one day a:c	d Investment in machinery $US	Production in one year per $US 1 invested a x 250days : d
8 pairs	Semi-mechanized	3	2.7	3,700	0.5 pairs/$US
40 pairs	Semi-mechanized	10	4.0	5,500	1.8 pairs/$US
200 pairs	Semi-mechanized	38	5.3	15,700	3.2 pairs/$US
1000 pairs	Mechanized	130	7.7	140,000	1.8 pairs/$US

By further mechanizing and using modern management techiques, the labour productivity and machinery utilization can be further improved, as illustrated in Annex 3. A feasibility study that includes market analysis, product requirements, production volumes needed, economic considerations, training needs, infrastructural services etc., will give more balanced information concerning choices of technology, size of production lines, and staffing appropriate to the situation.

In developing countries, it is frequently seen that buyers prefer sophisticated machinery designed for the high labour-cost First World, even though simpler and more economically feasible machinery is available for lower labour-cost conditions, still capable of producing the exportable product qualities required.

The shoe industry, using assembly-type production techiques, can buy components such as uppers, insoles, soles, heels, counters and buckles from outside sources. This has created a shoe component industry, serving the strong local export-oriented industry. Some of these component manufacturers are small, flexible workshops; others have increased their volume to serve the global market. The industry, which has a certain fashion content in most of its products, is served by its own or free-lance design services. Tanning and other related trades add up to the resources. These bustling shoe industry centres and, for that matter, other leather product centres, are successful because they operate in a competitive and dynamic environment with the necessary infrastructure.

Countries or regions that are interested in such development phenomena may, for their strategy decisions, study how some newly-developed countries have achieved this. Shoe exports could be started by exporting cheaper footwear or shoe uppers first, and then gradually upgrading the products and price levels to achieve higher added value.

The industry will not be motivated to improve its skills to an international level if it is protected by import restrictions and export subsidies for too long.

Local material inputs for shoes, depending on the country in question, can be:

- leather for uppers and bottoms,
- canvas for uppers and linings,
- rubber for soles and heels,
- wood for heels and wooden bottoms,
- leather fibre board and other fibre boards for insoles, heels and counters.

It may be economical to export most of the locally-available leather as leather or leather products, and let manufacturers import soft leather substitutes for shoe uppers, and rubber and synthetic soling materials for shoe soles for local consumption. This may first require the upgrading of animal husbandry, hides and skins and leather. Even the import or manufacture of all plastic sandals for local use may allow the leather to be left for exports.

A typical material requirement for a factory producing 200,000 pairs annually is given in Table 2-5.

Table 2-5, Estimated annual requirements of raw materials and utilities[23]

Item	Amount
Shoe upper leather	35,000 m^2
Lining leather	20,000 m^2
Rubber sheet	10,000 m^2
Fibre board	12,000 m^2
Synthetic counter material	3,500 m^2
Toe-puff thermo material	1,000 m^2
Cement, latex	10 ton
Thread and yarn	1,200 km
Steel shanks	500,000 pieces
Heel lifts	500,000 pieces
Top lifts	500,000 pieces
Electricity	80,000 kwh

Leather goods manufacture

The leather goods classification chart in Table 2-1 gives an indication of the great variety of leather goods that are made available to the market. Most of these products are made not only from leather but from other materials as well.

The production of leather goods is highly labour intensive, but some machinery is needed to reach quality requirements for export and reasonable level of labour productivity.

Many of the views presented under the heading "Shoe manufacture" for creating export industries, are valid for leather products manufacture as well.

A factory equipped to produce a few commonplace articles such as ladies' handbags, wallets and belts, with a chosen capacity of 10,000 pieces per year is described in the following tables and Figures 2-2 and 2-3.

Table 2-6, Machines and equipment[24]

Item	Number
Hydraulic clicking machine	1
Guillotine cutter	1
Strap cutter	1
Splitting machine	1
Skiving machine	1
Folding machine	1
Sewing machine	8
Work tables and chairs, shelves, hand tools and accessories	

Total FOB cost including appropriate spare parts= approximately $US 75,600

Table 2-7, Estimated annual requirements of raw materials and utilities[24]

Item	Handbags	Wallets	Belts	Total
Upper leather (m^2)	4,200	1,200	800	6,200
Lining fabric (m^2)	5,600	1,000	-	6,600
Cardboard (m^2)	2,200	-	-	2,200
Lining paper (m^2)	4,000	-	-	4,000
Locks (number)	10,000	-	-	10,000
Zippers (number)	10,000	-	-	10,000
Buckles (number)	-	-	10,000	10,000
Glue, cement (kg)	300	50	50	400
Thread (km)	240	50	60	350
Electricity (kWh)				25,000

Table 2-8, Plant size[24]

Area	Size (m^2)
Cutting department	50
Stitching department	60
Assembling department	210
Stores	180
Offices	100
Total	600

Table 2-9, Personnel[24]

Post	Number
General manager	1
Sales manager	1
Technical manager	1
Designer	1
Engineer/mechanic	1
Supervisors	4
Skilled workers	16
Unskilled workers	32
Office workers	5
Total	62

Figure 2-2, Process flow sheet for belt production[24]

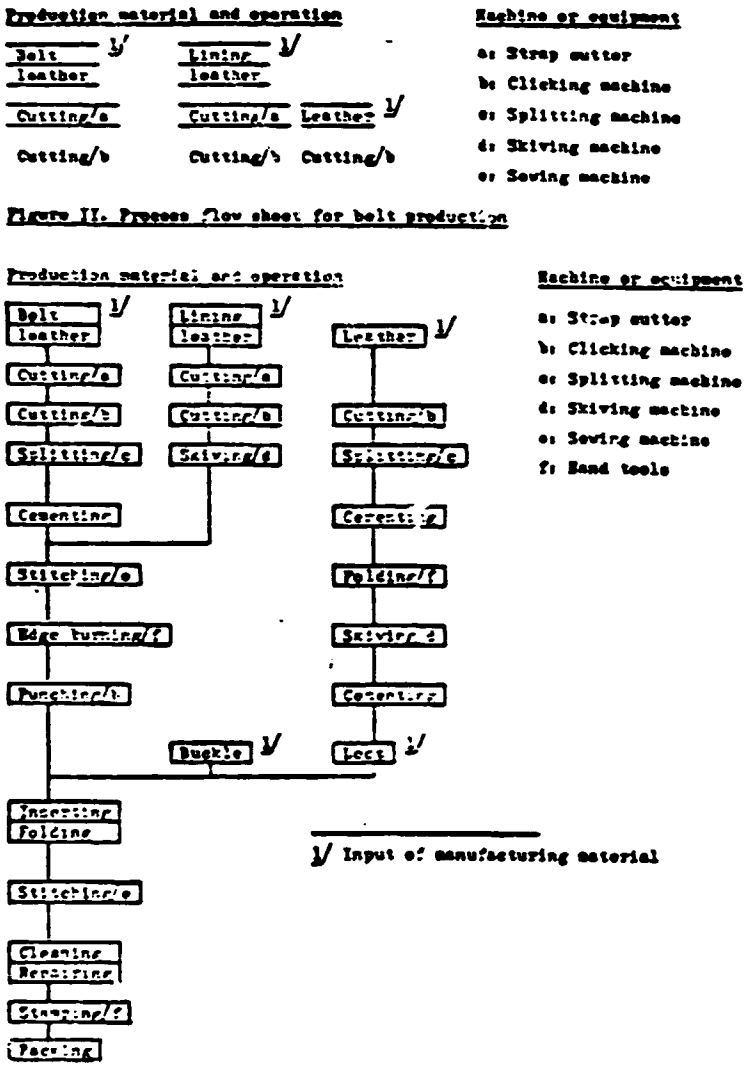
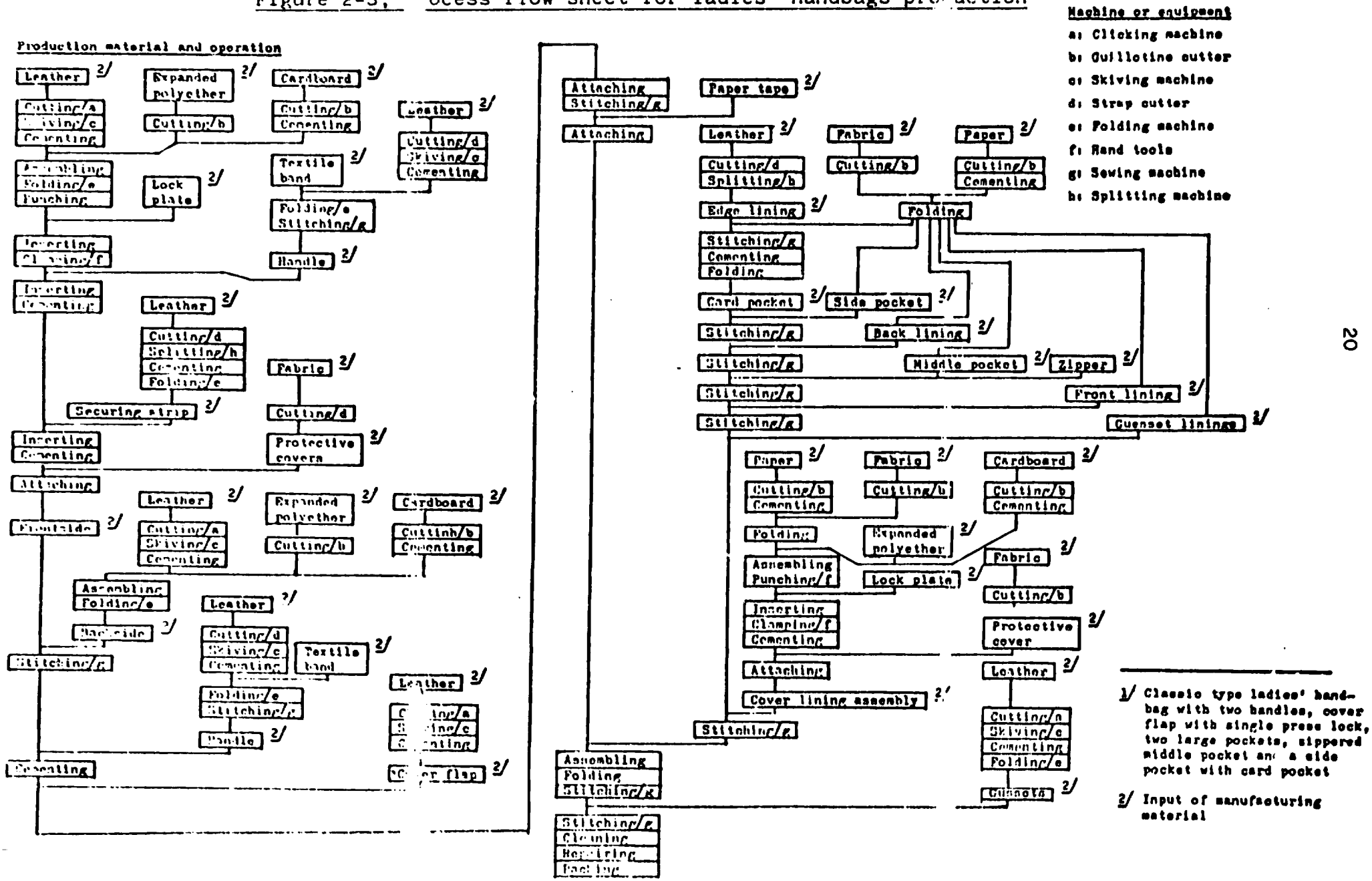


Figure II. Process flow sheet for belt production

Figure 2-3, ocess flow sheet for ladies' handbags pro uction[24]



3. CREATING ADDED VALUE

Definition of added value

Added value is the difference between the sales income achieved by an enterprise and the cost of its materials purchased:-

	Sales income
-	Cost of materials purchased
=	Added value

Added value may also be expressed as:-

	Sales income
-	Cost of materials, components and services purchased
=	Added value

Interest groups and added value

This latter example gives an indication as to how an enterprise, by utilizing its skills and capital invested, has produced added value, to the benefit of its Interest Groups, as discussed in the following example:-

	Sales income	40,720
-	Cost of materials, components, services purchased	27,960
=	Added value	12,760

The enterprise has distributed the produced added value of 12,760 as follows:-

Wages & salaries to workers & staff	9,775	76.6 %
Interest on loans to creditors	1,174	9.2 %
Depreciation etc.; to Enterprise itself	778	6.1 %
Taxes etc. to State	842	6.6 %
Profit to owners	191	1.5 %
	12,760	100.0 %

Increase of added value

The increase of added value is a basic prerequisite for the material development of any country. The principle ways of achieving this are:-

- by increasing sales income;
- by producing a larger volume of goods;
- by upgrading products and services in order to achieve higher sales prices;
- by reducing costs by improving the yield of materials, land, capacity of buildings, productivity of machinery and equipment and the efficiency of human resources.

Cost efficiency and added value

The more a sector produces in terms of added value, the more useful that sector is said to be to the country as a whole. However, this needs to be qualified, in that enterprises also need to be cost-effective. In Table 3-1, the cost-efficiency of three enterprises is compared by expressing each enterprise's costs as a percentage of added value. The added value for this purpose is expressed as the difference between the sales income and the cost of materials.

Table 3-1, Cost absorption of added value

	All Wages, Salaries	Production Overheads	Admin. Overheads	Marketing Overheads	Financial Overheads	Total of All Costs
	%	%	%	%	%	%
Enterprise 1	76	10	9	2	9	106
Enterprise 2	73	8	8	4	4	97
Enterprise 3	81	2	5	1	5	94
Average	77	7	7	2	6	99

Enterprise 1 is a big mechanized shoe factory with a very large variety of products, supplying its customers from stock. Enterprise 2 is somewhat smaller, aggressive mechanized factory supplying high-demand, made-to-order products, some of these for export. Enterprise 3 is a semi-mechanized workshop which has created flexible responses to local customer needs.

The enterprises are rated in terms of overall efficiency: Enterprise 3, Enterprise 2 and Enterprise 1 (94%, 97% and 106% respectively). Enterprise 3 has shown the best results; Enterprise 1 is by far the worst of the three.

Looking at these three factories, Enterprise 1 has higher than average overheads, Enterprise 2 has slightly higher than average production and administrative overheads and is well above the average in marketing overheads, whereas Enterprise 3 is higher in wages and salaries. The fact that these firms differ in structure may mean that it is not possible to compare them directly, but at least the study may lead to some development ideas for each firm and for the sector as a whole.

A larger and better-utilized amount directed towards product development, aggressive marketing, technology, information and decision-making systems, systems in the working environment of the firms etc., may benefit the overall result. In addition to this, seeking out ways of cutting unnecessary costs will also be of importance in achieving this aim.

Utilization of assets in added value

Another useful method is to study the utilization of assets as added value produced for each $US 1 invested. Table 3-2 compares the utilization of machinery and equipment in various types of shoe factories.

Table 3-2, Utilization of fixed assets in machinery and equipment in added value terms

Shoes with leather uppers, cemented bottom construction	Added value produced in one year a	Capital invested in machinery and equipment b	Added value produced for each $US 1 invested $\frac{a}{b}$
A. Highly mechanized 1000 pairs/8 hrs. 80 operatives 12.5 pairs/operative day	1000 x 250 days x $US 3.00 = $US 750,000	$US 362,000[23]	2.0
B. Mechanized 1000 pairs/8 hrs. 120 operatives 7.7 pairs/operative day	1000 x 250 days x $US 3.00 = $US 750,000	$US 140,000[5]	5.4
C. Mechanized 200 pairs/8 hrs. 38 operatives 5.2 pairs/operative day	200 x 250 days x $US 3.00 = $US 150,000	$US 15,700[5]	9.6
D. Semi-mechanized 40 pairs/8 hrs. 10 operatives 4.0 pairs/operative day	40 x 250 days x $US 3.00 = $US 30,000	$US 5,500[5]	5.5

Assuming each of the factories is producing $US 3.00 in added value per one pair of shoes, Factory C is utilizing its capital invested in machinery to best effect. It is, however, from a broader point of view, advisable to extend the study to include capital invested in land and buildings and in inventories, in both local and foreign currencies.

Incremental nature of added value

The final method is to study the incremental nature of added value. One may envisage an African operation[1], employing virtually 100 per cent domestic materials:-

Sales income				$US 10.00
Materials	Domestic	Imported	Total	
2 ft^2 upper leather	$US 4.00			
1 ft^2 lining leather	1.20			
450 g sole leather				
450 g heel/insole leather	2.00			
Domestic	7.20		$US 7.20	
Threads and eyelets		$US 0.10	0.10	
			7.30	$US 7.30
Added value				$US 2.70

Added value increment on domestic materials =

$$\frac{\text{Added value}}{\text{Domestic materials}} \times 100 =$$

$$\frac{2.70}{7.20} \times 100 = 38 \text{ per cents}$$

Trade balance and local material input

The added value increment of 38 per cent will give a false picture if the leather at $US 7.20/pair could be exported. We will suppose that a production level of 100,000 pairs is planned. The leather export then could be:

100,000 pairs x $US 7.20 = $US 720,000. The import content for the shoe production will be:

100,000 pairs x $US 0.10 = $US 10,000.

In order to reach the export/import balance, the volume of shoes to be exported would have to be:-

$$\frac{\text{possible leather export} + \text{planned material import}}{\text{sales income per one pair}} =$$

$$\frac{\$US\ 720,000 + \$US\ 10,000}{\$US\ 10.00} = 73,000 \text{ pairs}$$

Production that could by this simplistic calculation be allowed to local consumption is:

	100,000 pairs of total production
-	73,000 pairs to export
	27,000 pairs to local consumption

If the aim is higher mechanization, it normally results in higher export content because many of the materials, components, spare parts, services and energy will have to be paid for in foreign currencies. Imported machinery and inventories will also tie up capital in foreign currencies. In the present situation, only a very carefully conducted feasibility study could provide the information the decision-makers need.

4. IMPROVING LOCAL INPUTS IN TERMS OF MANAGERIAL CAPACITIES

4.1. Purpose of development

The development means increasing the capacity of people to influence their future. It means that projects and programmes not only need to accomplish physical and concrete changes, but need to do so in such a way that people have a greater capacity to choose and respond to these changes. It means that planned change has to be concerned with the potential of individuals and with the inviolability of their person[10].

Development encompasses a concern with production and growth, but it has much broader meaning. It includes the capacity of the nation to develop political and social institutions responsible for production and allocation, but capacity also includes a concern for people's self-esteem, their ability to invest themselves in caring about and shaping their own future. Development therefore has both a micro and a macro aspect: it involves changes in the individual and the community as well as the nation[15].

4.2 Need of management systems and process

Much too often, after the factories have been built, the value added envisaged has not materialized because of the great complexity of situations, which have to be faced by the larger enterprises in particular. Both private and public organizations must develop processes for research and learning as well as those for decision-making. This will focus great attention on management systems as a means of enhancing local inputs in terms of man-power services.

Traditionally, management theories were primarily closed-system views concentrating on the internal operations of the organization. The open system views of today are also concerned with the interrelationships between the organization and its environment, and suggest more uncertain, less deterministic patterns of internal and external relationships with the organiza-

tion. This concept studies the organizations as a socio-technical system with a structuring and integration of human activities around various technologies directed towards achieving certain objectives. The system has components of environmental supra-systems as well as technical, structural, psycho-social goals and values systems[9].

The emergence of the systems approach provides a basic framework for management development, a basis which allows the integration of knowledge from a wide variety of specialized fields[9]. Managers ability to solve problems will be based more on their skills in processing information and ability to assess the framework they use in evaluating given situations[25]. For this reason, some common management systems, appropriate for the leather products industry, will be discussed, bearing in mind that the level of uncertainty in management decisions would appear to be greatest at the level of interrelationships with environmental systems (market, etc.). This affects the flexibility and co-ordination needs of the complete systems set-up. The systems may be simple, as indeed greater sophistication may only lead to confusion and inflexibility.

The management systems are to be understood as tools for creative, interactive management processes, for responding to the problems and opportunities arising.

4.3 Profit planning

In setting profit objectives, management needs to harness budjeting, marketing planning, production planning, results oriented management and other planning systems to work out a budget, a well thought out operational profit plan.

Direct costing

Direct costing approach can be useful means in working out the plan, because it charges products with only those manufacturing costs that vary directly with volume, as illustrated on the following:-

Sales
Less Variable cost
= Contribution margin
Less Fixed cost
Operating income

A contribution plan for three products to be sold and manufactured is shown in Table 4.3-1. The approach allows one to simulate by sales and production volumes of the products, sales prices and costs in order to reach the profit target.

If the inventories are fluctuating, the beginning and ending inventories are taken into account as on the following:-

Sales
Less Variable cost
Plus Beginning inventory
Less Ending inventory
Contribution margin
Less fixed cost
Operating income for the period

Return on capital employed and the effects on planned programs for profit

The capital shortage, the cost of capital and the alternative investment possibilities has throughout the world focused management's attention on the return on the capital involved in the business. Table 4.3-2 illustrates the effect on planned programmes for both profit and return on capital. The management systems that one can use as tools for these planned programmes are mentioned in Table 4.3-3.

Table 4.3-1, Contribution plan

Product	a Volume of production	b Sales value of one piece (Net)	Variable cost per piece			Contribution margin per one piece	Contribution margin of the plan
			c Material	d Labour	e Other	b-c-d-e	a x f
	PIECES	$US	$US	$US	$US	$US	$US
AA	25,000	6.00	4.20	0.50	0.20	1.10	27,500
DD	4,000	12.00	7.00	0.60	0.20	4.20	16,800
GG	10,000	9.00	6.70	0.45	0.10	1.75	17,500
						Total contribution margin	61,800
						Less budgeted fixed cost	47,000
						Less profit target	14,000
						Favourable (+)	800
						Unfavourable (-)	

Table 4.3-2, Effect ... planned programmes for profit and ret...on on capital involved adapted 41

	PRESENT		CHANGE BY VOLUME	CHANGE BY COST REDUCTION	ASSET CUR-TAILMENT	FUTURE	
ASSETS:-							
Inventory	900,000				- 300,000	600,000	
Other current assets	300,000		+ 200,000			500,000	
Non-current assets	800,000			+ 80,000		880,000	
a. Total assets	2,000,000					1,980,000	
PROFIT:-							
b. Sales billed	2,500,000	100.0 %	+ 500,000			3,000,000	
Manufacturing cost	1,950,000	78.0 %	+ 330,000	- 450,000		1,830,000	61.0 %
Marketing and admin. expenses	300,000	12.0 %	+ 60,000	+ 90,000		450,000	15.0 %
Total cost and expense	2,250,000	90.0 %				2,280,000	76.0 %
c. Operating profit	250,000	10.0 %				720,000	24.0 %
RETURN ON CAPITAL EMPLOYED:-							
% of profit to sales		10.0 %					24.0 %
Return on capital employed ($\frac{c}{a}$ %)		12.5 %					36.4 %
Value of assets per $US 1,000 sales per year, ($\frac{a}{b} : 1{,}000$)		800					660

Table 4.3-3, Systems used in a planned programme for a higher profit and return on capital involved

EFFECT	SYSTEMS USED
(1) Inventory (material stock, work-in-progress, finished goods stock) reduced	- Marketing planning - Production planning - Quality control - Purchasing - Work study - Payment by results
(2) Non-current assets increase = purchase of machinery to clear bottlenecks	- Work study - Production planning - Technology evaluation - Purchasing
(3) Sales volume increased	- Marketing planning - Product development - Production planning - Work study - Quality control - Payment by results
(4) Manufacturing cost reduced	- Product development - Work study - Production planning - Quality control - Payment by results - Marketing planning - Profit planning
(5) Marketing costs increased, as input to achieve higher sales volume	- Marketing planning - Payment by results

4.4 Production planning and control

Objective of production planning and control

The objective of production planning and control, inter-related with other systems, is to ensure that a factory will:-

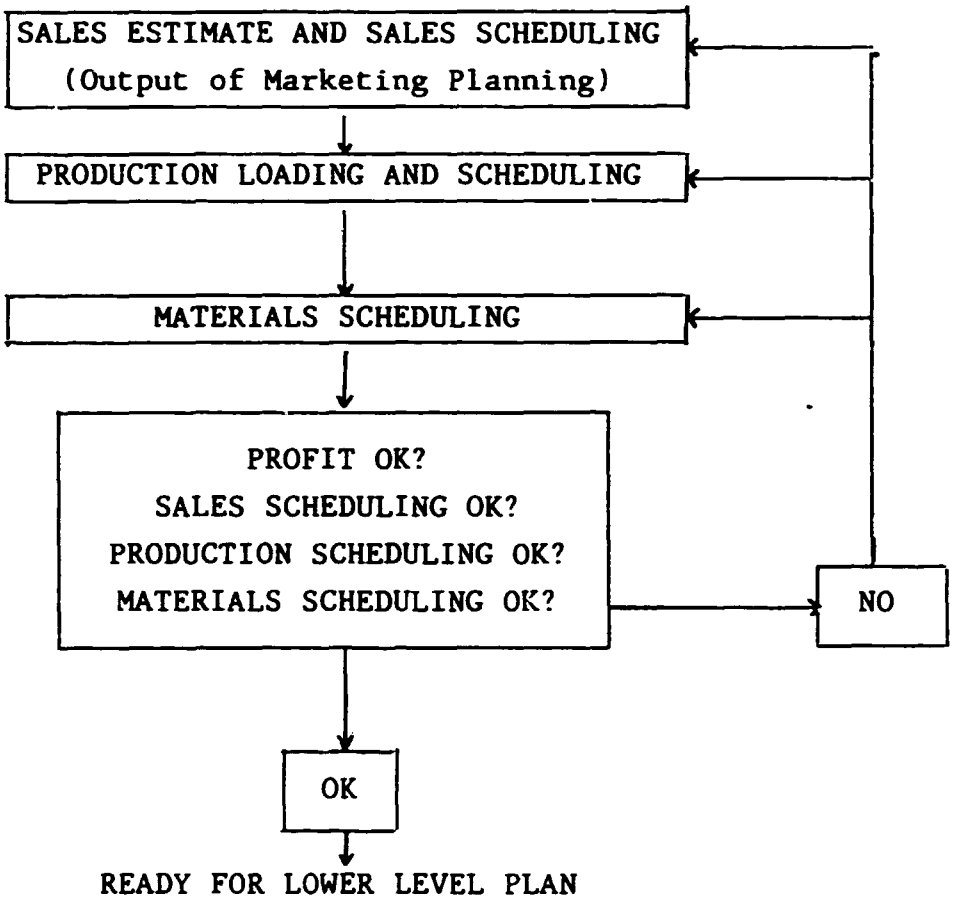
- produce the right products in sufficient quantities,
- work to shedule regarding delivery dead-lines,
- utilize the capacities, including machinery and tools and labour capabilities and skills, to sufficient performance,
- reach the break-even point in profit requirements and
- keep inventories at a reasonably low level.

The absence of sufficient production planning and control activities easily leads to delivery dates not being met, dissatisfied customers and to low overall performance.

Basic model of production planning and control

The system is a linking mechanism for the production planning team for attaining the objectives. The team is composed of people from the general management, marketing, purchasing, production maintenance and finance sections of the enterprise. The decisions are arrived using the basic model shown in the Figure 4.4-1.

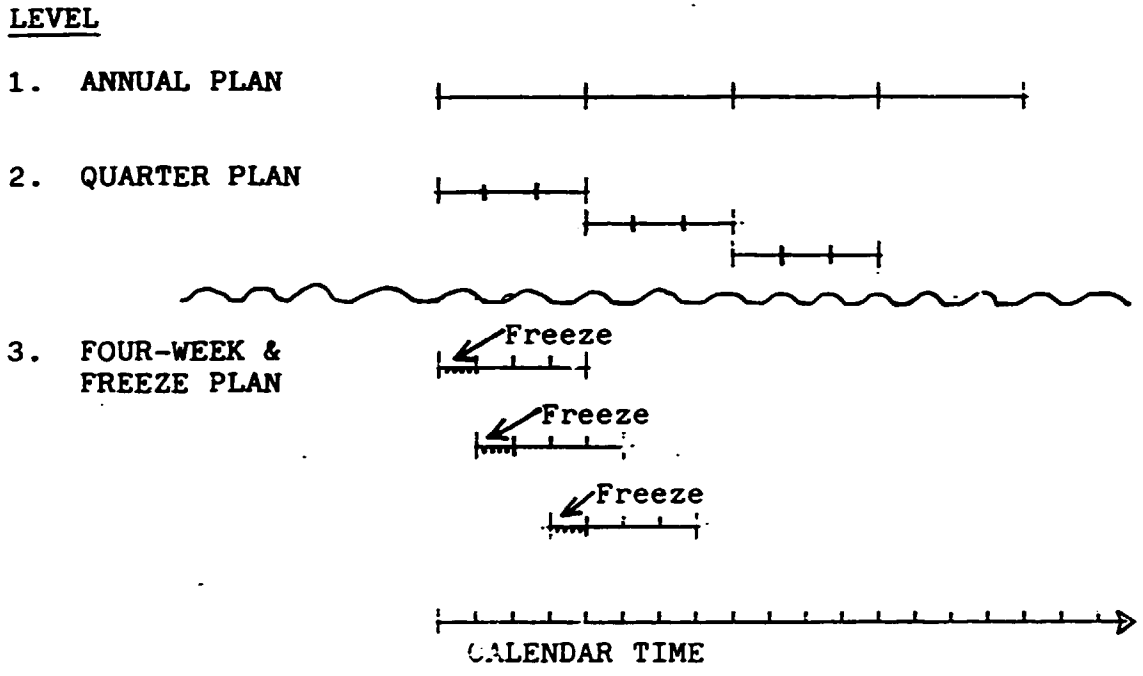
Figure 4.4-1, Basic model of production planning and control



Planning levels

In order to deal with forthcoming environmental or production-related uncertainties the planning is carried out at time-span related levels, illustrated in Figure 4.4-2. Each level is a plan in itself, lower level plans trying to follow goals of higher levels, but modifying the plans to market demand changes, material supply prospects, labour shortages, machinery breakdown etc.

Figure 4.4-2, Planning levels



Each planning level is worked out according to the basic model, in Figure 4.4-1.

The spans, breakdown into blocks of time and frequency of planning decisions are illustrated in Table 4.4-1.

Annual plan is iterated with budgeting (profit planning) to ensure that budgets are based on concrete plans.

Production freeze is prepared one week before production by making certain that recources such as

- materials and components,
- equipment,
- machinery, and
- personnel

are available when production starts.

Table 4.4-1, Production planning time spans, time breakdowns and planning frequencies

LEVEL	TIME SPAN	BREAKDOWN INTO BLOCKS	PLANNING FREQUENCY
Annual planning	1 year	4 quarters	Once a year
Quarterly planning	1 quarter	3 groups of weeks	Once a quarter
4-week planning	4 weeks	1 week	Once a week
Freeze	1 week	5 (or 6) days	Once a week

Capacity

Data regarding capacity is required for loading of machinery, tools and manpower services. This capacity is expressed either in terms of time:-

Manual capacity = 8 hrs/day = 480 min/day

Machine capacity = 8 hrs/day = 480 min/day (8 hour day),

or in terms of production:-

$$\text{Capacity} = \frac{480 \text{ min}}{\text{Standard operation time}} =$$

$$\frac{480 \text{ min}}{0.45 \text{ min/pair}} = 1{,}067 \text{ pairs in 8 hours at 100\% performance}$$

Because of absenteeism, machinery breakdowns etc., the 100 per cent performance is not normally attainable. To cover this aspect, one can express capacity of production at lower performance levels as:-

- Capacity at 80% performance = 0.80 x 1,067 pairs/8 hrs
  = 845 pairs/ 8 hrs
- Capacity at 60% performance = 0.60 x 1,067 pairs/8 hrs
  = 640 pairs/ 8 hrs

Loading

Loading of a factory or a manufacturing department takes into account both the intended product mix and the capacities involved in the production as is shown in Table 4.4-2.

DEPARTMENT: CUTTING

DATE:

PLAN: III QUARTER 1986 Table 4.4-2, Loading

BLOCK: WEEKS 27-39

Product Mix		Operation or Operation Group					
Product	Pairs/ 8 hrs	Upper cutting (machine)	Lining cutting (machine)	Upper cutting (Hand)	Lining Cutting (Hand)	Stitch, mark edge ink etc.	TOTAL
A	420 x	1.24 = 520	0.84 = 353			0.30 = 126	
B	260 x	1.43 = 372	0.54 = 140			0.76 = 198	
C	80 x			2.60 = 208	1.20 = 96	0.42 = 34	
a. Loaded pairs Total 760		892	493	208	+ 96 = 304	358	2,047
b. Performance previously attained		0.95	0.90		0.95	0.75	
c. Loading corrected to performance a:b		938	548		320	477	
d. Capacity available à 480		960	480		480	480	2,400
Operatives available Machines available		2 2	1 1		1 by hand	1 by hand	
e. Capacity idle (-) Capacity overloaded (+) c - d		22	68		160	1	
Loaded performance a:d		0.93	1.03		0.63	0.75	0.85

Table 4.4-3, Material requirement plan

4-WEEK MATERIAL REQUIREMENT PLAN FOR WEEKS 02, 03, 04 AND 05 / 1986

ITEM	UNIT	TOTAL OUTSTANDING PURCHASE ORDERS NOW	STOCK LEVEL NOW	QUANTITY ON HAND FOR THIS PLAN	WEEK 02			WEEK 03			WEEK 04			WEEK 05		
					DELIVERY	REQUIREMENT	BALANCE 3 + 4 - 5	DELIVERY	REQUIREMENT	BALANCE 6 + 7 - 8	DELIVERY	REQUIREMENT	BALANCE 9 + 10 - 11	DELIVERY	REQUIREMENT	BALANCE 12 + 13 - 14
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Box smooth upper leather, black	ft^2	10,000	500	300	500	600	(200)	(1,000)	800	400	(1,200)	600	1,000	-	1,200	(200)

Critically small safety stock ?

Planned delivery from tannery critical ?

Larger deliveries to be negotiated, otherwise the plan will not be OK.

The standard times for lining cutting by machine are 0.84 min/pair for product A, and 0.54 for product B. Total standard minutes loaded for the operation is 493 minutes. The performance earlier attained has been 0.90: for this the loading has been corrected to 548 minutes/8hrs. As it turned out the capacity was overloading by 68 min/8 hrs. The problem can be overcome by letting the hand lining cutter help the machine lining cutter by hand-cutting the work which is normally cut by machine. Overall performance of the department became 0.85.

Material scheduling

Material scheduling is the next stage in the production planning process. The requirements for main materials such as upper leather, unit soles etc., can be affected by the product mix intended for the plan. A suitable material requirement calculation method for such a situation is shown in Table 4.4-3.

For other materials, such as cements and tacks, consumption of which is not greatly affected by the product mix, one can project the requirements on previous consumption.

Assessment of profitability of production plan

The assessment of profitability for the production (and sales) plans is carried through as was earlier illustrated in Table 4.3-1.

Production bottlenecks which cannot be opened may affect the profit. Table 4.4-4 studies this problem.

Table 4.4-4, Contribution margin in a bottleneck situation

Product	a Contribution margin/piece	b Standard operation time of a bottleneck operation	Contribution margin per one second a : b
	$US	Sec./piece	$US
AA	1.10	20	0.055
BB	4.20	86	0.049
CC	1.75	24	0.073

Assuming there are no bottlenecks, product BB is best, contributing $US 4.20/piece. However, in case of bottlenecks, product CC becomes the best, contributing $US 0.073/bottleneck second.

The plan, whether annual, quarterly or weekly, has now been worked through, and by an iteration with all people concerned, the demand for sales, production and scheduling, and that for profit have been met. Finally, production will start at freeze-plan level. The system by which the products are followed through the production departments sequence is called "Progressing".

Progressing

Progressing starts by dividing the freeze plan into one-day plans, batch quantities and case lots; for example:

Freeze plan for one week	=	6,000 pairs
Day plan = 6000:5	=	1,200 pairs
Batch quantity = 1200:10	=	120 pairs
Case lot quantity = 120:10	=	12 pairs

Related systems

Marketing planning, product development, sales order processing, purchasing, maintenance planning, financial planning, work study, quality control etc., are interactive systems to the production planning and control. If these do not function correctly and smoothly, production planning objectives will not be met.

4.5. Work study

In recent years, throughout the industrialized world, there has been growing understanding of improving productive efficiency (i.e., productivity). In addition to this, there has been a growing awareness that only through economically healthy industrial organizations can the progressive national prosperity, which will vitally affect the standard of living in every nation, be achieved[11].

Productivity and the techniques of work study

Productivity in the broadest sense is the quantitative relationship between that which is produced and the resources which are used; in other terms:-

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

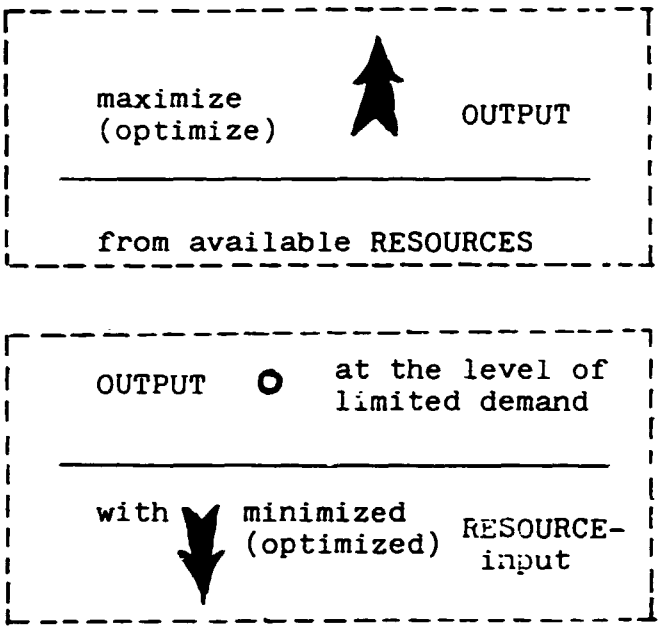
The fact is that in developing countries, a large part of the raw materials for the industry are imported. Even locally-available resources may not have been utilized to best advantage.

This situation calls for improved methods of eliminating wastage and at the same time, utilizing locally-available resources more fully.

Human resources for research and development to improve processes and procedures are always limited. Too often however it is found that technologists are in fact performing all sorts of other tasks, not paying attention to productivity improvement. This can be improved by adequate supply of technologists, trained and motivated not only in technological but also in productivity-improvement methods.

Few things determine the future of the industry as directly as the way it spends its money. The economic use of resources require managers and workers of all levels to follow the rule as illustrated in Figure 4.5-1[19].

Figure 4.5-1, Utilization of resources[19]



The resources are man, land, buildings, materials, machinery, money.

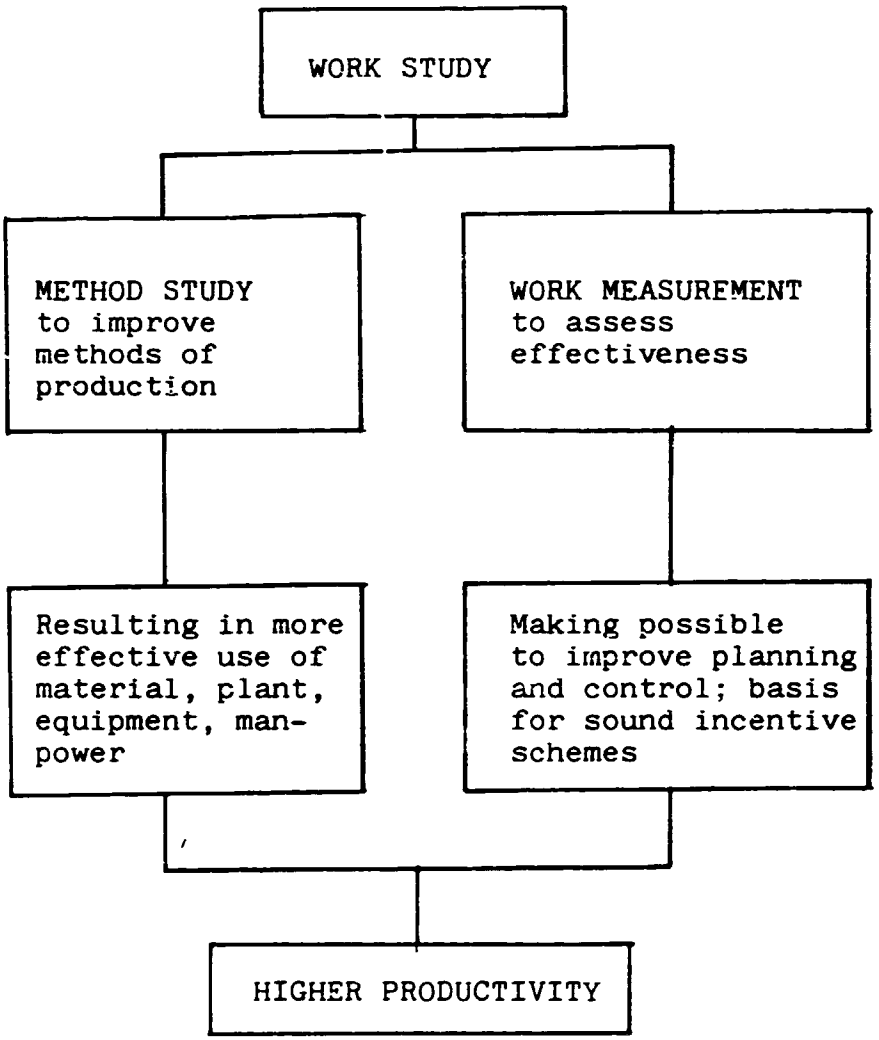
Work study is one of the most effective management tools for improving productivity of:-

land and buildings,
materials,
machinery and equipment and
manpower services.

The work study finds application in each of these fields.

Too often it has been the practice to accept opinion in place of fact, making decisions on the basis of beliefs rather than upon what was known to be true. The function of work study is to obtain facts, and to then utilize those facts as a means of improving the situation at hand. The main techniques of work study are shown in Figure 4.5-2.

Figure 4.5-2, Techniques of work study[11]



The techniques of work study, in both the method study and the work measurements, are primarily means of recording in convenient form the use to which an organization's resources are being or may be put regarding provision of goods and services.

Method study

Method study, fundamentally, involves the breaking down of an operation or procedure into its important elements and their systematic analysis. Hence, those elements which do not hold up to analysis are eliminated or improved. In other words, the method study contributes to improving efficiency by getting rid of unnecessary work, avoidable delays and other forms of waste. This is done by:-

1. Improving lay-out and design of factory, plant and work place.
2. Improving working processes, both in production and administration.
3. Improving use of materials, energy, plant and equipment, and manpower.
4. Improving the working environment.
5. Improving the design or specification of the end product.

There is a simple framework for the basic procedure of method study:

SELECT	-	the work to be studied
RECORD	-	all relevant facts
EXAMINE	-	those facts critically
DEVELOP	-	more economical methods, taking into consideration work safety and ergonomic requirements.
INSTALL	-	that method as standard
MAINTAIN	-	that standard practice.

Systematic recording of working practices often highlights problem areas with potential for improvement. Some of these are:

1. Poor use of materials, labour or machine capacity; high scrap and reprocessing costs;
2. Bad lay-out or working methods, resulting in unnecessary movement of materials, equipment and labour;
3. Problems in information processing and decision-making;
4. Existence/creation of bottlenecks;
5. Inconsistency in quality;

6. Highly strenuous work or health risks;
7. Excessive overtime.

For better visualization of problems and for the subsequent critical analysis, recording techniques such as charts, diagrams and standard data systems are used in the method study.

The outline process chart in Figure 4.5-3 is of use in eliminating unnecessary handling and movement. Another type of chart is the multiple activity chart, shown in Figure 4.5-4. By instructing operatives to work while the machine is working, idle times can sometimes be considerably reduced. In the third example in Table 4.5-1, the work study man has used MTM-1 (Methods Time Measurement 1) standard data for recording and analysis. With the help of the production head, the maintenance man and the operative, the jig in use was improved for easier positioning of heels, enabling two heels to be processed at a time. The handling distances were as well somewhat reduced.

Figure 4.5-3, Outline process chart

Original method:

Check quality of heels

Have heels temporarily stored

Transport heels to heel covering area

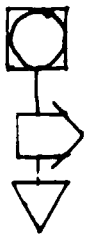
Have heels temporarily stored

Check quality of heels and fill the form

Transport to heel covering operation

Cover the heels

Improved method:



Check quality and quantity, and fill the form

Transport to heel covering area

Have heels temporarily stored.

Figure 4.5-4, Multiple activity chart, man - machine

Original method:

MIN	MAN	MACHINE
0.20	Removes product	
0.40	Measures dimension	Machine idle
0.60	Files edge	
0.80	To box, take new	
1.00	To machine	
1.20		
1.40	Man idle	Machine working
1.60		
1.80		

Improved method:

MIN	MAN	MACHINE
0.20	Removes product	
0.40	New to machine	Machine idle
0.60	Files edge	
0.80	To box, take new	Machine working
1.00	Man idle	
1.20		

Machine and man-time saving = $100 \times \frac{1.8 - 1.2}{1.8} = 33\%$

Table 4.5-1, MTM-1 analysis

Present working method:-

LEFT HAND	SYMBOL	TMU	SYMBOL	RIGHT HAND
Reach for heel	R50B	18.4		
Grasp heel	G1A	2.0		
Move to other hand	M50A			
Transfer to other hand		5.3	G3	
		16.8	M35C	Move to jig
		9.1	PISSE	Position to jig
		2.0	RLI	Release hand
		8.5	FM	Press pedal by foot
		62.5		

LEFT HAND	SYMBOL	TMU	SYMBOL	RIGHT HAND
Reach to one heel	R40B	15.6	R40B	Reach to other heel
Grasp heel	G1A	2.0	G1A	Grasp heel
Move to jig, against guide	M40A	15.8	M40A	Move to jig, against guide
		8.5	FM	Press pedal by foot
		41.9 /2 = 21.0		

$$\text{Man-time saving} = \frac{62.5 - 21.0}{62.5} \times 100 = 66\%$$

(TMU = Time Measurement Unit = 0.00001 hour)

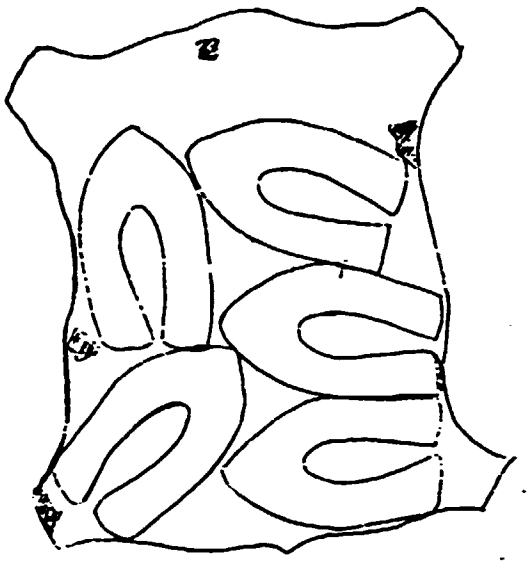
The examination is in the form of questions, the primary questions being those indicating the facts and the underlying reasons, the secondary questions seeking to establish suitable alternatives to existing or previously proposed methods.

PURPOSE	:	What is achieved? Is it necessary? Why?	What else could be done?
MEANS	:	How is it done? Why that way?	How else could it be done?
PLACE	:	Where is it done? Why there?	Where else could it be done?
SEQUENCE	:	When is it done? Why that time?	When else could it be done?
PERSON	:	Who does it? Why that person?	Who else could it be done by?

By using the examination technique as a tool, having workers, supervisors, technologists, managers and other persons with expertise on problem under study one can expect development ideas not only on man and machinery productivities, but also in material productivities. The illustrations on following figures on material productivity improvements are typical in leather products industries. One should note the importance of material savings, knowing the fact that the material cost in this industry is 60 - 80% of total cost.

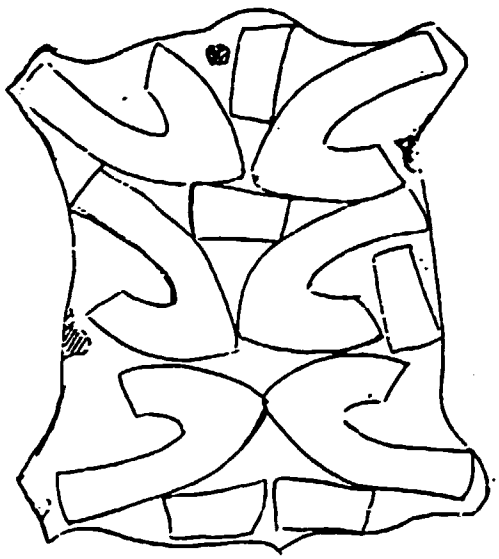
Figure 4.5-4, Economizing in skin cutting

Original method:



Material productivity = $\frac{2.5 \text{ pairs}}{1 \text{ skin}} = 2.5$

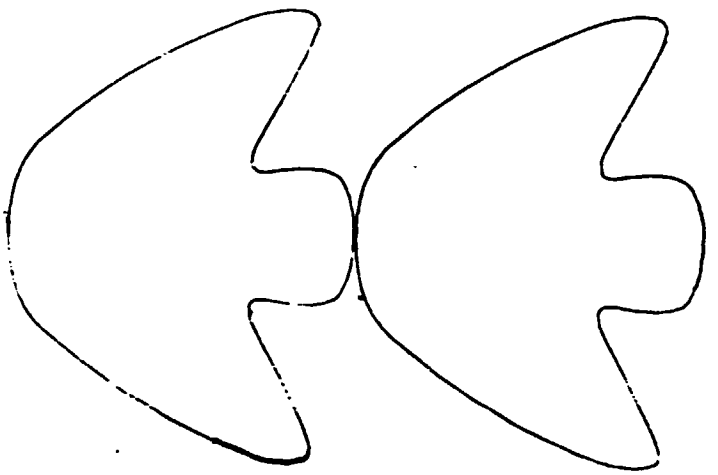
Improved method:



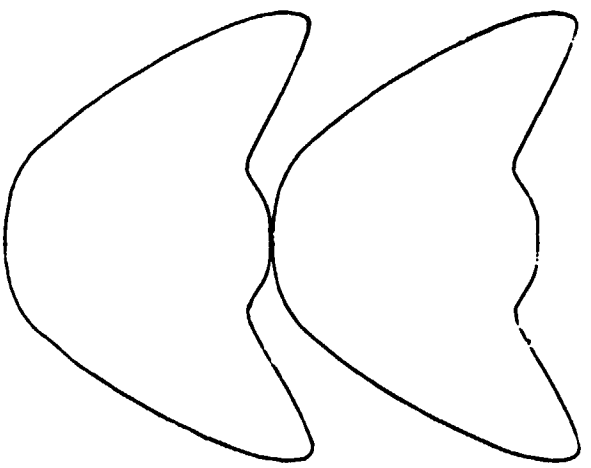
Material productivity: $\frac{3 \text{ pairs}}{1 \text{ skin}} = 3.0$

Figure 4.5-5, Economizing in vamp pattern cutting

Present pattern:



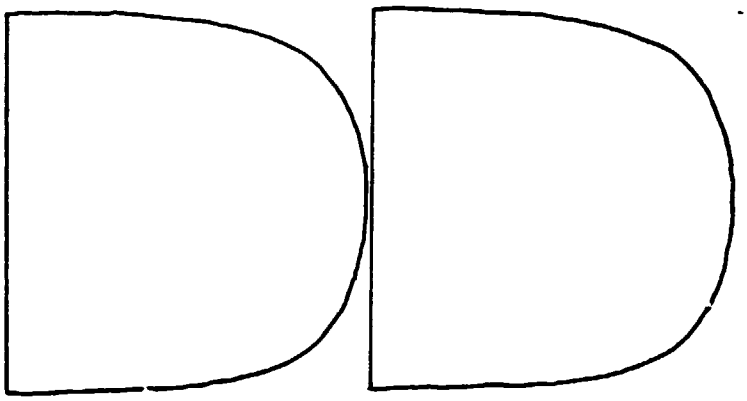
Improved pattern:



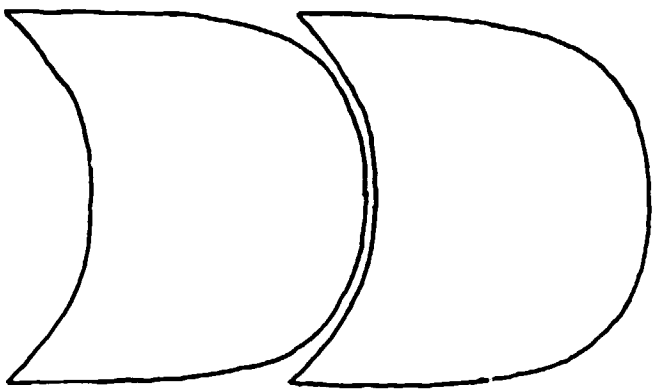
The tongues can be cut of pieces of cut-off scrap, which would otherwise be thrown away.

Figure 4.5-6, Heel designing

Original design:



New design, with saving of 12%:



Some aspects of economizing on materials will be further elaborated under the headings of Quality control and Payment by results.

Method study and work measurement is also successfully used to improve administrative procedures in enterprises, government agencies and elsewhere. It is, in this context, referred to as Organization and methods.

The second part of Work study is the work measurement which will be discussed in the following.

Work measurement

Work measurement is the term for a family of techniques for measurement work. The Work measurement is used for:-

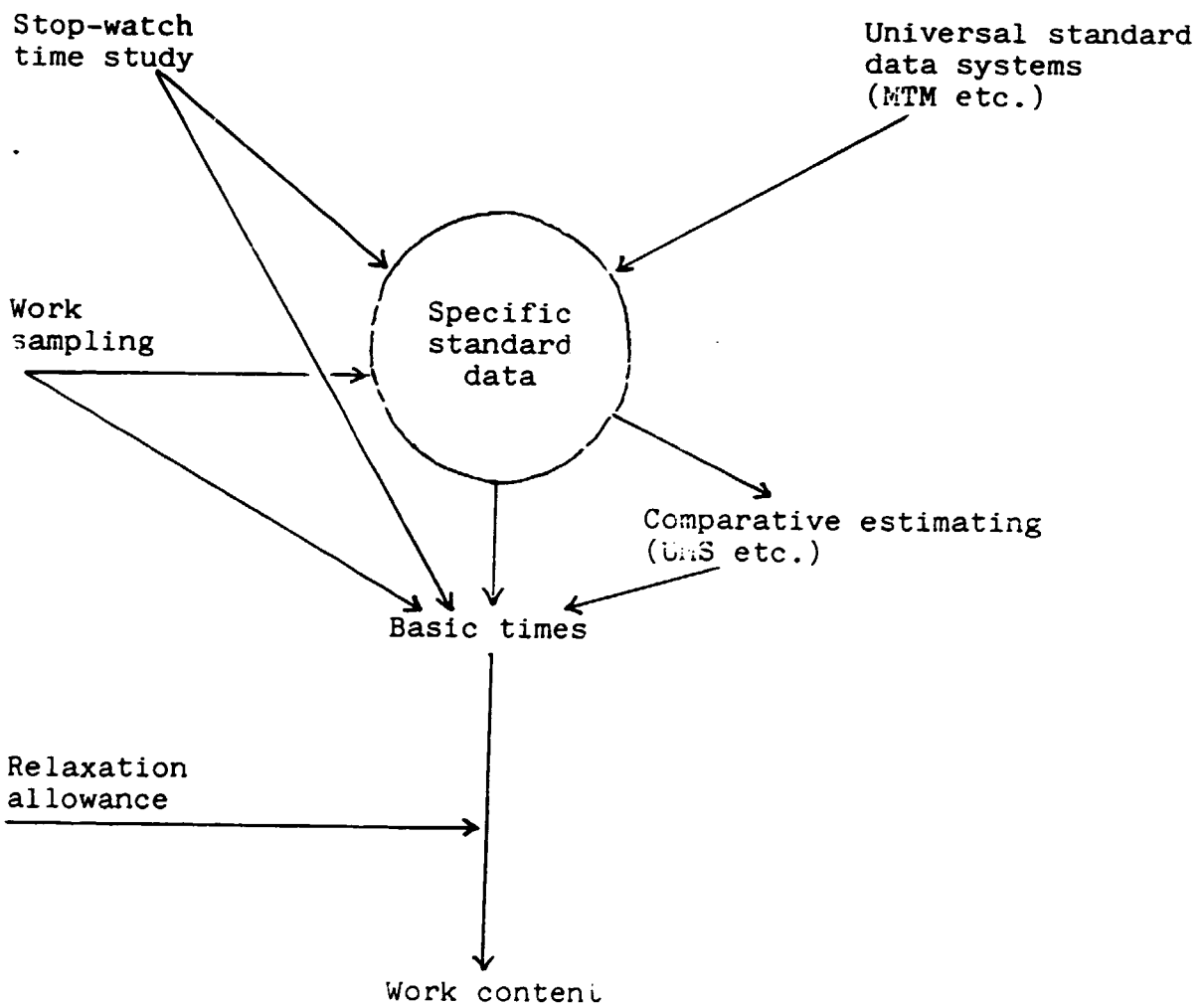
- comparing efficiency of alternative working methods in terms of time, and
- balancing the work of the members of a team.

The time standards set by the work study provide information for:-

- loading the capacities
- preparation of tenders
- setting sales prices
- monitoring of labour and machinery utilization
- setting standard costs.

An approach to work measurement is shown in Figure 4.5-7.

Figure 4.5-7, Approach to work measurement adapted 11



Stop-watch time study is the original method of work measurement, and it is carried out by directly observing the work. An example of stop-watch time study is given in Table 4.5-2.

A trained work study man divides the work into elements to be observed separately and thereby rates the performance of the worker:-

$$\text{Observed time} \times \frac{\text{Rating}}{\text{Standard rating}} = \text{Basic time}^{22}$$

as illustrated in the table:-

$$13.85 \times \frac{105}{100} = 14.54$$

the worker was observed performing the stitching at performance 105 the basic time 14.54 being expressed at standard performance level 100 (British Standard scale).

The standard time of an operation is calculated by adding allowance for fatigue and contingency to the total of element basic times.

Table 4.5-2, Example of stop-wach time study of a stiching operation

20 PIECES STITCHED					
ELEMENT	OBSERVED TIME min/100	TOTAL OBSERVED TIME	SELECTED TIME/ONE PIECE b:20	PERFOR-MANCE RATING	BASIC TIME/ ONE PIECE $\frac{d \times c}{100}$
Fetch box	21	21	1.05	100	1.05
Take part from box, put onto table	22,26	48	2.40	80	1.92
Stitch parts	17,18,13, 11,14,12, 12,13,14, 16,12,12, 17,13,16,15, 11,11,12,18	227	13.85	105	14.54
Parts to box	30,25,28	83	4.15	90	3.47
Cut coupon	23	23	1.15	100	1.15
Put box away	16	16	0.80	110	0.88
				Total basic time	23.01
				+ 11% for Relaxation & Contingency	2.63
				= Standard time	26.52

It is now possible to devise a control based on standard time as follows:-

$$\text{Machine performance} = \frac{\text{Standard minutes produced}}{\text{Actual time available (in minutes)}}$$

$$\text{Operator performance} = \frac{\text{Standard minutes produced}}{\text{Actual time attended (in minutes)}}$$

$$\text{Overall performance} = \frac{\text{Standard minutes produced}}{\text{Actual time attended (in minutes)}}$$

In certain types of work, or study, it may be impractical to use a stop-watch time study. For this a group of techniques called Work sampling give a variety of choices by which to measure work.

Work sampling is done by split-second observations at random, or equal intervals; or by combinations of both. Statistical methods are used to determine the margin of error (accuracy) of the result at a certain confidence level.

Examples of results from work sampling are given in Tables 4.5-3 and 4.5-4. Performance rating, as in stop-watch time study, can be incorporated into the work sampling.

Table 4.5-3, Work sampling, observations at random

ELEMENT	OBSERVATIONS	TOTAL	%
Machine running	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 //	62	82.7
Machine down:			
Repairs	//	2	2.7
Suppliers	𝍸 /	6	8.0
Personal	/	1	1.3
Idle	////	4	5.3
	Total	75	100

68 pieces were produced during the observation.

Total observation time was 36 minutes (checked by using watch)

Machine running time = $\frac{82.7 \times 36 \text{ min.}}{100}$ = 29.8 min.

Observed machine running time/ piece = $\frac{29.8 \text{ min.}}{68 \text{ pcs.}}$ = 0.43 min /piece

Table 4.5-4, Work sampling, observations equal intervals

PRODUCTION = 135 pcs cut		OBSERVATION INTERVAL = 15 sec		
ELEMENT	a OBSERVATIONS	b TOTAL NO. OF OBSER-VATIONS	OBSERVED TIME b x 15 sec.	OBSERVED TIME PER ONE PC. $\frac{c}{135}$
Fetch work	𝍸 //	7	105 sec.	0.8 sec.
Cut material into pieces	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ////	64	960 sec.	7.1 sec.
Take work away	𝍸 𝍸 𝍸 /	16	240 sec.	1.8 sec.
	TOTAL OBSERVED TIME		1305 sec.	9.7 sec

The third work measurement technique, an example of its use being for maintenance work, is known as Comparative estimating. The term Universal Maintenance Standards (UMS) has been used in many countries to represent this idea. A job is evaluated by comparing the work it involved in a series of jobs - bench-marks, the work content of which has been measured. The arranging of jobs into broad bands of time reveals the basis of the technique.

The fourth family of work measurement systems is that of Standard data systems, and can be defined as existing in three general categories.

a) Universal systems (Predetermined Motion Time Systems) are constructed in general terms so that they are applicable in any area of business or industry. The most common of these systems is MTM (Methods Time Measurement), that can be used on three levels[17]:-

- Basic motion level : MTM1
- Sub-element level : MTM2
- Element level : MTM3

b) Specific standard data systems (SDS) are developed for specific areas of activity often related to a specific company

MTM has been widely used in the leather products industry because it has been proven to be an excellent tool for both work measurement and methods improvement (see Table 4.5-1). Some enterprises have built specific standard data systems based on MTM for cutting, skiving, stitching etc.

It should be noted that by means of standard data systems, one can synthetically construct working methods and set standard times, often very speedily.

4.6, Ergonomics, and health and safety

Ergonomic research is used in the adaptation of work conditions to the physical and psychosocial nature of man[12]:-

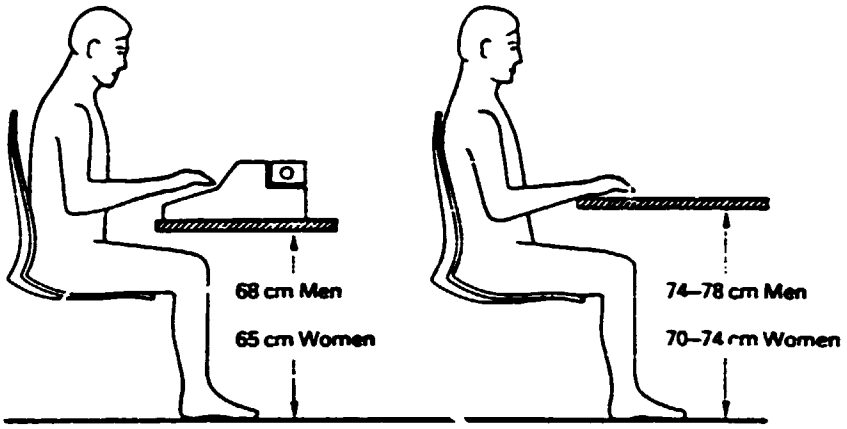
- Fitting the demands of work to the efficiency of man in order to reduce stress.
- Designing machines, equipment, and installations so that they can be operated with great efficiency, accuracy and safety.
- Working out proportions and conditions of the work place so as to ensure correct body posture.
- Adapting light, ventilation, noise, etc., to suit man's physical requirements.

By applying basic ergonomic recommendations one can eliminate many work-related health hazards and improve the quality of working life itself. Some examples of ergonomic principles are given in Figures 4.6-1 and 4.6-2[12].

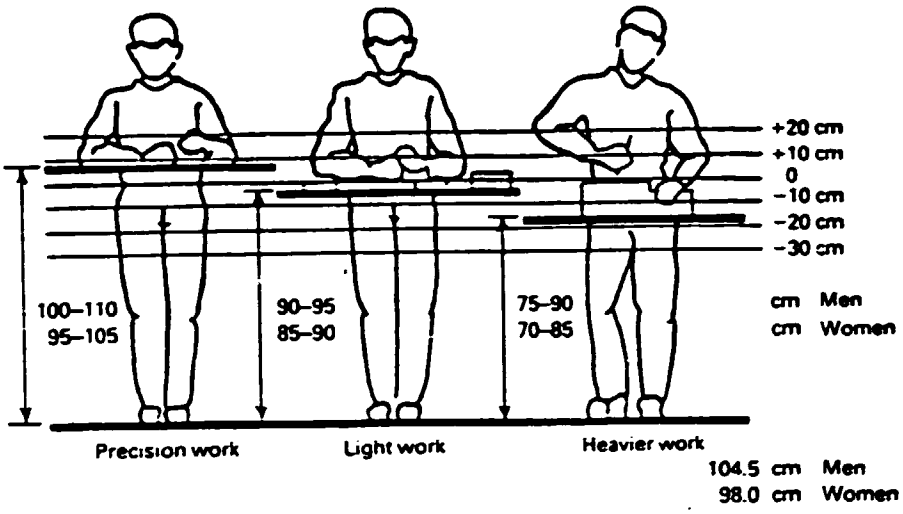
Accidents and other work related health hazards are important to be prevented as well.

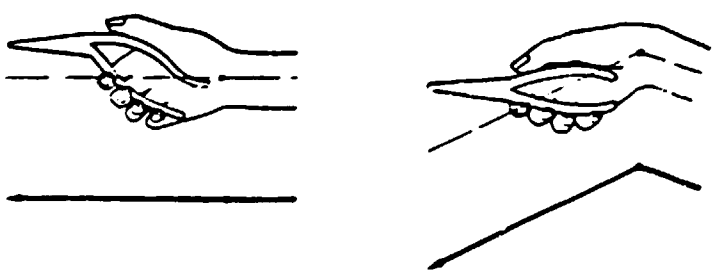
The most effective method of obtaining good results in accident and other health hazards prevention is to establish good safety organization within the organization. The organization structure need not be formalized, nor need it require the employment of specialists; its special features should be a precise delegation of responsibilities within a structure which can ensure sustained action and joint effort by employers and workers to "raise the quality of working environment, in all its technical, organizational and psychological aspects, to a satisfactory high standard"[26].

Figure 4.6-1, Examples of ergonomic recommendations



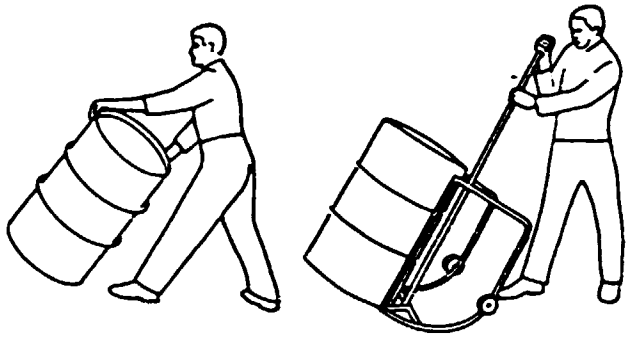
Recommended table heights for sedentary work.



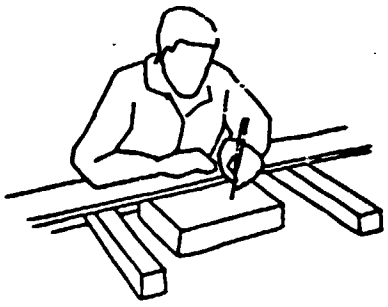


Left: the curved pliers are shaped to fit the hand, which remains in line with the forearm. Right: pliers of the traditional shape require sustained static effort, with the wrist turned outwards; the hand is no longer in line with the forearm.

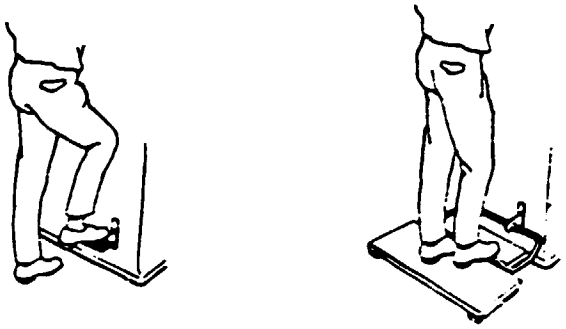
Figure 4.6-2, Examples of ergonomic recommendations



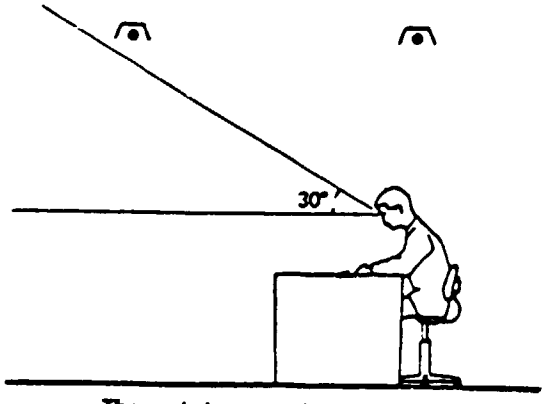
Handling casks.



A good example of relieving muscular tension during skilled work.



Pedals are undesirable for standing work, since they set up heavy static loads in the legs.



The angle between the horizontal and the direction from eye to overhead lamp should be more than 30°.

4.7, Quality control

Quality phenomena

Quality has risen on the horizon as a competitive necessity. Today, for many manufacturing companies, quality is the only unique value added. Successful product differentation via features has become too tough. Adding value via quality may become a national way of life. The driving forces behind the rise of quality conciousness are several[27].

First there seems to be psychological force at work. "Nothing corrodes working ethic more than the perceptions that employers and managers are indifferent to quality"[28]. The study goes on to say that a strict, "even harsh", emphasis on quality reinforces the conviction that the work has intrinsic worth and meaning. Work ethic and quality are relatives[27].

Second, quality can be counted. Over the past 10 years, the direct cost of low quality is something the controllers of the world have now figured out; it turns out to be a big number. In fact, it is often less expensive to build quality in than to make repairs later in the field [27].

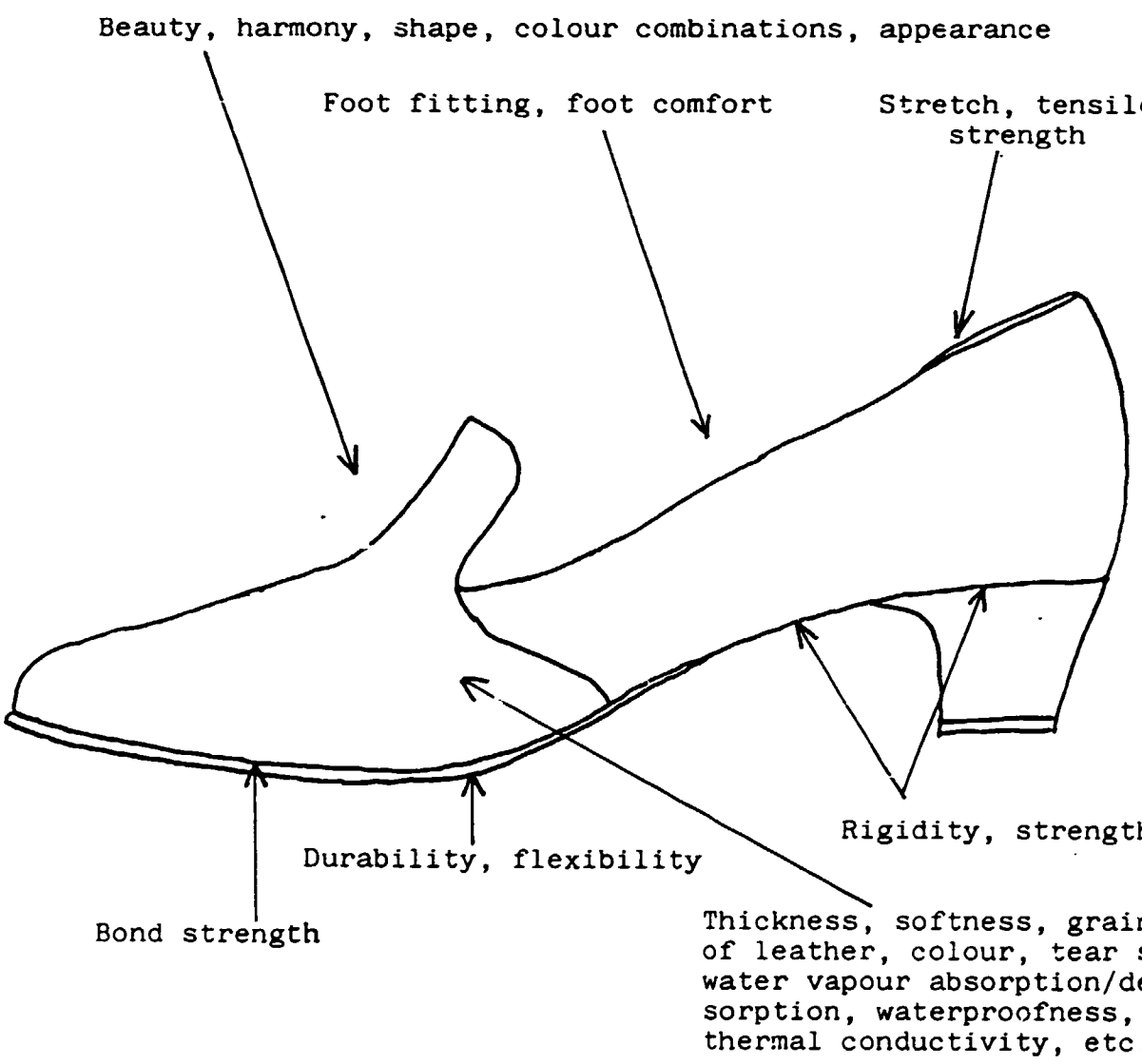
Third, education, communications, and affluence are resulting in a steady upgrading of tastes. People want higher quality because they know it is available and others are getting it. People do not want the hassle that often accompanies low quality[27].

Quality characteristics

In order to reach the desired level of added value and customer satisfaction, leather products indeed need to be fit to use. The fitness for use is expressed by Quality characteristics, a type of basic building blocks, that is any features of the products, materials or processes which are needed to achieve the fitness for use. These characteristics, as in Figure 4.7-1, can be.

- softness, hardness, flexibility, rigidity;
- beauty, harmony;
- reliability, maintainability, etc.

Figure 4.7-1, Quality characteristics



Quality control in a larger sense is a planning and regulatory process through which quality standards are set and the actual quality performance is measured against the standard of quality necessary; any difference between the two is then acted upon.

Enterprises without proper quality control practices will experience continuous and excessive sporadic quality problems, unequal product quality, hidden costs, personnel too often engaged in trouble-shooting or having become indifferent to the situation.

The aim of a manufacturer is to determine the true and actual needs of the market; to design, develop and manufacture a product or service that satisfies those needs.

Quality control process

Primarily the functions involved in the quality control process of a product are:-

- Market analysis to identify customer and consumer needs;
- Product development to meet needs and to prepare specifications;
- Manufacturing engineering for choice of machinery, tools and work methods;
- Purchasing for choice of suppliers based on quality considerations;
- Production to meet specifications;
- Inspection of materials, components and products before their acceptance.

Total quality control

Achieving co-ordination of these activities is the objective of the modern Total quality control. Without such co-ordination, individual and department goals will replace company goals, this easily leading to hassle, in-fighting and to a bad working atmosphere.

In order to have co-ordination, total quality control must have elements of:-

- Quality policy, consisting of principles to guide the activities; and quality objectives for specific goals in quality-related activities.
- Quality system, consisting of procedures that are to be followed in each sub-system, such as:-
  - specifications,
  - pre-production activities,
  - inspection,
  - training, etc.

Specifications

Quality characteristics are built into the product and specified already in its development stage. Each characteristic is specified in terms of colour, thickness, tear strength, tensile strength, etc., of each material, and in terms of drying times, activation temperatures, pressures, tools, etc., of manufacturing methods.

Inspection

An example of a visual inspection at factory floor by random sampling is shown in Table 4.7-1. The adequate quality percentage during the period was 81.3 per cent.

Table 4.7-1, Visual inspection by random sampling

PRODUCTION DURING THE PERIOD = 2,400 pieces = 1,200 pairs NO. OF SHOES INSPECTED = 320 pieces = 160 pairs			
DEFECT	OBSERVATION	a TOTAL	% -AGE OF SAMPLE $100 \times \frac{a}{320}$
Wrinkles	𝍸 𝍸 𝍸	15	4.7%
Incorrect back seam or back height positioning	𝍸 /	6	1.9%
Incorrect vamp positioning	///	3	0.9%
Not tight on last	𝍸 𝍸 𝍸 𝍸 //	22	6.9%
Grain crack	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ///	43	13.4%
Other	𝍸 /	6	1.9%
ADEQUATE	//// ...	260	81.3%

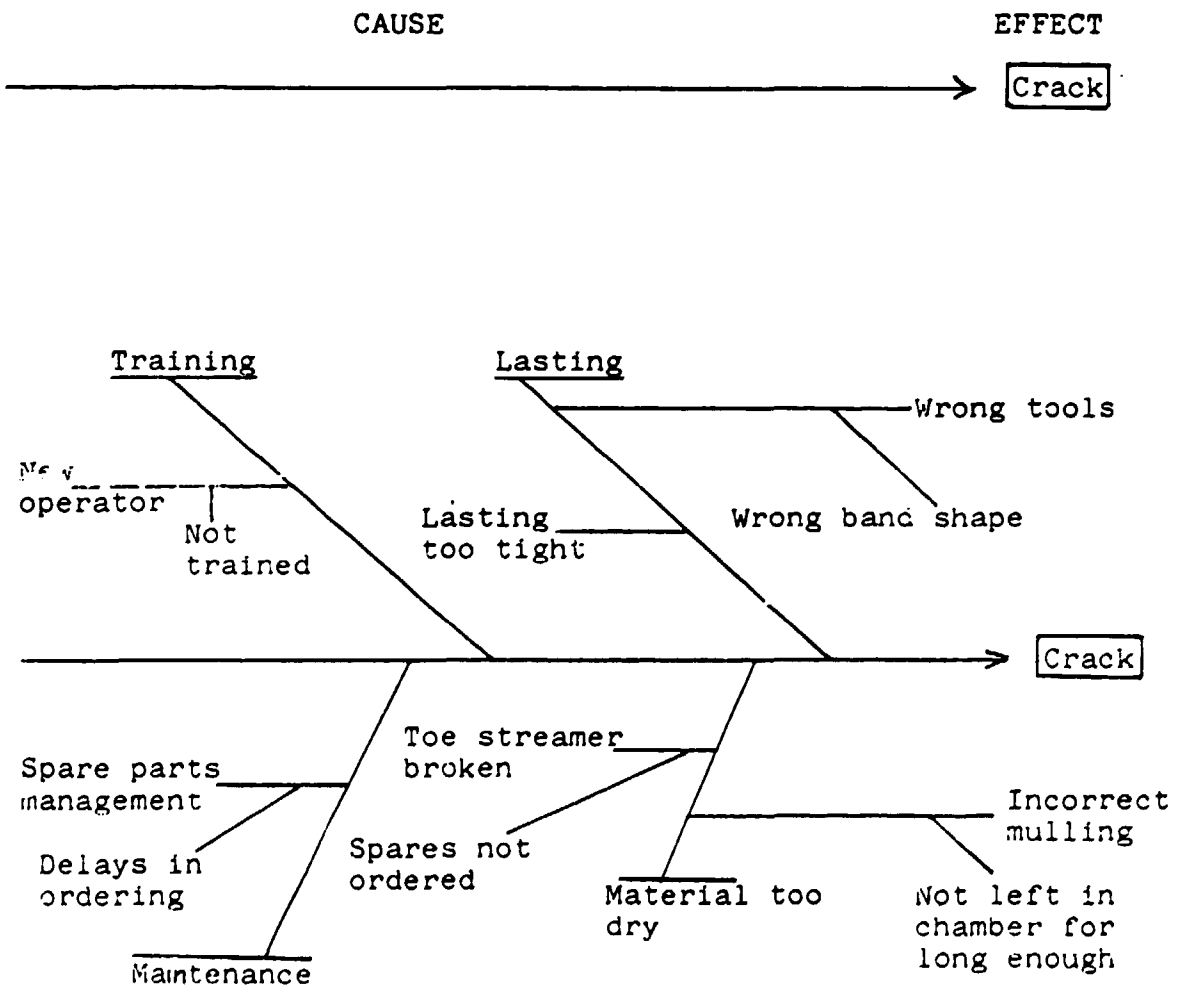
The biggest defect was the tearing of upper materials, 13.4 per cent of production. This triggered off an alarm signal in the control system to prevent the defect re-occurring.

Let us assume that the repair cost for each defect of the grain crack was $US 0.90 per one pair. With a daily production of 1600 pairs, the cost of this defect amounted to:

250 days x 13% x 1600 pairs/day x $US 0.90/pair
= $US 46,000/year

This prompted the already-established Quality control circle, a small group of experts including operatives, to select this problem for study and recommendations for corrective measures to be given to the management. The group used cause-effect diagram to help to solve the problem, as shown in Figure 4.7-2. Their recommendations were presented to the management. The management took prompt steps to correct the situation.

Figure 4.7-2, Cause-effect diagram



Leather assessment

Materials received also need to be inspected. An example of leather assessments procedure is illustrated in the following:-

(1) For cuttability assessment, 10-15 skins are selected from each shipment at random;

(2) the uncuttable areas are written off each skin selected for sample by using crayon chalk, Figure 4.7-3;

(3) the uncuttable area of each skin is measured by using one $ft.^2$ of transparent plastic divided into one-hundredth of a $ft.^2$ squares, Figure 4.7-4. The coefficient of cuttability of the leather will be:-

$$\text{Coefficient of cuttability} = \frac{\text{Total usable area of the skins checked}}{\text{Total area of the skins checked stated by tanner}}$$

Figure 4.7-3, Uncuttable areas written off each skin in sample

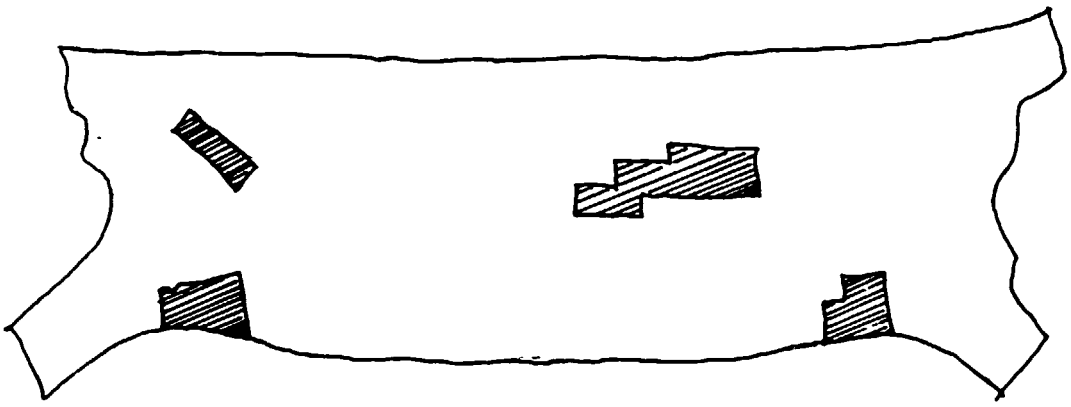
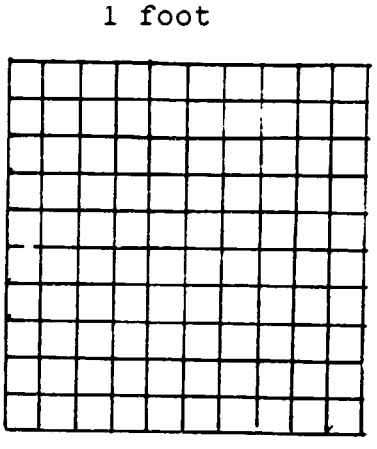


Figure 4,7-4, Transparent grid for area measurement



1 foot = 30.5 cm

(4) For area coefficient assessments, 5 skins are selected at random from the shipment;

(5) the exact size of each skin is measured by using similar but larger plastic grid, divided into one ft.^{2} and one-hundredth ft.^{2} squares. Thus the coefficient of skin area is derived:-

$$\text{Coefficient of skin area} = \frac{\text{Total area of skins checked}}{\text{Total area given by tanner for the skins checked}}$$

(6) The net coefficient of the leather will be:-

a = cuttability coefficient

b = area coefficient

Net coefficient = a + b - 1

(7) The true price of the leather is the price per usable ft.^{2}:-

$$\text{Price per usable ft.}^2 = \frac{\text{Purchase price per ft.}^2}{\text{Net coefficient}}$$

The buying price, in fact, can be misleading. Let us assume that a leather products factory has received two shipments of leather. Shipment A is priced 2.07 and Shipment B is priced 2.00 per ft.^{2}. With no further information, Shipment B is 0.07 cheaper than Shipment A.

Both shipments were assessed for cuttability and area discrepancy:-

	Cuttability coefficient	Area coefficient	a Net coeff.	b Purchase price	b:a Price per usable ft.^{2}
SHIPMENT A	0.92	0.99	0.91	2.07	2.28
SHIPMENT B	0.91	0.96	0.87	2.00	2.30

Shipment A was revealed to be a better purchase.

The specifications given for leather purchase may include the Standard cost as follows:-

Grade of leather	Standard purchase price		Standard net coefficient		Standard price per usable ft.^{2}
A	2.71	:	0.92	=	2.95
B	2.59	:	0.86	=	3.01
C	2.46	:	0.81	=	3.04
D	2.35	:	0.76	=	3.09

Having defined standard cost per usable ft.^{2}, the Purchase variance can be quantified in financial terms as follows:-

	Purchase price		Net co-efficient		Cost per usable ft.^{2}
Standard	2.71	:	Std. 0.92	=	Std. 2.95
less Actual	2.66	:	Actual 0.89	=	Actual 2.99
= Favourable (+)	0.05				
= Unfavourable (-)					0.04

The purchase variance of the shipment was unfavourable, although the purchase price was favourable. The situation was caused by the low net coefficient of the shipment.

Material testing

Coming back to quality characteristics of shoes as illustrated in Figure 4.7-1, the material testing methods are used to indicate desired characteristics of materials and components, to avoid materials or components having inappropriate properties for their end use. Common testing methods and the type of material properties they are used for, are given in Annex 4.

Some research centres have recommendations for test result standards for various materials and components for different types of leather products. These testing requirements can be modified to suit each factory, by learning through wear trials and through problems faced through customer complaints.

The problems typically fall into one or more of the following categories[7]:-

A. Materials - bad material or inappropriate physical properties for its end use.
B. Construction - poor design, not in keeping with stress and strain encountered during end use.
C. Workmanship - operator failure to meet assembly quality standards.

Only by a co-ordinated total quality control approach, having full management involvement, can an enterprise ensure the quality of its products and services.

4.8, Standardization

Standardization is another widely used method in modern leather products industry. The aim is to increase both economy in production and production flexibility, as in the following shoe industry standardization examples:-

- standardization of shoe upper components
- standardization of shoe bottom components and
- standardization of working methods.

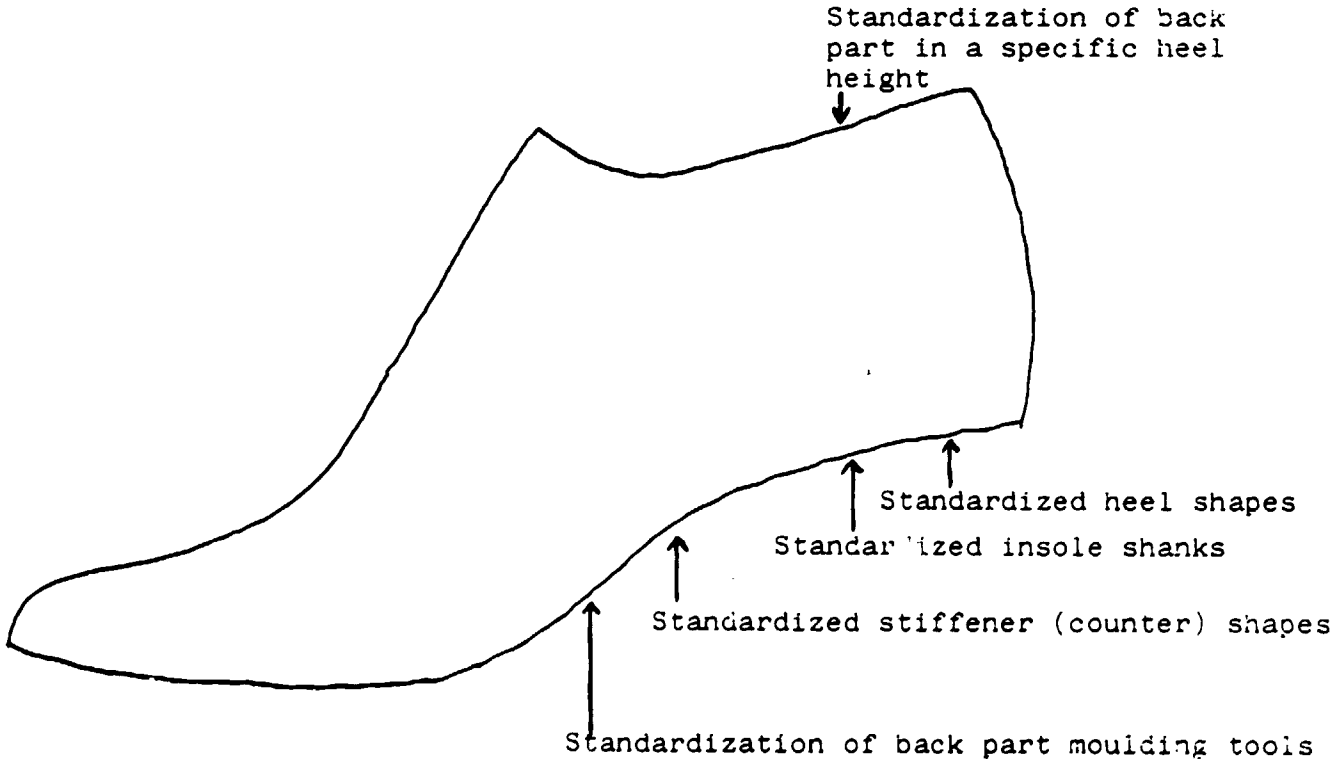
By standardization of product components one can save on:-

- tooling costs of lasts,
- tooling costs of moulds,
- tooling costs of cutting dies, and
- inventory costs of components and materials.

Working method standardization makes it possible to shift manufacture of shoes or other leather products from one production line to another to overcome bottleneck situations.

In the shoe industry the standardization of back parts of lasts can serve the purpose as illustrated in Figure 4.8-1.

Figure 4.8-1, Standardization of back part of lasts



Because fashion changes affect not only toe shapes but also the shape of the waist of the lasts, another approach to last standardization, known in Central Europe as "Umriss" shapes, has gained larger acceptance.

The idea is to agree, industry-wide, on new last shapes, related to sole shapes, for each new season. The shoe manufacturer can buy a variety of new fashionable unit soles adhering to the standards set, from the suppliers taking part in the scheme.

The standardization, for reducing the number of cutting dies of uppers and linings as illustrated in Figures 4.8-2 and 4.8-3.

Figure 4.8-2, Standardization of shoe upper parts

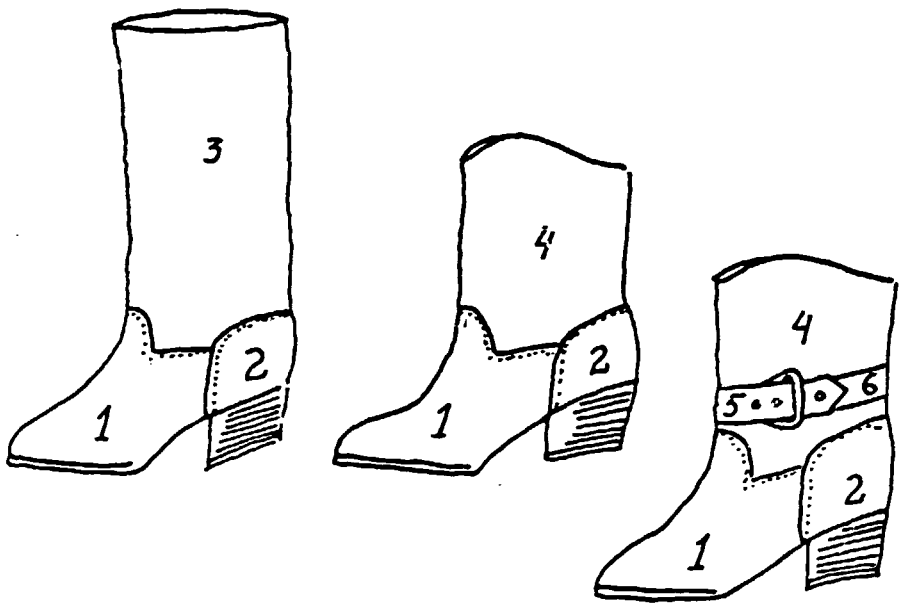
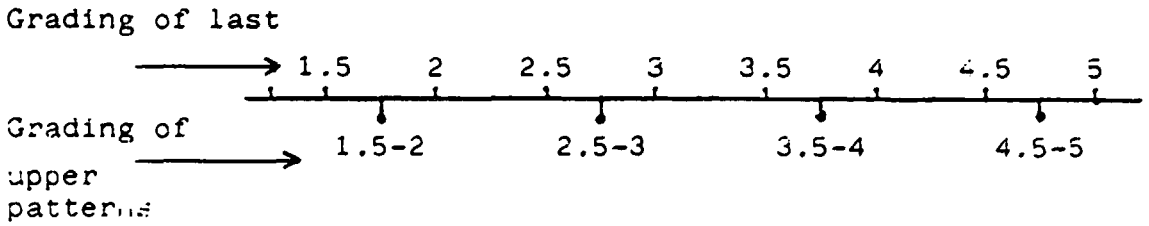


Figure 4.8-3, Grading of patterns of shoe uppers for cutting die standardization



4.9, Payment by results

Motivation and payment by results

The need to motivate employees towards higher productivity of machinery, equipment, materials, and the labour itself has focused attention on employee motivation. The two basic motivational approaches used are[13]:-

- Extrinsic and
- Intrinsic

Extrinsic motivation involves the use of external reward such as increased wages, promotions and praise. Instrinsic motivation involves arranging the job and the work so that it is interesting, challenging and fulfilling.

Herzberg, by his Motivation-Hygiene theory, combines motivation and job satisfaction. This theory states that, in contemporary society, the lower level needs described by Maslow have generally been satisfied. Where they are not satisfied, job dissatisfaction is the result. However, the fulfillment of these lower-level needs does not alone produce job satisfaction. Herzberg calls those factors that produce job satisfaction "motivation factors" because they motivate the worker to the highest level of performance. The factors that cause dissatisfaction are the "hygiene" or "maintenance factors"[13].

Improvements in the factors of hygiene (company policy and administration, relations with supervision, working conditions etc.) will serve to remove the impediments to positive job attitudes. When these factors deteriorate to a level below that which the employee considers acceptable, then job dissatisfaction ensues. However the reverse does not hold true. When the job context can be characterized as optimal, we will not get dissatisfaction, but neither will we get much in the way of positive attitudes[13].

It is often felt, when surveying enterprises, that even if the job itself does not seem to produce dissatisfaction, the necessary positive attitudes towards performance are missing, to a large extent. This results in under-utilization of plant, poor workmanship and wasting of materials used. It also experienced that the introduction of well-designed payment-by-results

schemes have helped to solve the problem.

Choosing payment system

It is suggested that an enterprise's main problem when it comes to choosing a payment system is that of establishing the criteria by which management can judge the success or failure of the system. The method adopts four steps[14] :-

(1) listing the criteria of success,
(2) listing and clarifying known forms of payment,
(3) systematically describing the situation to which the system is to be applied, and
(4) testing available payment systems in the situation so as to identify those systems which best fulfill success criteria.

Payment by results (PBR) is a payment system under which money rewards vary with measured changes in performance according to predetermined rules. The money rewards are determined after the completion of the tasks has been recorded, and depend on the level of performance achieved[29].

The basic alternative to PBR is Time payment. The workers reward under this system is a predetermined amount for each hour, week or month worked whatever the variation in performance[29].

The choosing of payment system for the established success criteria can only be done by understanding the motivational factors in a given situation, and the related characteristics of the payment system under consideration.

Examples of payment by results systems

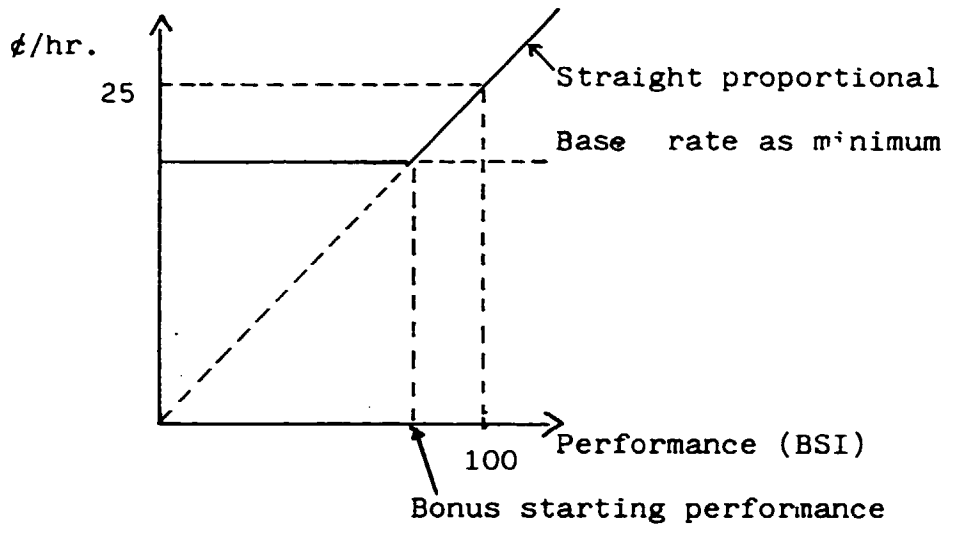
Three different examples of PBR schemes are outlined on the following:

(1) Individual Straight-proportional scheme

Individual straight-proportional scheme is shown in Figure 4.9-1. Each production operation for each product is given a standard time in the work study. The standard time is multiplied by an agreed money coefficient to produce the "piece-rate"; example:-

- Earning at performance 100 = 25¢/hour
- Money coefficient = $\frac{25¢}{60 \text{ min.}}$ = 0.42¢/standard min.
- Standard time for an operation = 0.18 min./piece
- Piece rate = 0.18 x 0.42 = 0.076¢/piece
- Base rate or hourly rate is paid as minimum

Figure 4.9-1, Straight proportional scheme

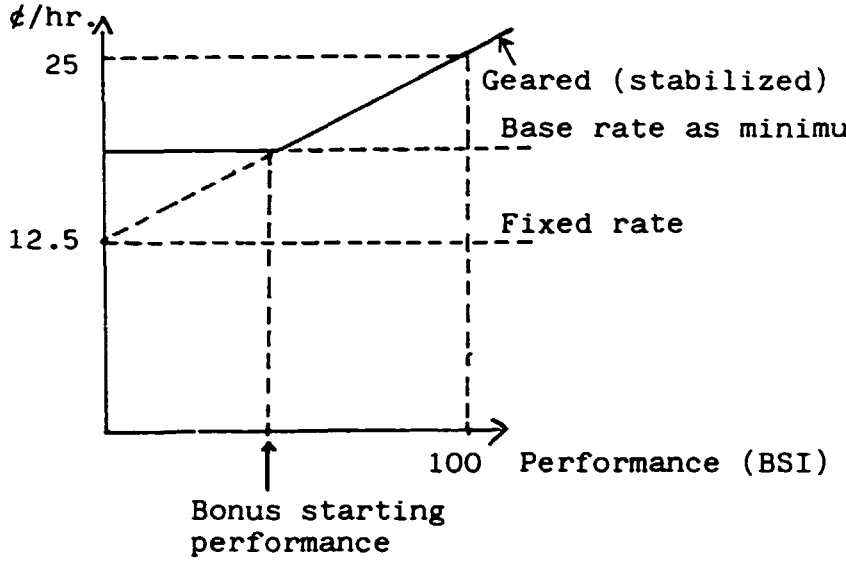


(2) Individual Geared (stabilized) scheme

Individual geared (stabilized) scheme, Figure 4.9-2, is constructed in a similar way to the basic piece-rate, but has part of the pay paid at a fixed rate; example:-

- Earning at performance 100 = 25¢/hr
- Fixed part of wage = $\frac{25¢}{2}$ = 12.5 ¢/hr
- Money coefficient for variable part = $\frac{25\ ¢}{60\ \text{min.}}$: 2 = 0.21 ¢/standard min.
- Standard time for an operation = 0.18 min./piece
- Piece rate = 0.18 x 0.21 = 0.038 ¢/piece
- Base rate or hourly rate is paid as minimum

Figure 4.9-2, Geared (stabilized) scheme



Both schemes are widely used, as they are simple and easy to understand for the workers, and regarded as fair. However, there are some problems in starting or using these schemes, especially when used as individual schemes:-

- The working methods and standard times should be carefully set by a trained work study person (this is less important with an extremely stabilized scheme than with the straight scheme), otherwise piece-rate workers could inflate their earnings by improving methods or they could in such case introduce performance ceilings;
- A substantial amount of clerical work is involved in the collection and processing of information from the factory floor;
- Because of uneven loading caused by varying product mixes etc., supervisor and worker will be in constant conflict as to idle time pay;
- Piece-work operatives tend to work as individuals. Frequently they are not very willing to help fellow workers in bottleneck situations;
- Piece-work might (although this is not necessarily so) have a negative effect on product quality;
- Supervisors, maintenance staff etc., are excluded from the individual schemes.

It should be noted that the more geared (stabilized) the scheme becomes, the less incentive will be built into the system; the less stabilized the system the more incentive, but any variation in production quantities or work content will fluctuate the wage more.

The workers' expectations of the bonus over the base rate vary from 15 to 35% depending a country or an enterprise in question.

(3a) Group scheme

To overcome the problems of the individual schemes discussed, prefer to construct a Group scheme, as in the following.

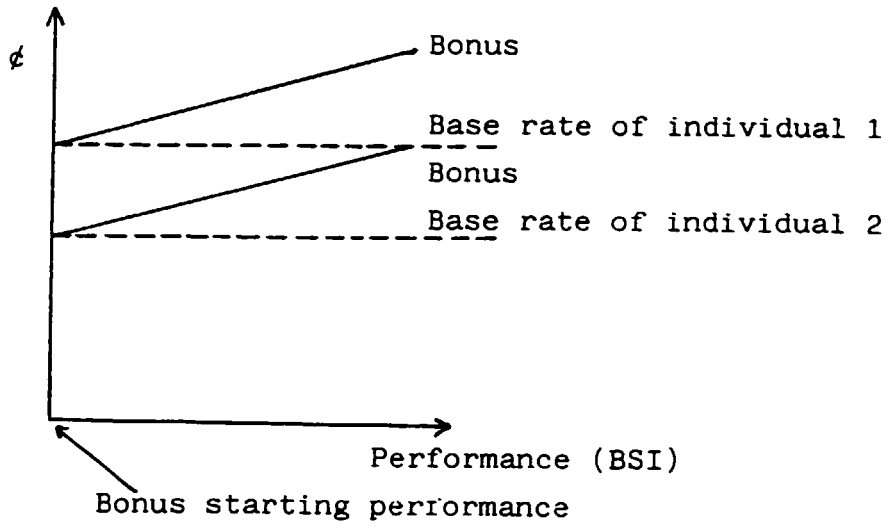
In this example the scheme was planned, involving the management, supervisors and workers in the planning.

The chosen success criteria were:

- better utilization of fixed assets,
- less capital tied up in work-in process,
- better quality of products and services,
- less unit labour cost (through higher production),
- less unit total cost (through higher production),
- higher production,
- less absenteeism and labour turnover (through group discipline and higher pay),
- higher earnings,
- better maintenance and other services,
- better vertical and lateral co-ordination within the organization,
- better production flexibility to meet changes in market demand.

The planners decided to build a Group scheme. The bonus to an individual was paid on his/her base rate, as illustrated in Figure 4.9-3. Production operatives, supervisors, maintenance personnel and raw material store personnel became group members.

Figure 4.9-3, Group scheme



The bonus was calculated as follows:-

- Bonus for production at performance 100 was set at ¢ 7/hr
- Money coefficient = $\frac{¢\ 7}{60\ \text{min}}$ = ¢ 0.117/std.min
- An additional quality bonus was set, as illustrated in Table 4.9-1.

Table 4.9-1, Quality bonus

Adequate quality	Quality bonus as %-age of production bonus
90 %	4 %
95 %	8 %
97 %	12 %
98 %	14 %
99 %	17 %

- During a pay period, following production was achieved:-

Product	Production in pieces		Std. min per one piece		Production in std. mins
A	10,000	x	26	=	260,000
B	1,600	x	17.5	=	28,000
					288,000
			+ 15 % allowance for supervision and maintenance		43,200
			= Production bonus earned by the group		331,200

- Adequate quality was found to be 97 per cent; entitling to 12 per cent quality bonus.

- Group as a whole earned a bonus of:

  (331,200 x 0.117) + 12 % = ¢ 43,400

- Attendance of the group was 6,800 hours

- Bonus per one attendance hour became:

$$\frac{¢\ 43,400}{6,800\ \text{hours}} = ¢\ 6.4/\text{hr}$$

- Bonus of an individual was calculated as:-

  attendance hours of individual x bonus per one attendance hour

- Wage of an individual was calculated as:-

  hours attended x (base rate of an individual + bonus for an individual); example:-
  80 hrs x (¢18 + ¢6.4) = ¢1952/pay period.

The importance of the payment-by-results type of incentives can be seen by the fact that in many cases a work force not working under incentive is achieving only about 40 per cent performance. In the leather goods industry, the ratio of worker to machine is usually 1:1. Low labour performance will thus result in low machinery utilization. By increasing the performance and motivating people to go from 50 per cent performance to 80 per cent performance, one can increase production, as in the following example:-

from performance 50 per cent = 1,000 pairs/day
to performance 80 per cent = 1,600 pairs/day

from the same machinery. In such a situation, however, it is normally found that some bottleneck machinery or tools have to be purchased as a minor capital investment.

(3b) Group bonus scheme including individual material saving bonus

A leather-cutting bonus for upper-leather cutters can be included in the group bonus by paying an individual material-saving bonus to cutters, as shown in Table 4.9-2.

Table 4.9-2, Material saving bonus in cutting

Leather saved against standard	Individual material-saving bonus as percentage of group bonus of an individual
1.0 - 1.9 %	10 %
2.0 - 2.9 %	20 %
3.0 - 3.9 %	30 %
4.0 - 4.9 %	40 %
5.0 - 5.9 %	50 %
6.0 -	60 %

Cutter's wage = based rate + group bonus + individual material saving bonus

The prerequisite system for material-saving in cutting bonus is a well-established system for setting standards for economy in cutting, as will be discussed on the following.

Cutting economy improvement

For the leather products industry, a system for leather usage standards must be able to correlate any pattern used for cutting with any type and quality of leather to any given set of sizes of products.

The systems available for the shoe industry consist of sub-systems such as:-

- Pattern assessments
- Leather assessments
- Setting standard for a cutting batch for a cutter
- Feed-back information

The feasibility of installment of such a system could be studied by comparing costs to benefit as in the following example:-

- Production 1,000 pairs/day
- Upper leather consumption 2.00 $ft.^2$/pair
- Upper leather consumption in one year = 1,000 pairs x 250 days x 2.00 $ft.^2$ x $US 1.50/$ft.^2$ = $US 750,000/year
- One cutter cuts 333 pairs/day
- Number of cutters needed = 1,000 pairs : 333 pairs/day = 3 cutters
- Wage cost of cutting = 3 x $US 5.00/day x 250 days = $US 3,750/year
- Cutting economy bonus = 30 % x (base rate + group bonus)= 30 % x $US 3,750 = $US 1,125/year
- Clerical costs, costs of leather assessment and amortization of installment, in the first five years = $US 16,000/year; from sixth year onward = $US 2,500/year

The introduction of a cutting-economy bonus in fairly well-functioning factories has resulted in 8-14 per cent saving on upper-leather usage. The future cost-benefit ratio, by installing the system in a factory producing 1,000 pairs of shoes daily, could be:

$$\frac{\text{worth of benefit}}{\text{worth of cost}} = \text{cost - benefit ratio}$$

(1) In the first 5 years:-

at 8 % leather saving

$$\frac{8\ \% \times 750{,}000}{16{,}000 + 1{,}125} = \frac{60{,}000}{17{,}125} = 3.5$$

at 14 % leather saving

$$\frac{14\ \% \times 750{,}000}{16{,}000 + 1{,}125} = \frac{105{,}000}{17{,}125} = 6.1$$

(2) From sixth year onwards:-

at 8 % leather saving

$$\frac{8\ \% \times 750{,}000}{2{,}500 + 1{,}125} = \frac{60{,}000}{3{,}625} = 16.6$$

at 14 % leather saving

$$\frac{14\ \% \times 750{,}000}{2{,}500 + 1{,}125} = \frac{105{,}000}{3{,}625} = 29.0$$

If the leather used is of local origin, the better cutting economy will also render additional production potential, as shown in Table 4.9-3.

Table 4.9-3, Additional shoe production potential with same local-leather input

CUTTING ECONOMY IMPROVEMENT	ADDITIONAL PRODUCTION POTENTIAL WITH SAME INPUT
8 %	8.7 %
14 %	16.3 %

4.10, Maintenance procedures

Leather products industries' fixed assets utilization in machinery, measured in terms of machine performance, can be as much as 75-85 per cent in a well-run factory. In some developing countries, however, much lower performances have been experienced because of excessive down-times of machines caused by machinery break-down and by a shortage of spare parts.

The causes of break-down follow an approximate pattern, shown in Table 4.10-1.

Table 4.10-1, Probable causes of break-down of machinery and equipment[18]

100 % percentage of break-down		Probable causes of break-down
a)	20 %	- By the unawareness of cleaning/ lubrication/needs
b)	10 %	- Neglecting minor defects
c)	35 %	- Weakness and inadequacy of maintenance team
d)	10 %	- Improper utilization or misuse of machinery
e)	05 %	- Wrong adjustments
f)	05 %	- General wear and tear
g)	15 %	- Buying from inferior or substandard manufacturers - Inadequate supply of data from manufacturers - Design defects or manufacturing defects - Machir at experimental stage - Unavoic ble circumstances - Handling mistakes during transportation and installation - Difficulties in selection of proper materials for modifying worn out parts.

By improving maintenance procedures, items a,b,c,e and f (a total of 70 percentage points) and by improving training and supervision of workers item d (ten percentage points) can largely be eliminated. Further improvement can be gained by looking into item g.

The industries, both in developed and in many developing countries, have made substantial improvement in overall performance, in cost saving and in foreign currency saving by introducting modern systems of:-

(1) Planned maintenance procedures for:-

- maintenance planning
- cleaning
- lubrication
- periodic insp n
- repair & over:
- etc.

(2) Spare parts management for:-

- spares forecasting
- procurement
- storage
- etc.

(3) Re-claiming and re-utilizing of spare parts by:-

- metal-spraying techniques
- welding techniques
- etc.

(4) Reproduction of spare parts

In mechanized leather products industries, spare parts costs exceeding approximately 1 per cent of the sales or 2 per cent of machinery value, are excessive, and when imported, constitute an unnecessary drain on foreign exchange.

4.11, Product development

Entrepreneurial startup leather product companies sell a product or products to a market niche of some kind. With success more products will be found to the same success base - a product development approach to build the business. Gradually, by innovate efforts and learning process, more market niches (segments) will be utilized.

Innovative companies are close to the customer. Their customers even take part in the product development, and most of the new product ideas originate in the market place.

As the product development is the real success component, it involves the inputs of the senior executives of the company, illustrated by following anecdote.

"The vamp should be made 1/8 inch shorter", said Max Bally as he knelt down to a little platform covered by green felt. Whenever it was possible for him, he took part in fitting trials conducted in the mornings. Non-professionals amongst the employees asked themselves if he, as Chief of the world-wide firm, would not have better things to do. But at this time of the day it drew "M.B.", as he was called, almost irresistibly to the small fitting room at the end of the large office complex.

"Now, I would like to shorten the vamp by about 1/8 inch" (3mm) repeated Max Bally to Albert Eng, the chief last-designer.

"Agreed, Mr. Bally", Albert Eng replied and lovingly stroked the shoe from heel to toe, almost like a discreet caress, "but I am only afraid that the shoe might not hold at the back and that the points of the toes might show"[16].

And so the discussion during the fitting trial continued, until Max Bally and Albert Eng had agreed on vamp lengths and the lasts for various markets. And so continue the fitting trials and other product development activities throughout the world, having chief executives as company entrepreneurs.

Corporate entrepreneurs acquire their power through mobilizing others (and being mobilized by them) as collaborators; They are not "solo artists". They secure information, support, and resources by building an actual or implicit "team" of people who will maximize goals of their own through their involvement[32].

Innovation typically occurs at the interface, requiring multiple disciplines. This requires informality, the informal management process is: Interact, test, try, fail, stay in touch, learn, shift direction, adapt, modify and see: incorporated by action orientation[31]. This applies to product development, and to other development as well.

But product development must also be a disciplined system for co-ordinating the efforts of marketing, design and pattern-cutting, purchasing, production, costing, quality control, work study etc.; all the activities directed towards the common goal of having a well-designed product on the market at the right time and the right price.

The main product development stages are shown in Figure 4.11-1 and the activities of each stage are shown in Annex 5.

For marketing planning and for product development the market is segmented, divided into parts. A model to assist segmentation and related planning communication is given in Table 4.11-1.

Figure 4.11-1, Product development stages

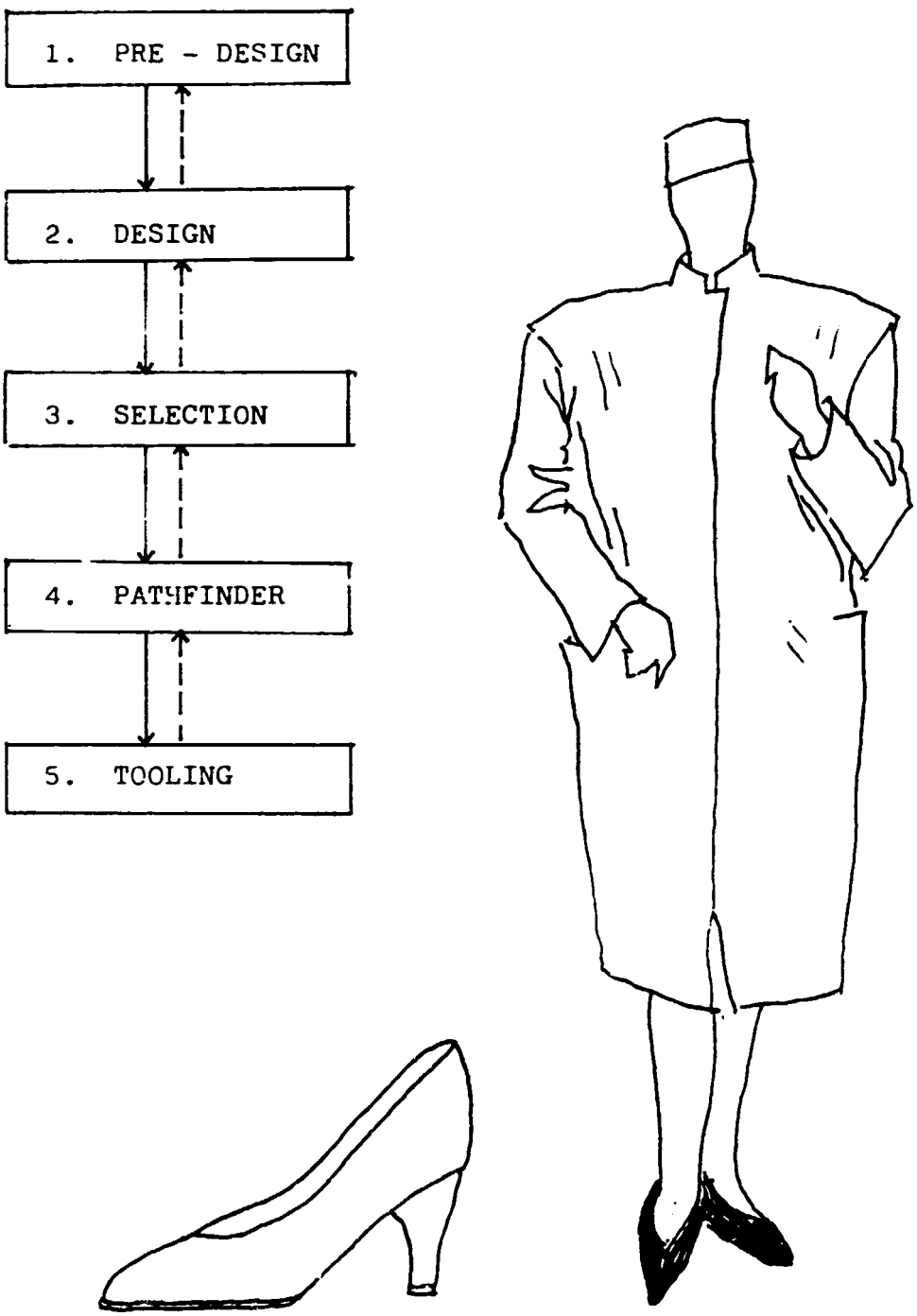
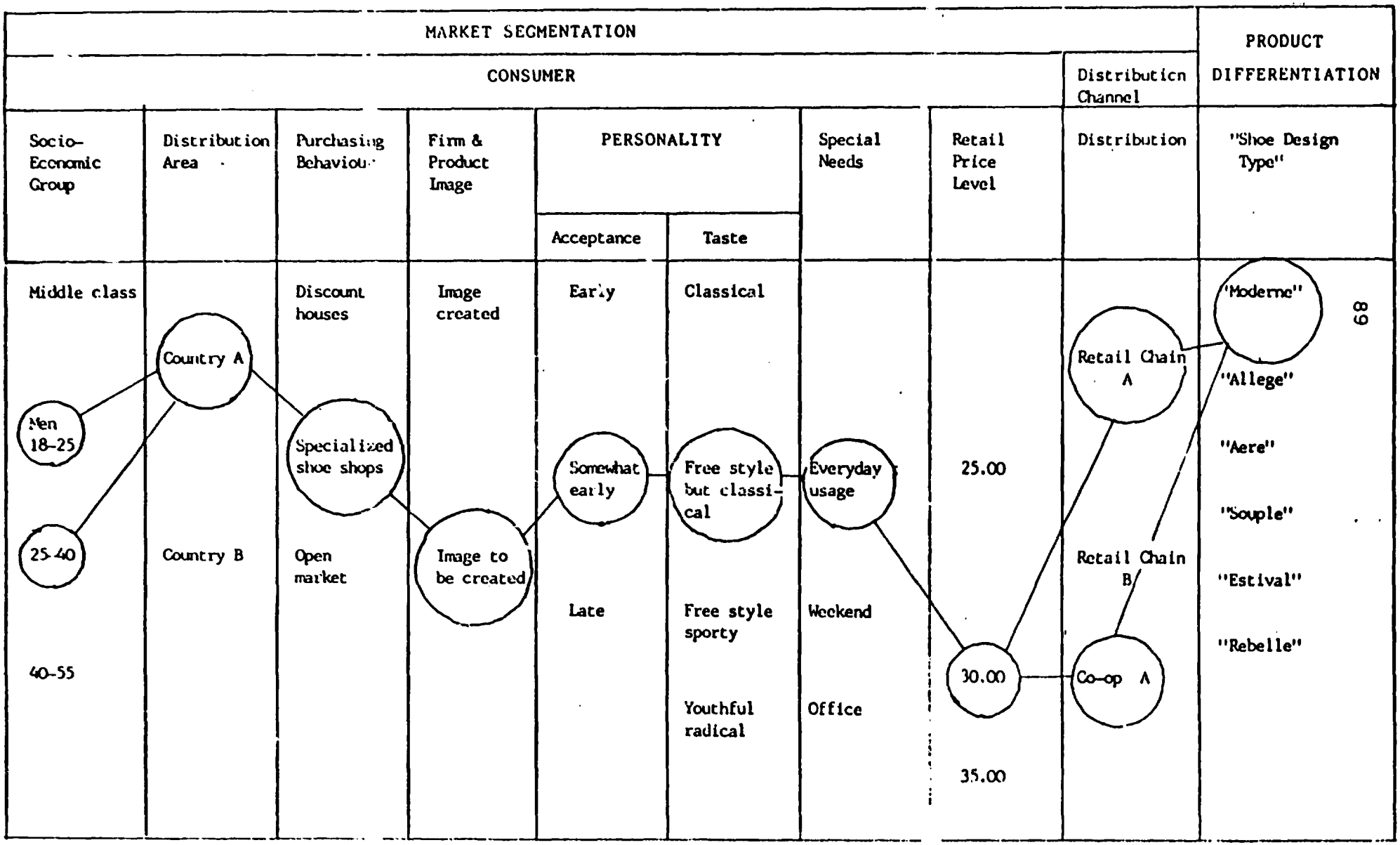


Table 4.11-1 Segmentation model for the leather goods market



Times for responding to the market demands may vary considerably. This is overcome by setting out the timing of the process by having three different "trains":-

- Normal train
- Fast train and
- Express train

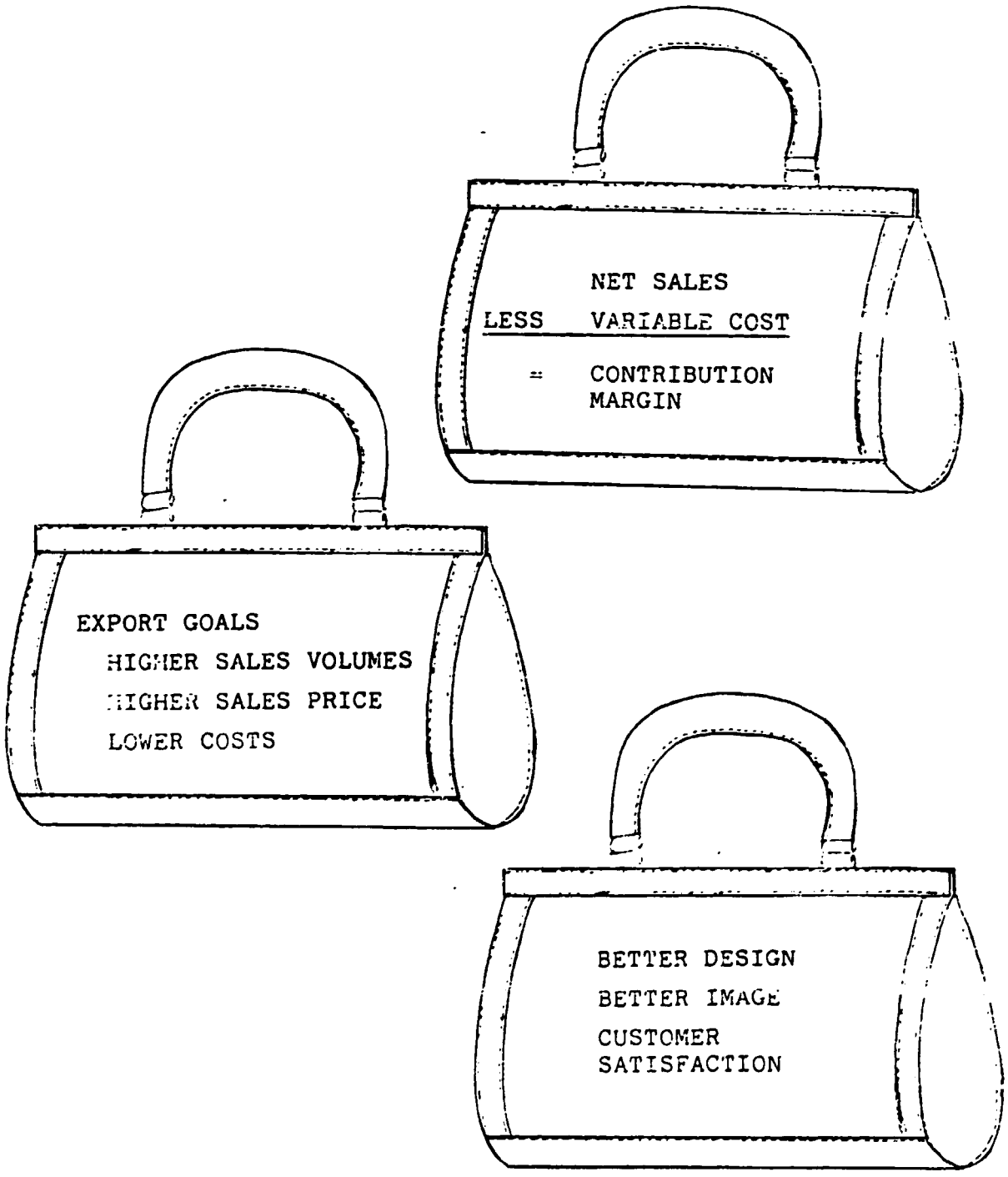
as illustrated in Table 4.11-2

Table 4.11-2, Timing of product development

Stage / Stage completed	"Express" for Paris Fair DATE	"Fast train" for Düsseldorf Fair DATE	"Normal train" for domestic DATE	Responsible
Pre-design				
Design				
Selection				

Continued success in designing leather products for a segment may contribute to the achievement of higher sales volumes or sales prices. Higher sales prices may be gained by up-grading the product to higher-priced segments. One should also note that the majority of factors influencing the cost of a product are determined while it is in the development stage. Marginal costing will again aid planning for higher profits or, for that matter, for higher added value, as shown in Figure 4.11-3.

Figure 4.11-3, Product development and contribution margin



4.12, Marketing planning

The teaching of production management techniques and their application to the raising of productivity is a comparatively simple matter; but if the outlets for the resulting increase in production cannot be developed at the same time, rising productivity is likely to result in cutbacks in the labour force. It would not be too much to say that the creation of markets - and thus of increased opportunities for employment - is one of the burning problems of the developing world[35].

The creation of markets - looked at broadly, the creation of purchasing power - is not something that lies within the power of a single firm. It is problem involving economic and social factors that are multiple and interdependent, and one that will certainly not be solved solely by the application of modern marketing techniques by the individual enterprise. Neverthless, it has been shown that marketing techniques applied in developing countries have been able to orient substantial sectors of the population - even those living at the margin of the money economy - towards buying consumer goods, thus putting money into circulation[35].

Close to the customer

Recent studies conclude that excellent companies are close to the market.

However, the customer for many companies is the extent to which, and the intensity with which, the customer intrudes into every nook and cranny of the business - sales, manufacturing, research, accounting. The excellent companies <u>really are</u> close to their customers. That's it. Other companies talk about it; the excellent companies do it[31].

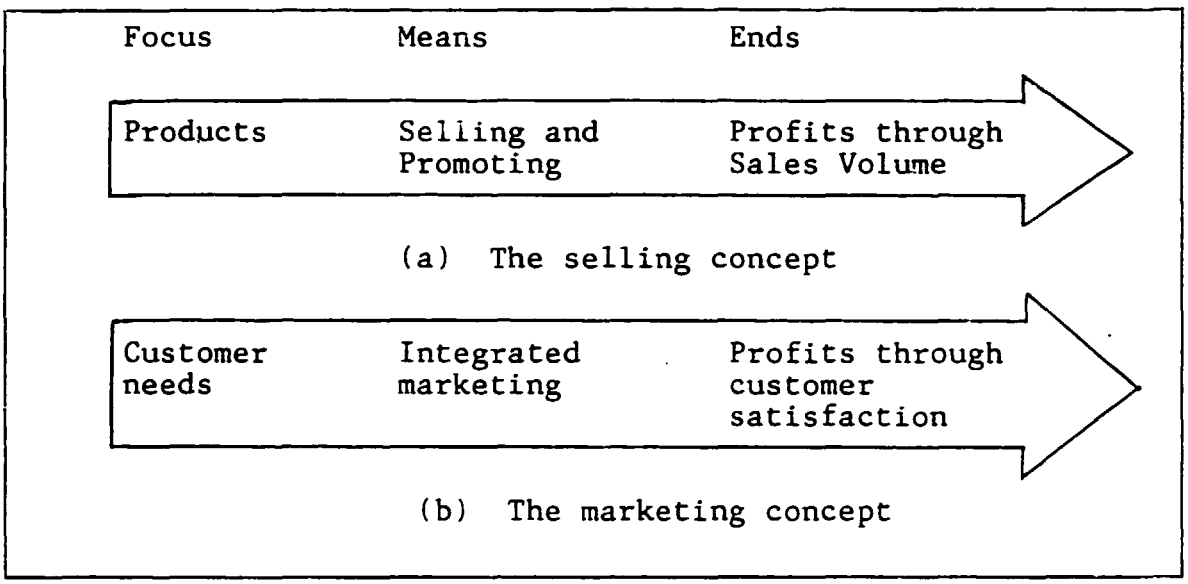
An enterprise to stay close to the customer needs to adopt a philosophy - the Marketing concept.

Marketing concept

The marketing concept holds that the key to achieving organizational goals consists in determining the needs and wants of target markets and delivering the desired satisfaction more effectively and efficiently than competitors[33].

The difference between selling and marketing is that the latter focuses on the needs of the buyer. The contrast between the selling concept and the marketing concept is further shown in Figure 4.12-1[33]. The concept is the foundation for modern marketing planning.

Figure 4.12-1, The selling and marketing concepts contrasted



Marketing planning model and process

Excellent companies are better listeners. Most of their real innovation comes from the market. Excellent companies are also superb competitor watchers. In pricing strategy they are not for high market shares by low price; rather their goal is for profit.

Marketing planning, model in Figure 4.11-2, has the demand, competition and institutional factors as variables, and the mission, broad objectives, policies and resources as inner variables. The model is an input/output model to plan the utilization of identified opportunities.

Planning starts by the segmenting of the market, continues by outputs planning and iterates with the marketing activities and resources mix.

Marketing planning as a process is illustrated in Figure 4.12-3. Market analysis and business assessment is outlined in Annex 6.

Segmentation of the market prepares the ground for marketing planning. A segmentation exercise was illustrated in Table 4.11-1. A hierarchical method of segmentation is shown in Annex 7.

Figure 4.12-2, Marketing planning model[40] modified

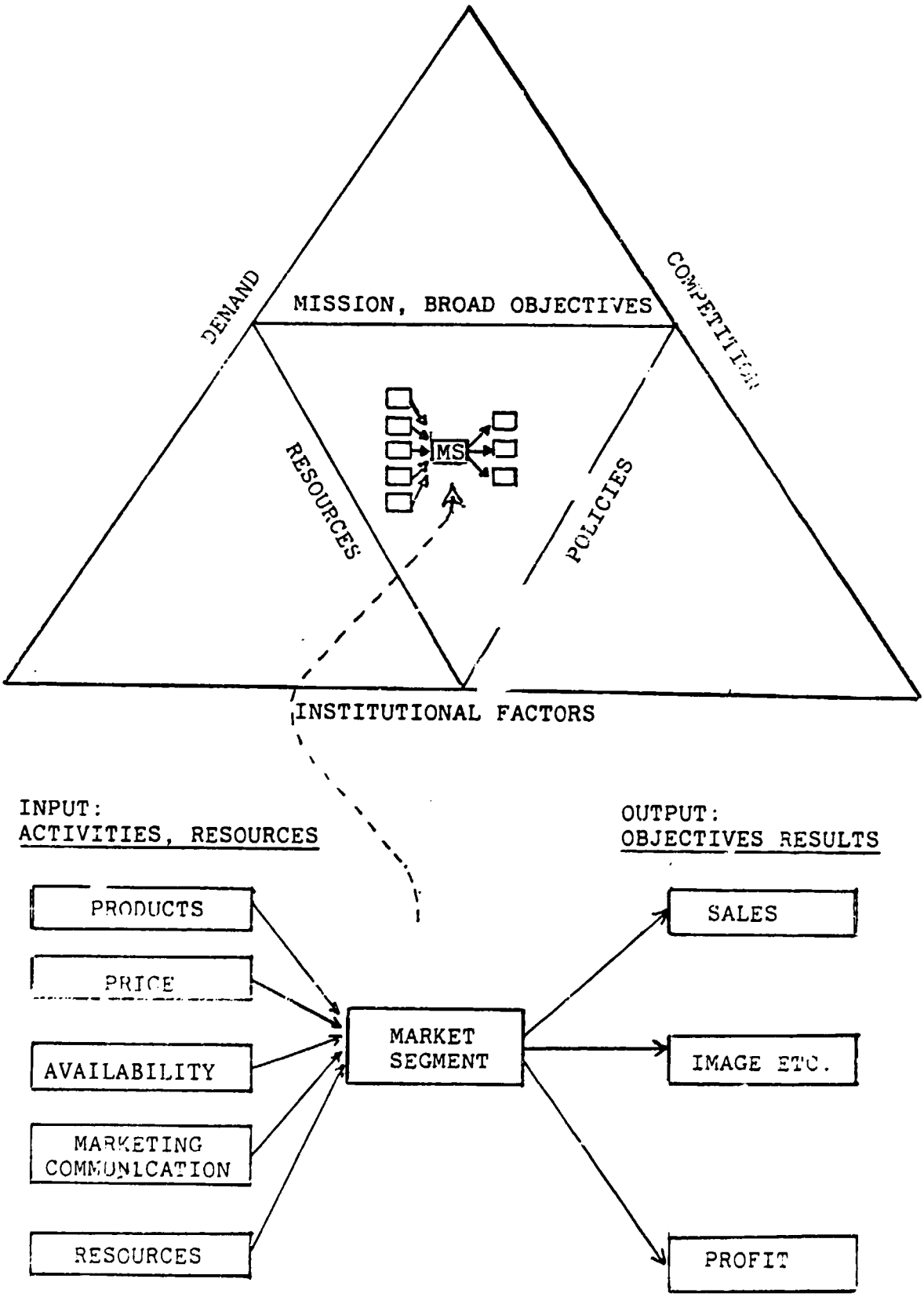
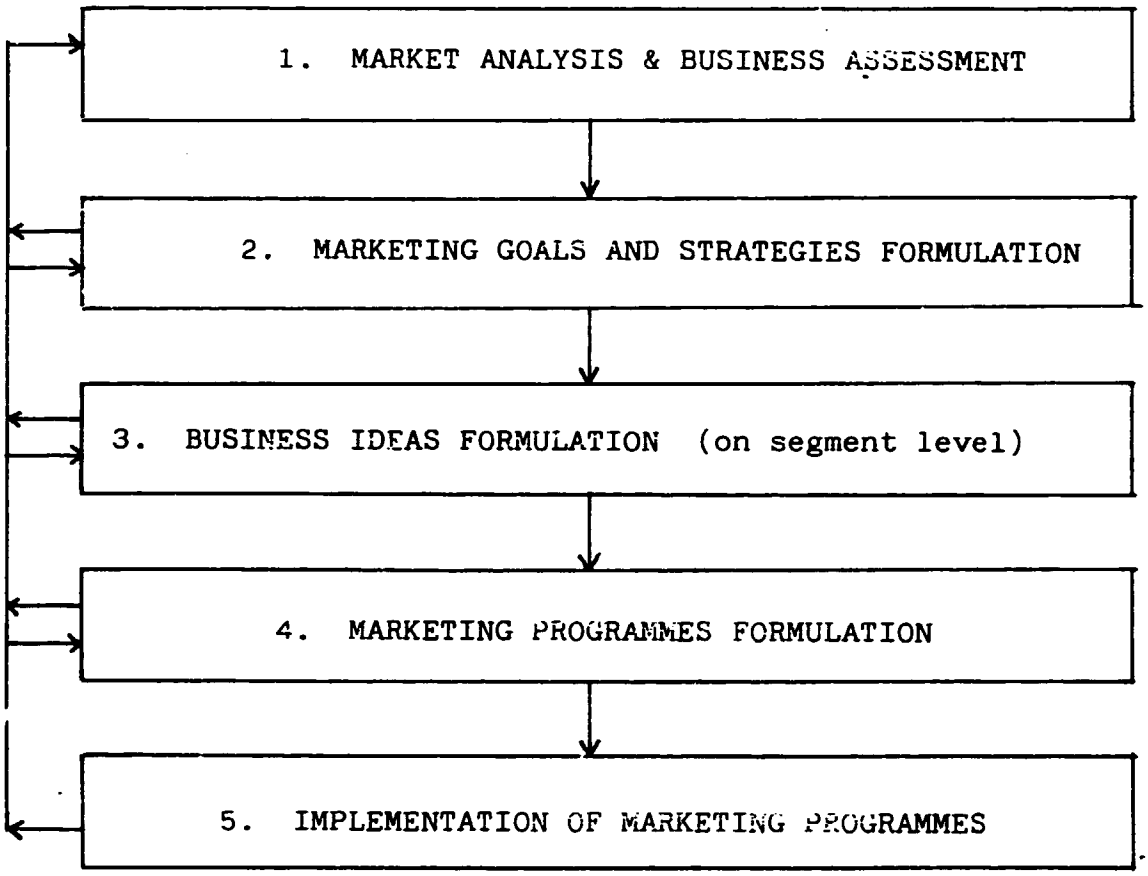


Figure 4.12-3. Marketing planning as a process



To achieve successful results, marketing planning and its implementation should be well integrated with other functions and systems of the enterprise, because the activities are backed up by a number of other activities, as illustrated in the diagram in Figure 4.12-4.

Country, company, brand product, etc. - image is a prerequisite for selling goods to any market segment, this being one of the major obstacles when starting export, not only in the minds of consumers but of distributors as well. To build company and brand image usually takes years, even decades. The image gained may suffer a set-back if the product, service price competitiveness, delivery dates or communication demands are not continually met.

Export

Export start may have to be assisted by an experienced marketing consultant. The consultant could study and give advice on:-

- Selection of markets and segments, this related to local manufacturing potential;
- Establishing product ranges, related to suitable manufacturing technology and materials;
- Establishing an arrangement for the gathering of fashion information on style, material, colour etc. trends; or arranging a supply of complete design-service including patterns, components etc.;
- Selection of distribution channels, and deciding on distribution price structures;
- Deciding on strategies or sub-contracting, joint-venturing etc.;
- Providing free trade status for exporting enterprises, ensuring access to foreign exchange for material imports, and exporting currency;
- Providing incentives such as tax incentives, accelerated depreciation etc ;
- Infrastructural support such as streamlined banking and customs services, transport and other logistical services, export salesmanship and secretarial training, subsidized sales promotion campaigns etc.

Exchange rates

The state of exchange rates plays a role in making sure the industries are competitive in export markets in relation to competitor nations; a ratio compared to competitor's ratio in wages is shown in the following:-

- $\text{ratio} = \frac{\text{nominal wage}}{\text{productivity}}$

Marketing results quantified

Marketing results, and those of previously-established export marketing, can be quantitatively reviewed, not only as sales revenue but also as[34]:-

- Sales
  less Marketing costs
  less Variable manufacturing costs
  = Marketing contribution

Marketing costs will take into account warehousing, distribution, advertising, selling and sales office costs, plus discounts given and bad debts.

An enterprise is trying to achieve an optimum balance between:-

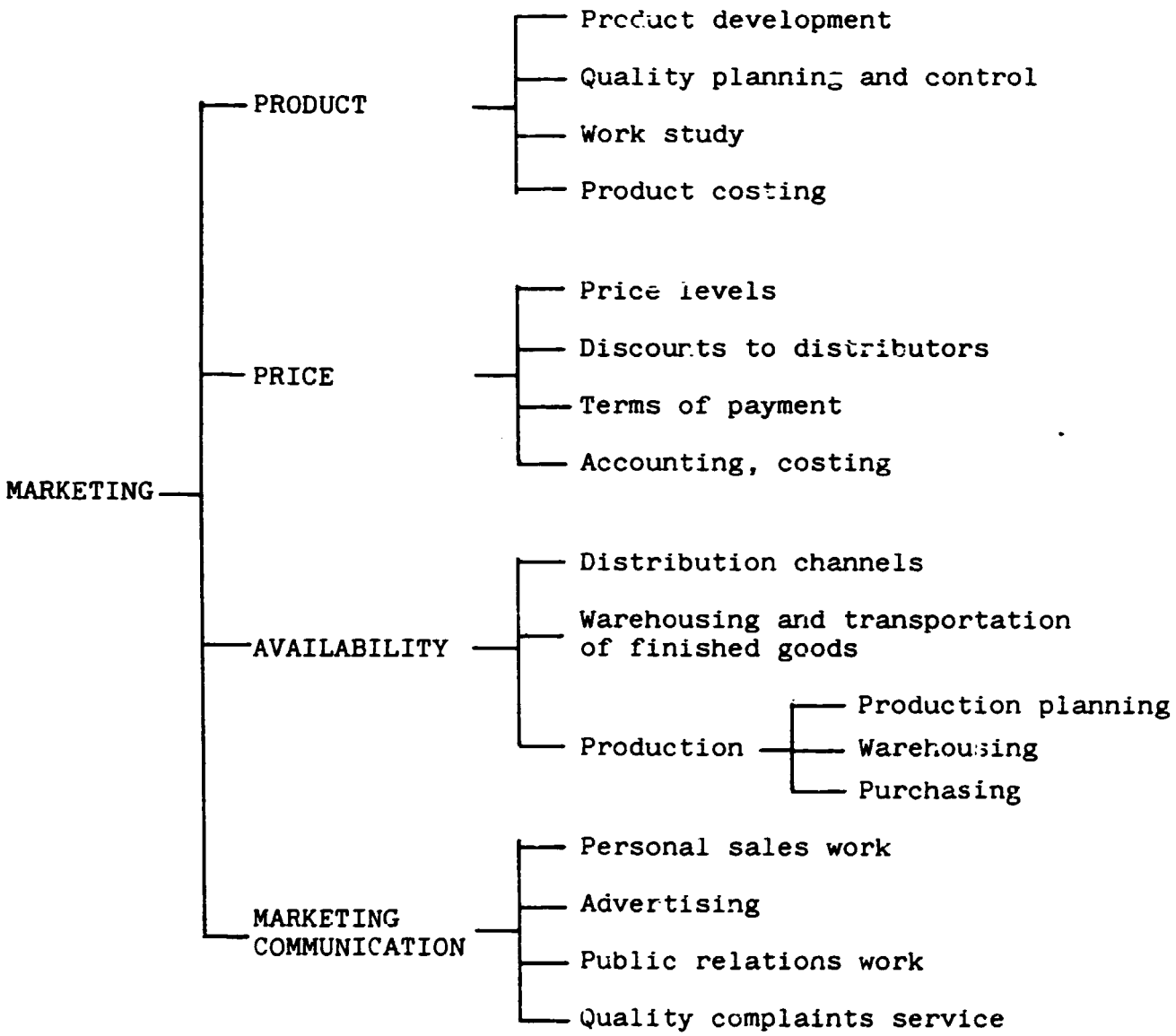
1. Maximization of profitables sales
2. Minimization of marketing costs
3. Minimization of assets used

A ratio that measures the combined results of achieving a balance between all three of the above objectives is:-

$$\frac{\text{Marketing contribution}}{\text{Marketing assets}}$$

Marketing assets will include finished goods stock, debtors, sales and distribution vehicles etc. The ratio is used for planning and follow up of each market segment.

Figure 4.12-4, Tree diagram of some back-up activities and policies of leather products marketing



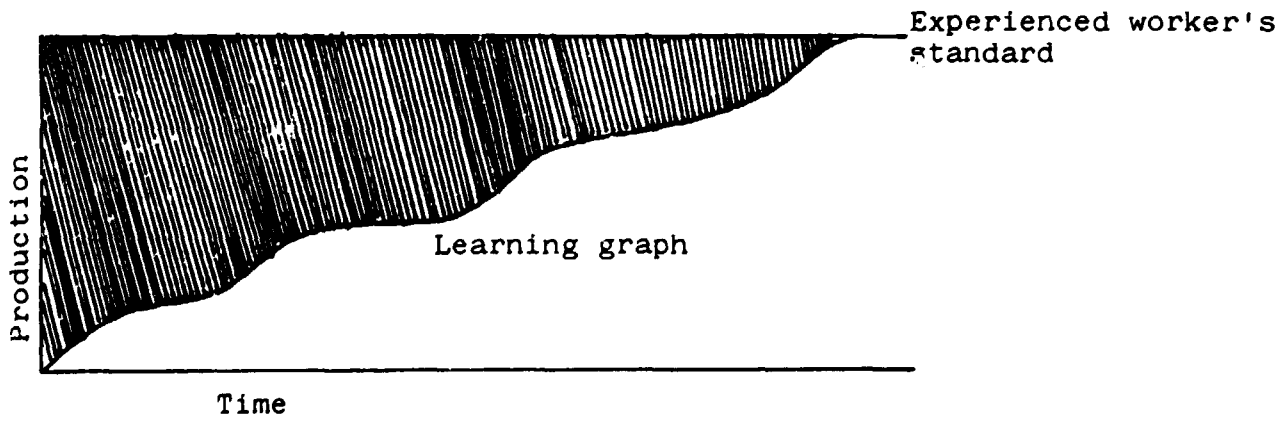
4.13, Training

The importance of training is expressed by Mr. T.H.R. Perkins, Managing Director Perkins Engines Ltd:- "If managers could determine their requirements for labour in the ideal industrial situation, training would be largely unnecessary. Industry would recruit employees capable of meeting in full the requirements of their jobs from the moment they joined an organization, and able quickly to adapt their skills and knowledge to changing technological requirements and operating needs. Unfortunately, this idyllic situation does not exist. We have to accept that few, if any, employees enter our factories and offices able to meet our requirements without some familiarization, and employees have to acquire many of the skills and much of the knowledge we require of them after they have joined the company. We have to incur the considerable overhead expenditure involved in training, whether it be the hidden cost of learning informally or the direct cost of providing controlled and organized training[36].

Costs to attack by training

The ultimate responsibility of management for training can be seen on the graph in Figure 4.13-1[36]. The area to the left of the learning graph represents loss of production and therefore loss of money; this in some cases may result in loss of reputation of the company on its market.

Figure 4.13-1, A representation of the loss of production by trainees not yet at experienced worker's standards



Typical losses caused by untrained workers and other personnel are:-

- low production volumes
- low machinery utilization
- poor utilization of materials
- fluctuating quality of products, unnecessary rejects and repairs
- high accident levels

Analytical training

By Skills analysis a job or task is broken down and analysed for skills and knowledge. In Synthesis the analysed facts are then grouped together to establish "easily digest ble portions".

Learning to perform each portion and finally the complete task motivates the trainee to learn, and even to apply for further training.

The relationship between many of the management systems of this paper and the analytical training can be illustrated in the phrase "work study states what should be done, skills analysis teaches how the what is to be achieved". Similar relationships can be found between other systems and training.

An example of widely used analytical training system for leather products stitching is given in Annex 8.

Supervisory and management training

A manager's training needs may be divided into three categories[37]:-

- Intellectual knowledge
- Problem solving skills
- Skills of social interaction

Training programmes may include job rotation, planning, reading, special projects, projects with consultants, membership committees, etc. in addition to running internal training courses and sending managers and supervisors on external courses, having ascertained the individual's training needs. Creative change programmes that are discussed in the next chapter, let participants learn from each other and that normally leads to training needs identification and to balanced training programmes.

4.14, Creating change

Consultants working with managements of industrial enterprises, with government and other officials, have found that some key members of the organizations have, at times, a surprisingly vague knowledge of goal-related value premises, the market and other working environment based systems concepts. This causes goal-related conflicts and tension, resulting in an unsatisfactory level of efficiency. For this reason, an enterprise or organization needs a planned change process designed to utilize local inputs in terms of human resources.

Baseline

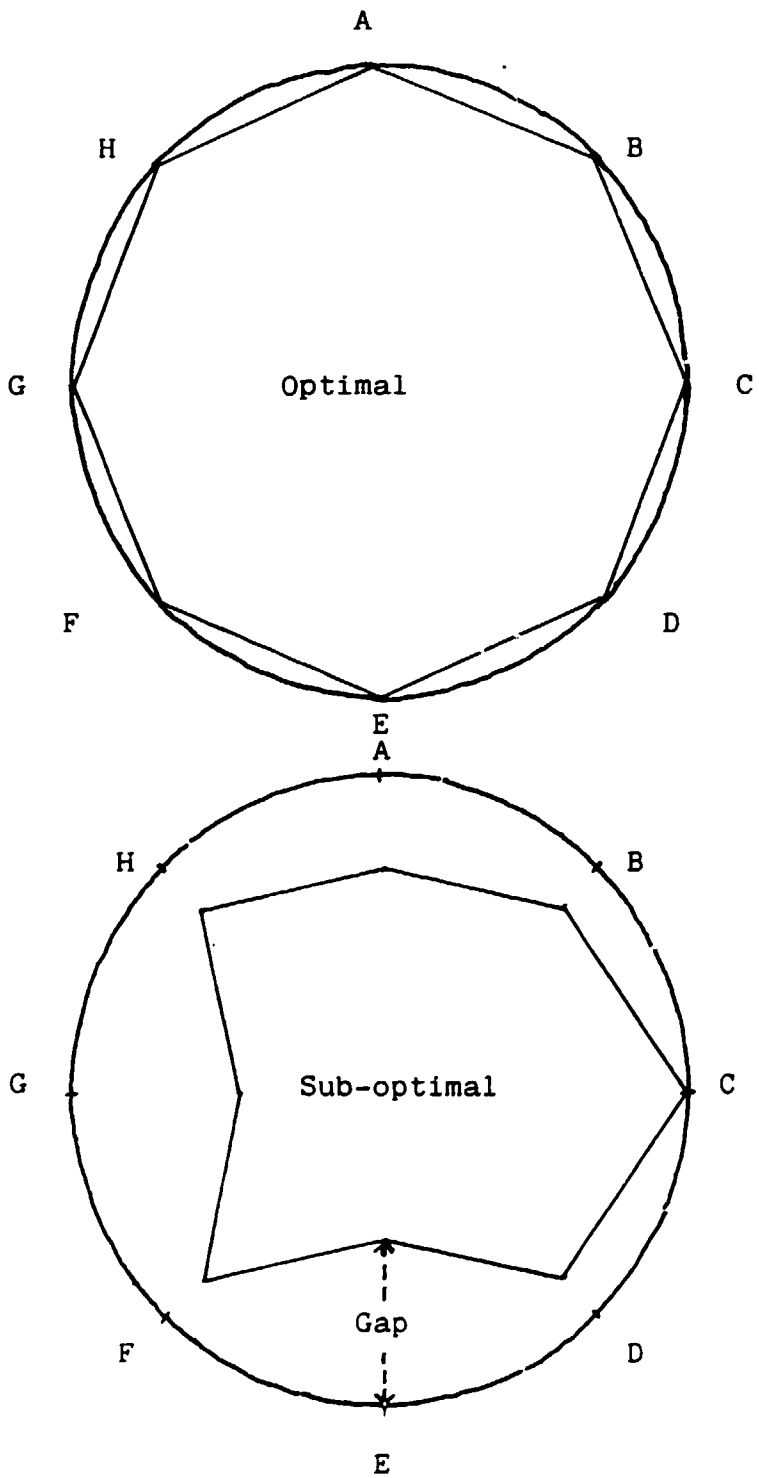
Creating change needs a baseline that addresses the problem. Logically, the first step is to identify the problem. The problem is the difference between the present status and the goals towards which one is aiming. Even the aims may still be in vague form, so an interactive approach is to be preferred.

Cutting the problem down to workable dimensions is often difficult. Specifying the aims or goals in practical terms may be equally problematic.

In order to utilize the potential, the aim could be defined as "optimizing" the utilization of opportunities and resources, that are available or to be created, to jointly agreed satisfactory level. An "optimal" and "suboptimal" situation are illustrated in Figure 4.14-1. The opportunities and resources in need of development for a trade or enterprise may be found in areas of:-

A. Utilization of added value potential
B. Utilization of assets employed
C. Technological skills
D. Managerial and administrative skills
E. Motivation
F. Infrastructural services
G. Entrepreneurial climate
H. Terms of trade
I. Financial markets
J. Development assistance

Figure 4.14-1, Utilization of potential and resources



Some human input dimensions

If we pass through monotonous landscape we gradually stop expecting something new to appear along the road. After a while we may even overlook the variation that exists. If we have to walk a road through such a landscape we may end up like sleepwalkers. If we drive a car we are in danger of running into a serious accident... The organizational landscape became monotonous and a lot of people started to behave like sleepwalkers or like bored and irritated passengers in motor cars[39].

And some more excerpts of human input dimensions:

Many young people are discovering that work rather than leisure can satisfy their hunger for self expression and creative challenge[27].

There are higher percentage of unique events than before, a lot higher in many established companies. Predictability is therefore sliding. All the existing control systems can do in many companies is to hamper the development of appropriate replies by the members of enterprise. Management heritage is aimed at order, not inventiveness or responsiveness[27].

Confidentiality is the enemy of trust[38]. When the facts of business life are kept as secrets, how does the latent creative energy of the corporation get on[27].

Management is not just a question of efficient service delivery or of effective control over the existing allocative systems. It is change oriented field concerned with the institutional dynamics of social justice. The problem is that administration in most third world nations is more marked by incapacity than by imaginative, responsive institutions[15].

In larger companies, the aim of systems people is to minimize risks; in smaller ones, the management uses systems to ensure concentration of resources on the most attractive opportunities... This is difference; risk minimizing vs. resource optimizing... The systems are defensive in nature... Decoupling systems from the structure needs to be a high-priority agenda item for managers intent on doing something more than merely "rearranging the deck chairs on the Titanic" in search of more entrepreneurial behavior[27].

But achieving original goals is not always the best measure of implementation. Implementation is also an ongoing process of goal redefinition and development, dependent upon learning, flexibility, and experimentation[15].

One of the reasons that the appropriate technology movement provokes so much controversy is that it challenges traditional relationships. When people feel little control over the technology they work with, changes are all the more threatening[15].

> The reward system in innovative companies emphasizes investment in people and projects rather than payment for past services - for example, moving people into jobs for which they must stretch or giving them resources to tackle projects they define... The other important conclusion about rewards is that they occur throughout the accomplishment process rather than in the end[32].

There is no magic in creating change. Managers' role in the process is to act as catalysts of pushing the autonomy and the power to innovate down the line, and to create participation, information sharing; letting everyone know what is going on. The managers' role is also to make sure that the jointly planned programmes are implemented.

Results-oriented management (ROM), a planned change process

Results-orientated management (ROM), is a planned change process developed by ILO assistance at the Productivity Improvement Centre of the Ethiopian Management Institute. The Institute has succesfully applied this system in production, maintenance and export marketing management in Ethiopian industries.

The process is designed to help management master its true role in the uncertain business world and to work as an effective tool in creating change.

The ROM process[6], is divided into integrated phases for co-alignment of actions. Each phase has its objective in the process for searching, learning, decision making and feedback. The phases or steps of the process are:-

(1) Identification of problems and opportunities
(2) Training in (production management, maintenance management, marketing management etc.) problem solving.
(3) Conducting an "external" work assignment in one of the factories or enterprises, for the participants to learn more about the methodology employed.
(4) Conducting an "internal" work assignment to start the process in one's own factory or enterprise.
(5) Scheduling the implementation in one's own factory.
(6) Carrying through the implementation.
(7) Evaluation of formal implementation of the change process.
(8) Evaluation of actual results achieved, and planning of a new process.

The phases help the participants, key personnel of different organizational functions and levels, to search for and process information, conceptualize problems through interaction with other members, locate strengths, weaknesses, threats and opportunities of the enterprise or trade, search for key strategic variables, agree on gaps, analyse causes and consequences of each gap and brainstorm solutions, and to create action plans with quantified results to be implemented and followed up by the team. The system is designed to allow participants to utilize the knowledge, views and ideas at hand and reinforce the emotional involvement of the members.

Management systems models, such as marketing planning, production planning and maintenance planning, are incorporated into the ROM process as "matrix systems", and participants learn them while using them. These systems are only starting points for creative thinking. The teams soon create their own language and systems.

The main ROM process can be run as a marketing process, involving the whole organization. It is experienced that the process very quickly branches out to special projects, some of which can also be run by the ROM procedure. The management should be aware not to overextend itself, by having too many change efforts in process at the same time.

ROM process leads to a creative conflict management, having rewards based on results of environmental footing and penalties based on social control of the participants. The multiplying effect is built into the system by letting the consultant introduce the process to several factories or organizational units simultaneously.

Self-help exercise

Although space constraints do not allow this paper to provide further elaboration of the change processes, a short self-help exercise can be conducted by the organizations interested in identifying their development opportunities and needs, and to start projects.

For problems and opportunities identification, a short seminar (lasting a few days) can be conducted, by inviting participants from different functional and organizational levels of the enter-

prise(s) or trade(s) concerned including people from related government, etc., agencies. The exercise could be conducted by the following methodology, by:-

(a) Analysing by questionnaire

Let participants discuss and debate questions in Annex 9 in small mixed groups, a few questions to be discussed at a time. The groups report their findings to the whole seminar for further debate. The groups then return to discuss further questions.

(b) Analysing the strengths, weaknesses, opportunities and threats.

Results agreed upon by debates in the seminar as a whole are recorded on "SWOT" sheets as shown in Figure 4.1-2. Partic pants will realize that through planned activities taken, weaknesses can be made into strengths and threats into opportunities.

Figure 4.14-2, SWOT sheet

STRENGTHS:	WEAKNESSES:
OPPORTUNITIES:	THREATS:

(c) Determining the gaps

The group as a whole will determine development gaps by:-

(1) agreeing on the aim;

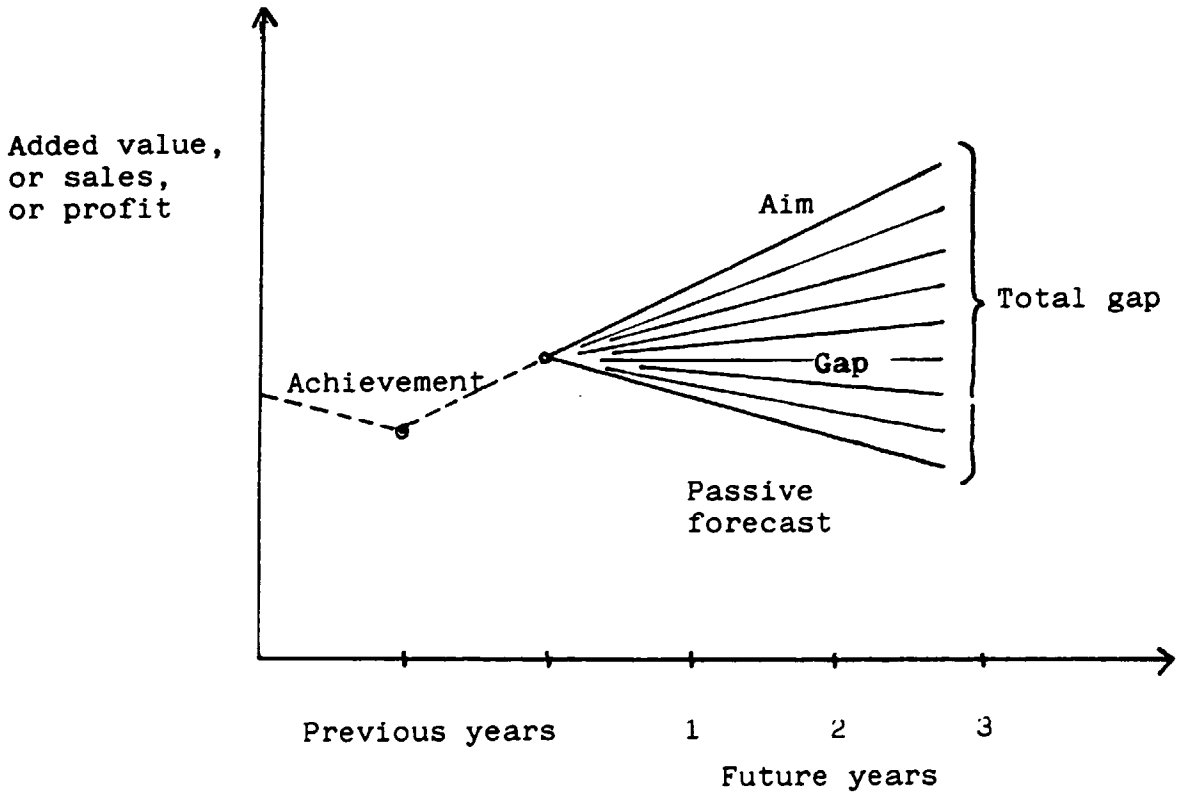
(2) agreeing on the passive forecast, as if no extra effort and resources were allocated;

(3) finding the total gap, and

(4) agreeing on gaps (maximum eight-ten gaps), as illustrated in Figure 4.14-3.

The aim is related to opportunities, the passive forecast quantifies the situation "if we continue our business without development efforts".

Figure 4.14-3, Total gap and gaps



(d) Analyzing each gap

Each group is given one to three gaps to be analysed, by filling the form in Figure 4.14-4. The groups report their findings to the whole seminar for further debate, and finalizing the information on the forms.

Figure 4.14-4, Gap analysis

Gap:
Gap defined:
Gap relates to opportunities of:
Causes and effects of the gap:

(d) Agreeing on results to be achieved
The interactive group work continues by determining 8-14 results to be achieved in the next 6-10 months in an effort to eliminate the total gap.

(e) Agreeing on activities and responsibilities
The groups and the whole seminar work out the set of activities and responsibilities, for each result, as illustrated in Table 4.14-1. Responsiveness will be built into the system by considering alternative actions in case of unplanned events occuring.

(f) Agreeing on follow up procedures
Finally, the seminar agrees as to how the activities will be co-ordinated and followed up. The team leaders may decide to meet the managing director and consultant (if any) once a week.

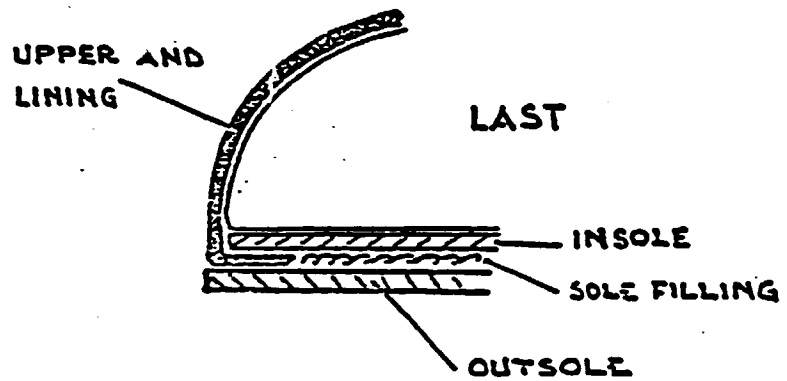
(g) Individual action plans
Each participant will prepare his/her own action plan and discuss that with the superior and other persons concerned; this after the seminar.

Table 4.14-1, Results-oriented work programme

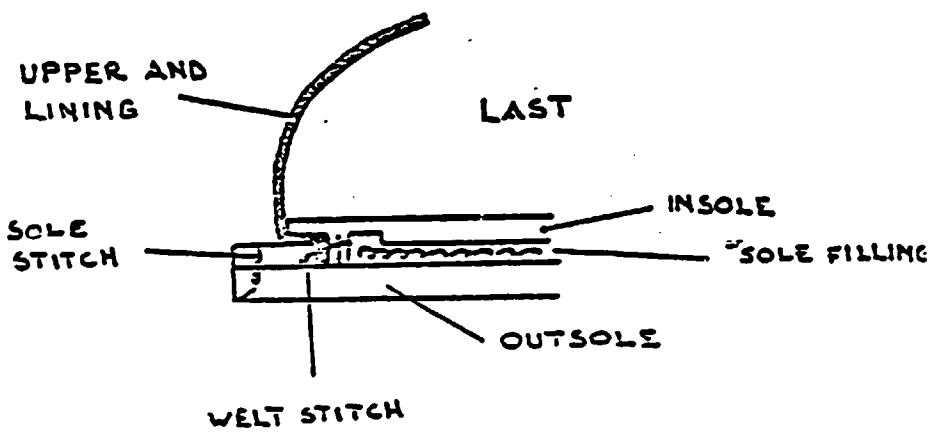
RESULTS TO BE ACHIEVED	ACTIVITIES TO BE CONDUCTED	UNIT	TARGET	PERSON RES-PONSI-BLE	RESOURCES TO BE ALLOCATED
1. Added value increased		%	10	Ms. ...	
		$US	---		
		date	Dec. '87		
2. Sales to export market X		$US	---		
	- Fact-finding tour to market X	date	Jan. '87	Mr. ...	$US ...
	- Four new products ready	"	Dec. '86	Mr. ...	
	- New agent to be selected	"	Feb. '87	Mr. ...	
3. Adequate quality improved					
- adequate quality %- age		%	98	Mr. ...	
		date	Mar. '87	Mr. ...	
	- Quality examinining operational	"	Dec. '86	Ms. ...	
	- Quality circles enhanced	"	Dec. '86	Ms. ...	
4. Material wastage reduced	- Work study introduced	date	Feb. '87	Mr. ...	Consultant
	- Cutting standards and payment incentives introduced	date	Oct. '87	Mr. ...	Consultant
5. Production bottlenecks opened	- Production planning enhanced	date	Feb. '87	Mr. ...	
	- Import procedures streamlined	date	Mar. '87	Mr. ...	With government agency ...
6. (Etc.)					

ANNEX 1, Some common shoe bottoming constructions[20]

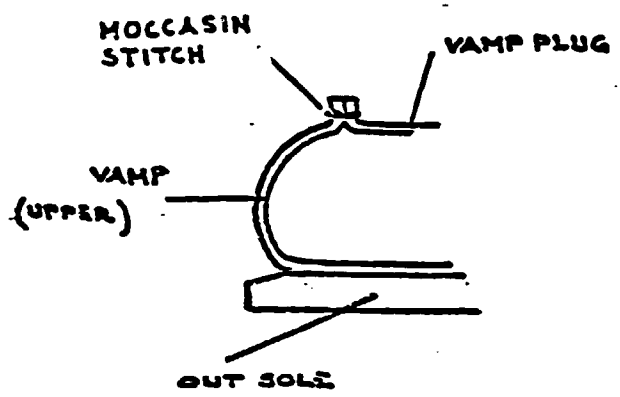
CEMENTED CONSTRUCTION.



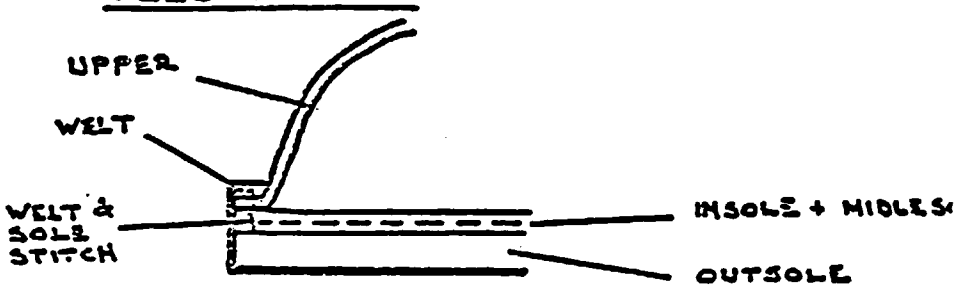
GOODYEAR WELTED



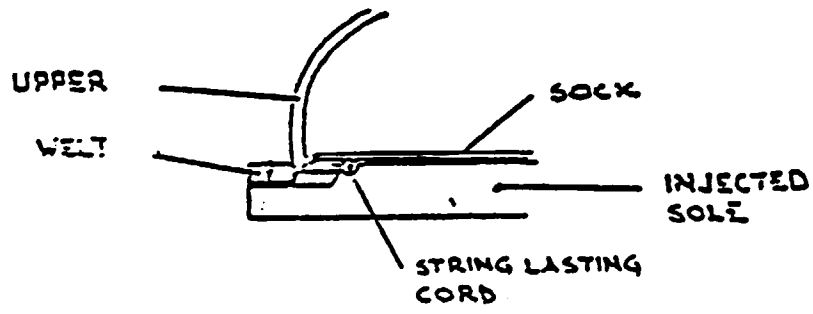
MOCCASIN



VELDTSCHOEN

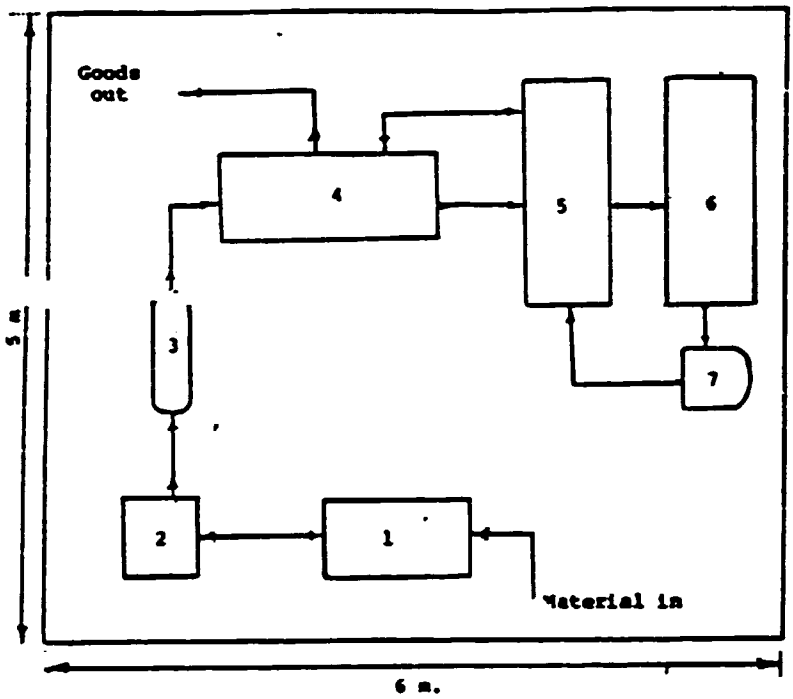


P-82 INJECTED



ANNEX 2, Layouts of different scale of shoe production areas for simple cemented footwear[5]

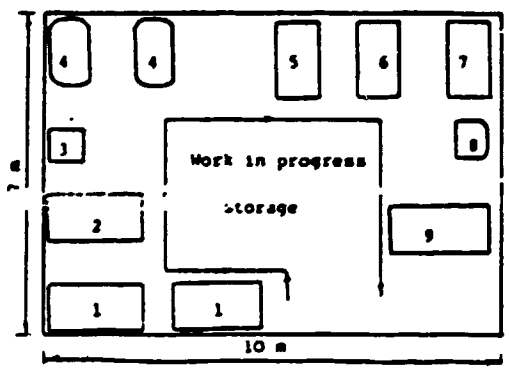
(1) Layout of production area for production of 8 pairs/day



Designation of work stations

1. Clicking
2. Embossing
3. Stitching
4. Upper finishing and packing
5. Lasting
6. Bottom preparation
7. Sole laying

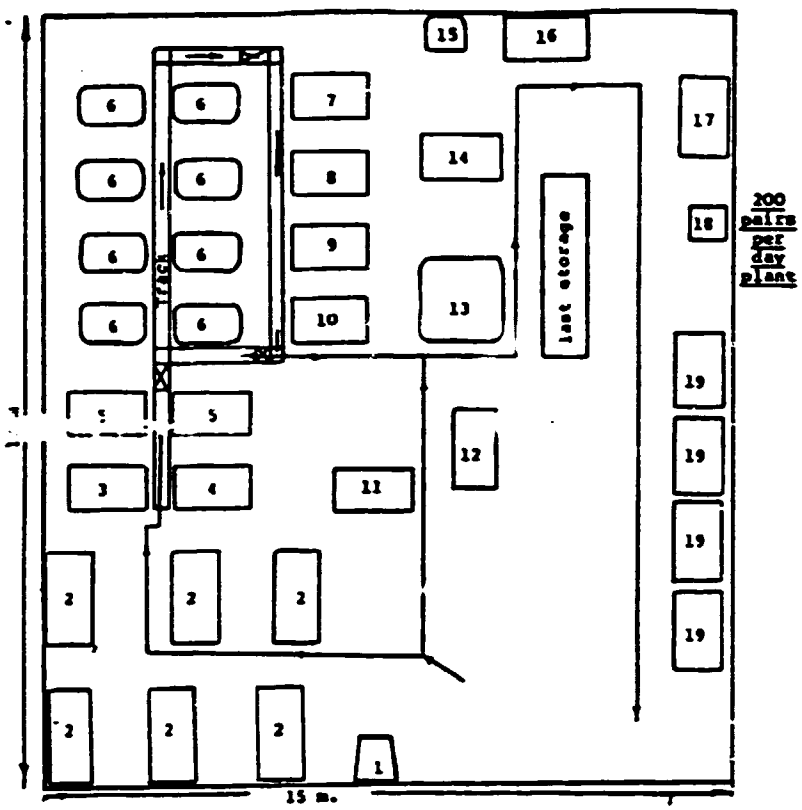
(2) Layout of production area for 40 pairs/day



40 pairs/8 hours

1. Clicking
2. Upper preparation
3. Embossing
4. Stitching
5. Upper finishing
6. Lasting
7. Bottom reparation
8. Sole laying
9. Finishing and packing

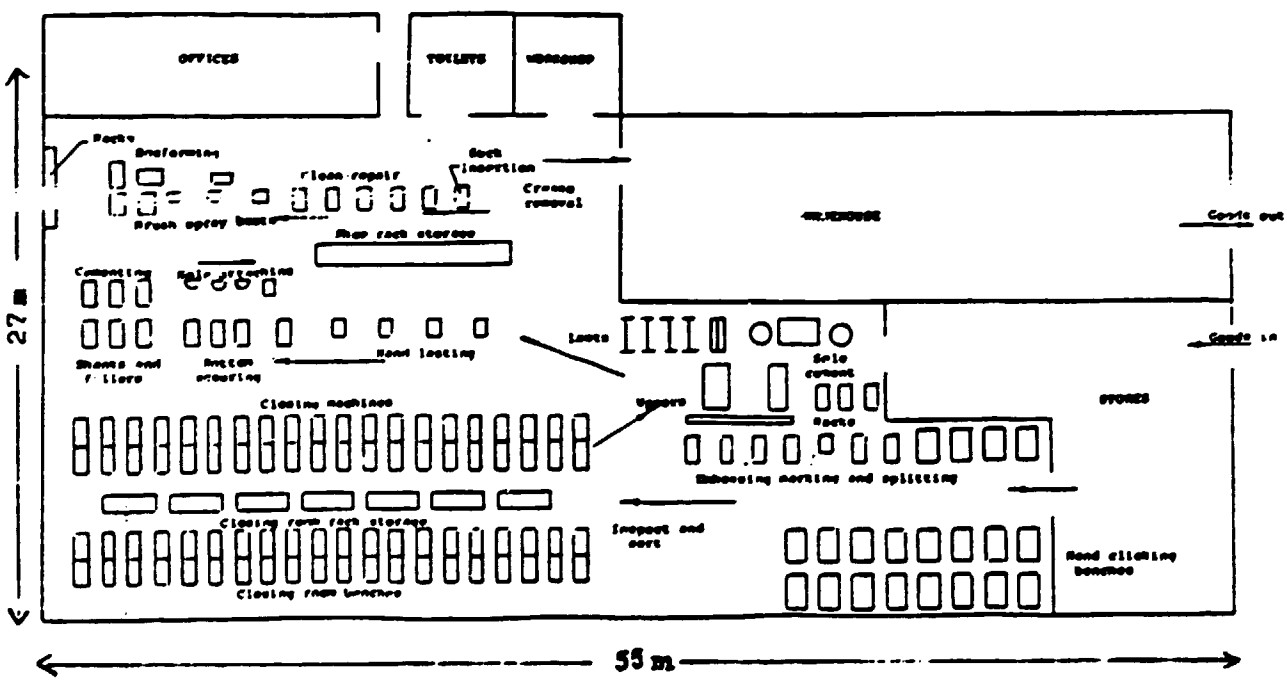
(3) Layout of production area for 200 pairs/day



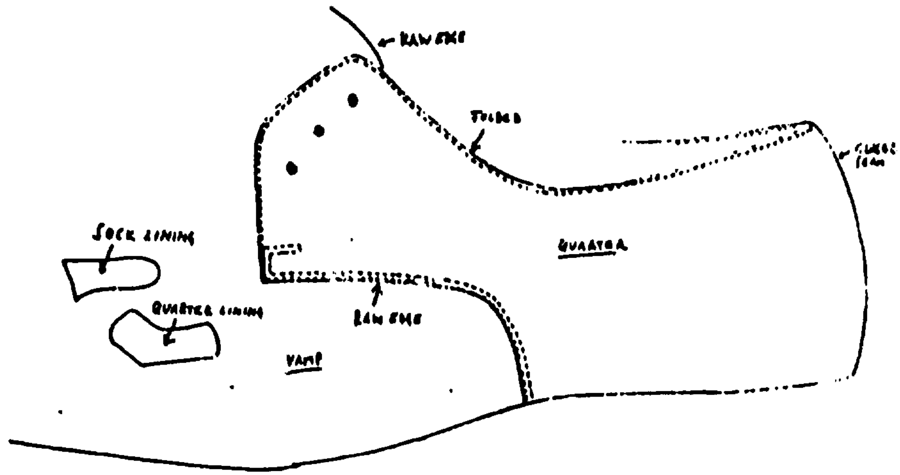
200 pairs/8 hours

1. Clicking machine
2. Hand clicking
3. Marking
4. Embossing
5. Skiving
6. Stitching
7. Seam reducing & taping
8. Eyeletting
9. Lacing
10. Upper fitting
11. Sole bench
12. Insole tacking
13. Lasting
14. Tack removal
15. Bottom roughing
16. Shank attaching
17. Bottom cementing
18. Sole laying
19. Finishing & packing

(4) Layout of production area of 1000 pairs/day

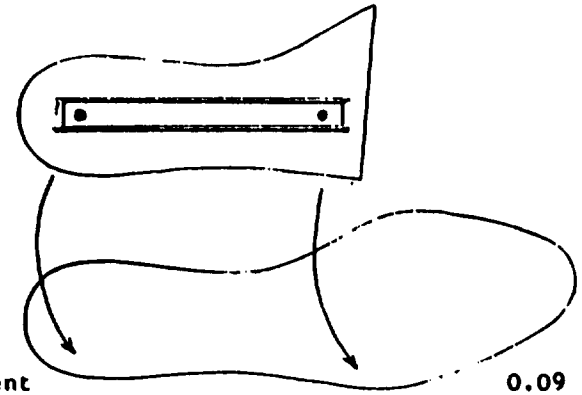


ANNEX 3, Standard times for a gents' shoe with pre-moulded unit sole, cemented bottoming construction (as illustrated in Figure 2-1)



OPERATION	STD. TIME MIN/PAIR	MACHINE
Upper cutting		
- Cut leather quarter lining and leather sock lining	0.87	Swing beam clicking machine
- Cut leather upper components	1.16	Swing beam clicking machine
- Examine cut parts	0.12	By hand
Upper preparation		
- Skive front of sock lining	0.08	Skiving machine
- Skive quarter lining	0.16	Skiving machine
- Skive upper parts	0.52	Skiving machine
- Mark lining for size etc.	0.08	Lining marking machine
- Emboss sock lining for trade mark	0.08	Sock embossing machine

OPERATION	STANDARD TIME MIN/PAIR	MACHINE
Closing		
- Seam back seam of quarter lining	0.18	1 - needle flat bed stitching m/c
- Seam back seam of quarters	0.18	1 - needle flat bed stitching m/c
- Reduce quarter lining back seam	0.06	Seam reducing machine
- Reduce and tape quarter back seam	0.06	Seam reducing machine
- Fold edge of quarters, apply tape	1.10	Folding machine with tape attachment
- Cement eyelet reinforcement to quarters	0.20	By hand
- Attach toe puff	0.23	Toe-puff fusing machine
- Attach quarter lining and top stitch (run round)	1.52	1 - needle post bed with lining trimmer
- Eyelet	0.15	Eyeletting machine
- Stitch vamp to quarters and bar tack	2.59	1 - needle post bed stitching machine
- Lace temporarily	0.28	Lacing machine
- Examine uppers	0.12	By hand



Insole preparation		
- Cut hardboard reinforcement	0.09	Travelling head cutting machine
- Skive reinforcement	0.06	Heavy duty skiving machine
- Groove reinforcement	0.07	Insole grooving machine
- Mould reinforcement	0.20	Insole moulding machine
- Attach steel shank by rivetting	0.31	Shank rivetting machine

OPERATION	STANDARD TIME MIN/PAIR	MACHINE
- Cut leather fibre board insole	0.18	Travelling head cutting machine
- Size-stamp insole	0.05	Size stamping machine
- Cement and attach reinforcement to insole	0.59	By hand, extractor for fumes
- Mould insole	0.14	Insole moulding machine
- Bevel the edge of insole at shank	0.14	Insole bevelling machine
Toe puff preparation		
- Cut toe puff, non-woven material	0.11	Travelling head cutting machine
- Skive toe puff (may not be needed)	0.04	Skiving machine for toe puffs
Counter (stiffener) preparation		
- Cut counter, non-woven material	0.11	Travelling head cutting machine
- Skive counter (may not be needed)	0.09	Skiving machine as for toe puffs
Sole preparation		
- Rough unit sole (rubber)	0.60	Unit sole roughing m/c, dust extractor
- Brush dust	0.14	Revolving brush
- Cement unit sole	0.50	By hand, extractor for fumes, drying rack
Lasting (making) - finishing (shoe room)		
- Moisten uppers	0.16	Mulling room, water spray
- Select lasts and insoles		
- Wax lasts		
- Tack insoles onto last	0.24	Insole tacking machine
- Insert thermoplastic counter	0.33	By hand

OPERATION		
- Mould back part of upper	0.55	Back part moulding machine
- Load conveyor, put upper on last	0.08	By hand
- Steam toe and last forepart	C.48	Toe streamer and toe-part lasting machine
- Last seat and waist, put to heat setting	0.34	Combined seat and waist lasting machine, heat setting machine
- From heat setting, chase wrinkles, remove insole tacks	0.84	Hot air blower
- Scour surplus, rough lasting allowance and brush dust	0.63	Lasting margin scouring, roughing and brushing m/c and dust extractor
- Cement lasting allowance and attach pre-cut bottom filler	0.55	By hand, extractor for fumes
- Fetch soles	0.03	By hand
- Heat activate, lay and press sole	0.50	Sole activating unit and sole laying press machine
- Clean dust from shoe etc.	0.70	By hand
- Remove last	0.16	Last slipping m/c
- Cement and insert sock lining	0.43	By hand
- Spray finish	0.48	Spray gun and booth
- Examine ready shoes	0.12	By hand
- Fold and staple shoe box and lid	0.43	Box stapling machine
- Pack shoes	0.13	By hand

BY SECTION:

Upper cutting		2.15	
Upper preparation		0.92	
Closing		6.67	
Lasting - finishing		7.18	
	SUB-TOTAL	16.92	16.92
Insole preparation		1.83	
Toe puff preparation		0.15	
Counter preparation		0.20	
Sole preparation		0.70	
	SUB-TOTAL	2.18	2.18
	TOTAL		19.10 min/pair

LABOUR REQUIREMENT FOR PRODUCTION OF 1,200 PAIRS IN 8 HOURS (= 480 MIN) AT 70 PER CENT PERFORMANCE:-

$$\frac{1{,}200 \text{ pairs} \times 19.10}{480 \text{ min}} : 0.70 = 68 \text{ direct operatives}$$

LABOUR PRODUCTIVITY:-

$$\frac{1{,}200 \text{ pairs}}{68 \text{ operatives}} = 18 \text{ pairs/operative/day}$$

Note:-

The shoe upper in this example is rather simple. A more complicated upper would have higher work content.

ANNEX 4, Common material testing methods for shoe quality control

a) In the case of shoe upper linings, some basic tests are:-

Test	To show
Tensile	Strength properties in each direction
Elongation	Stretch properties in each direction
Tear	Resistance to tearing when strains are applied
Grain crack at lasting	Withstand toe lasting operation
Adhesion	Bonding property to adhesive used
Flexing	Endurance to flexing before cracking
Finish Adhesion	Bonding property to adhesive used
Compatibility of finish with solings	To avoid discoloration problems after components are assembled
Seam strength	Resistance to tearing away from sewn seams
Abrasion	Relative resistance of material to abrasion under a specific set of conditions

b) In the case of soling materials, some basic tests are:-

Test	To show
Density	Basic characterization property of material, low density materials are lighter than high density materials
Hardness	Relative hardness/softness. This, with density, is used to characterize materials
Tensile & Elongation	Basic properties of material for strength and stretch
Tear	Relative ease of tearing solid or expanded materials
Adhesion	Bonding property to adhesive used
Flexing	Endurance to flexing before cracking
Abrasion	Relative resistance of material to abrasion under a specific set of conditions
Shrinkage	Sensitivity of material to shrinkage when exposed to heat

c) Some basic tests for components are:-

Test	To show
Density	Basic property to characterize material
Tensile	Basic strength property of material
Elongation	Basic stretch property of material
Stitch tear	Resistance to tearing after stitching
Adhesion	Bonding property to adhesive used
Flexing	Endurance to flexing before cracking
Impact	Ability of material to withstand impact forces
Fatigue	Ability of material to withstand repeated forces in wear before deteriorating
Abrasion	Relative resistance of material to abrasion under a specific set of conditions

ANNEX 5, Product development stages and activities

1. PRE-DESIGN

1. Goals and strategies as planning base
2. Business ideas for each segment as planning base
3. Segment the market
4. Analyse the market
5. Analyse fashion
6. Select segments
7. Prepare time-tables
8. Brain-storm product outlines
9. Instruct own suppliers
10. Draft marketing plan
11. Draft production plan
12. Select and order materials for samples

2. DESIGN

13. Design and cut patterns for prototype I
14. Let prototype I be made
15. Prepare prototype I costing
16. Review prototype I
17. Prepare prototype II
18. Let prototype II costing be done

3. SELECTION

19. Study customer reaction
20. Select and allocate materials and components to the production lines/segments
21. Select designs
22. Set selling price
23. Decide on test marketing and/or wear tests
24. Allocate roughly to production plan

4. PATHFINDER

25. Grade patterns
26. Make pathfinder
27. Conduct wear test (when necessary)
28. Conduct test marketing (when necessary)
29. Let quality sample be made
30. Let sales samples be made

5. TOOLING

31. Allocate to production plan
32. Make tools
33. Start production

ANNEX 6, Market analysis and business assessment

1.1 Segmentation

1.2 Own sales

1.3 Own image profile

1.4 Well-contributing/less-contributing products, services, customers, distributors, etc.

1.5 Demand analysis

1.6 Competition analysis

1.7 Institutional factor analysis

1.8 Forecast on demand, competition etc.

1.9 Own strengths, own weaknesses, threats and opportunities compiled

1.10 Passive forecast and gap analysis.

ANNEX 7, Hierarchial approach to market segmentation

Level	Segment
1	Male/female
2	Age group
3	Rural/suburban/urban
4	Retail price level
5	Product type
6	Country/province
7	Distribution/sub-distribution

Example of segmentation of shoe market:-

1	Female
2	16 - 24
3	No relevance
4	$US 40
5	"Survic"
6	Federal Republic of Germany, Bavaria
7	Retail group...

ANNEX 8, Training System for Stitching Machinist

The training system for stitching-machinist is for training operatives towards higher labour and machine productivities, towards production of high-quality products, and is used in order to reduce time needed for training.

The system is based on principles of:-

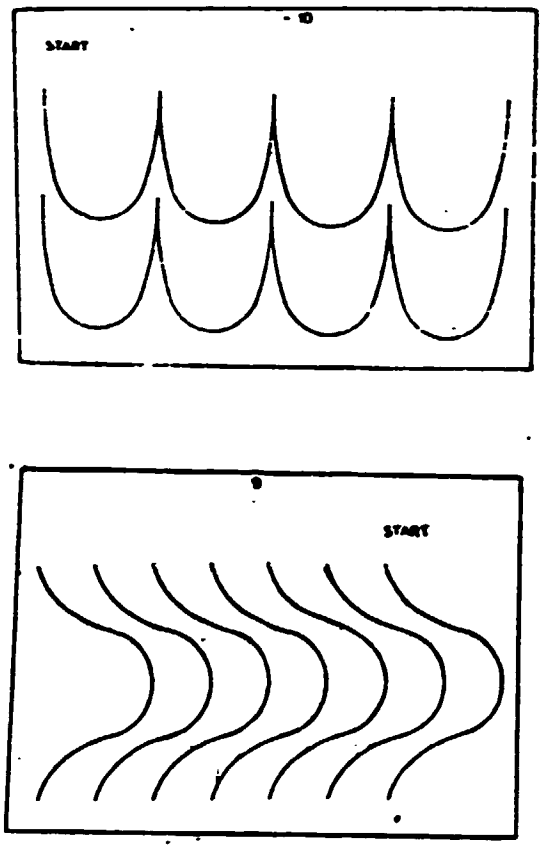
a. Progressive part method used
b. Targets for performance and quality set for all stages
c. Standardized "best methods" used, based on work-study principles
d. Each trainee progresses at his/her own rate
e. Trainees receive information throughout entire training.

The progressive part method stages are:-

a.1. Operation broken down into basic skills;
a.2. Each basic skill learned independently;
a.3. Two basic skills combined and learned as a combination of skills;
a.4. Another basic skill added to (a.3.) and the three learned as a combination of skills;
a.5. Further skills added one at a time until all basic skills are combined.

The training is conducted in needle-threading, machine-threading, bobbin-changing, needle-changing, tension adjustment, positioning parts under presses wheel, stitching straight lines, circular lines, bursts, speed control, seams, etc. Most of the exercises are based on stitching patterns onto sheets of paper, as shown in Figure A-1.; after that the trainee is ready for operation training. For the majority of exercises, the operative times himself/herself and compares performance to the target times given. The quality of the work is evaluated using a "points" system of defects.

Figure A-1., Examples of training system exercises for stitching machinists



ANNEX 9, Self-evaluation questionnaire

1. How do you evaluate our competitive profile on the market in terms of:-
   - our product or product range
   - our price(s), discounts, terms of payment
   - product availability on the market
   - marketing communication, including sales work, advertising etc. ?

2. Is there added value potential as yet unutilized by us: if so:-
   - in which products
   - by how much in financial terms ?

3. Are our products well in demand, are there any problem areas, is there still growth potential ?

4. What is the width and depth of our product range:-
   - from a marketing point of view
   - from a production point of view ?

5. What are the demand life cycles of our products and
   - which are our ageing products
   - are there new ones to meet market demand changes ?

6. How do you judge future change in market demand?
   - what are our competitors doing
   - what should we do in response to this ?

7. How do we meet our customers' requirements
   - in product packaging
   - in product warehousing and transportation
   - in product appearance
   - in other quality characteristics of our products
   - in product weight and shape
   - in product grading
   - in handling convenience
   - in shelf life, resistance to chemicals etc. ?

8. Are we pricing our products too low/high ?
   - how could we add more value by raising prices
   - how could we serve local demand by pricing lower/higher
   - how do you judge our discounts and credit terms in the sense of motivating distributors to work for us ?

9. How well have we selected our agents and distributors ?
   - are they willing to allocate their activities to selling our products ?

10. Are we efficient in making our products and services available on the market
    - by meeting delivery deadlines
    - in delivery times in relation to market demand
    - in the speed of despatch ?

11. How customers see the quality of marketing communications efforts of:-
    - our sales work
    - our advertising and public relations activities ?

12. Is our marketing communication characterized by:-
    - being a two-way process, also receiving information from the market
    - handling customer complaints efficiently
    - planning personnel and other resources needs well in advance ?

13. How do you rate our product development process ?
    - do we get enough fashion trends information
    - should our design capabilities be improved
    - are we allowing innovative processes to produce new products or are we too bureaucratic, thus hindering change
    - is our product development a well-systematized process meeting deadlines and other requirements set ?

14. Could we improve capacity utilizations by:-
    - improving our production planning and control
    - improving maintenance procedures
    - introducing payment-by-results schemes ?

15. Are we using work study and ergonomics in order to:-
    - reduce the work content of the products and operations
    - improve material utilization
    - improving administrative procedures
    - measure work
    - improve working conditions for the benefit of our workers ?

16. Do we have well determined quality-policy and quality-control procedures ?
    - are our quality costs known
    - do we act promptly and effectively if products do not meet specifications set ?

17. How much more added value could we achieve by more efficient utilization of materials ?
    - in which materials or production processes could we save on costs ?

18. How do you judge our material purchases:
    - could materials and components be purchased more cheaply
    - should our suppliers meet their delivery times better
    - could we use more local materials
    - do we need more streamlined banking, insurance and other infrastructural services ?

19. Are our inventories too large in:

- raw materials
- work-in-progress
- finished goods ?

20. Are we planning for profit

- by having our budgets based on marketing and production planning ?

21. Of our resources allocation:

- should we allocate financial, personnel and other resources in a more balanced manner ?

22. Do we have motivational problems. Are we to improve in our organization, outside our organization

- our reward systems
- team work, participation
- information sharing, feedback
- ways to give power to decide
- innovation, entrepreneurial climate ?

23. What are the infrastructural systems and services to be improved

- transportation
- customs
- telephone, telex
- financial markets ?

24. What kind of problems we face in building new industries. Should we build co-operation and strategic alliances with

- customers
- suppliers
- competitors
- government and other agencies ?

25. Which training and consultancy needs are at present most needed to improve

- technical skills
- management skills
- other skills ?

by having

- in-plant training
- extension agents
- training institutes
- regional training institutes ?

26. In which areas do we need to have more information, to be analysed by

- market analysis
- work study
- costing
- other methods ?

27. Do we have to rethink our strategy ?

- what is our present mission and strategy
- market factors
- financial factors
- other business environment related factors.

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