Japan International Cooperation Agency
Ministry of Industry and Commerce
The Republic of Zimbabwe

THE MASTER PLAN STUDY
ON
THE PROMOTION OF SMALL AND MEDIUM SCALE ENTERPRISES
IN
THE REPUBLIC OF ZIMBABWE

(REPORT ON FIELD SURVEY AND DIAGNOSIS FOR FOUR PRIORITY INDUSTRIES)

NOVEMBER, 1998

THE MATERIALS PROCESS TECHNOLOGY CENTER
(SOKEIZAI CENTER)
SYES CO., LTD.

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CONTENTS

1. GENERAL

1. General

This is the REPORT on facts found and its diagnosis for SMEs in each of the four priority industries.

1-1 Field Survey of SMEs

a) Selection Criteria of Subject Enterprises

The enterprises selected for the Study mainly consisted of SMEs (althought some large enterprises were also included) in the four priority industries. The definition of a SMEs in Zimbabwe is not the same as that in Japan and there is no legal or customary definition of a SMEs. Consequently, the following criteria were used to select the SMEs which were the main subjects of the Study.

① Enterprise belong to the four priority industries

② A small enterprises with upto 100 employees and judged to be a formal business entity

③ An enterprise recommended by MOIC as having a positive management attitude or judged by the Study Team to have a promising future

④ An enterprise run by an indigenous owner in line with the indigenisation of Zimbabwe's economy

The breakdown of the 84 surveyed enterprises by industry and location is shown in Table 1.

Table 1 Industrial Background and Location of Visited Enterprises

Location	Metal Processing	Food Processing	Textiles / Clothing	Wood Furniture	Total
Harare	8	8	6	7	29
Bulawayo	6	6	4	6	22
Masvingo	3	2	2	0	7
Kwe Kew	3	2	1	2	8
Gweru	3	2	3	2	10
Mutare	2	2	2	2	8
Total	25	22	18	19	84

b) Survey Method

The main component of the survey was interviewing of the owner or top executive of each enterprise, spending approximately half a day per enterprise. The survey results were classified in a format and were then evaluated according to the criteria as shown on Table 2.

Table 2 Check Point List for Evaluation

	Check Item	Very Bad (Point 1)	Bad (Point 2)	Moderate (Point 3)	Good (Point 4)	Very Good (Point 5)
Technology	Engineering	empirical imitation	intermediate	same extent of design standard available	intermediate	capable to develop own design
	Delivery Control	can not keep planned schedule	intermediate	keep as scheduled	intermediate	can accelerate schedule
	Facility Maintenance	many machinery not functional	intermediate	machinery and jigs moderately used	intermediate	machinery and jigs repair facility available
Quality	Raw Material/Parts	non standard materials are used widely	intermediate	standard materials are used (SAZ)	intermediate	international standard materials are used
	Processing	accuracy very bad and many mending	intermediate	accuracy moderate and less mending	intermediate	accuracy very good and no mending
	Finishing	faulty products many	intermediate	faulty products scarce	intermediate	faulty products non
Profitability	Facility Usage	50% facility in operation	intermediate	70% facility in operation	intermediate	90% facility in operation
	Labour Productivity	50% worker on work	intermediate	70% worker on work	intermediate	90% worker on work
	Financial Status	red for 3 years successively	intermediate	black for recent year	intermediate	black for 3 years successively
Marketing	Strategy	random	intermediate	domestic market oriented	intermediate	endeavor for export
	Products Development	stage of copying	intermediate	partial development	intermediate	unique product available
	Market	competition with informal sector	intermediate	middle class clients in domestic market	intermediate	partially export
Labour	Worker's Skill	skilled worker scarce	intermediate	skilled/helper moderately mixed	intermediate	multi skilled worker available
	Work Attitude	whispering, no concentration on job	intermediate	moderate concentration on job	intermediate	heavy concentration on job
	Work Environment	no attention paid	intermediate	lighting, ventilation moderate	intermediate	very clean and orderly

1-2 Diagnosis for Model Enterprises

From among the visited enterprises, 10 model enterprises (three in metal processing, two in food processing, two in textiles/clothing and three in furniture) were selected for diagnosis with a view to identifying as well as providing advice on managerial problems and providing guidance to achieve technical improvement.

(Note 1.Advice on managerial problems is carried out for 5 enterprise only those who provides financial report for successive 3 years.)
(Note 2. Guidance to achieve technical improvements are compiled in Annex II of this Report.)

1-3 General Picture of SMEs

The general picture of the four priority industries in Zimbabwe is described below based on the findings of the interview survey at the 84 enterprises and the diagnosis of the model enterprises.

a) General Characteristics of Visited Enterprises

The general characteristics of the visited enterprises are listed below.

- Most of the visited enterprises were established in 1991 or thereafter and are, therefore, newish enterprises (Fig. 1 refer).

- Partly because of the short history, the accumulation of own capital is not yet satisfactory.

- Despite plans to renew equipment and/or to expand business operation, fund raising is difficult.

- Compared to large enterprises, most of the visited enterprises are burdened with many handicaps, including a reluctance to provide finance on the part of possible lenders, disadvantageous payment conditions (cash payment required), gaps in terms of equipment and technology, difficulty to enter markets and difficulty of access to various types of information.

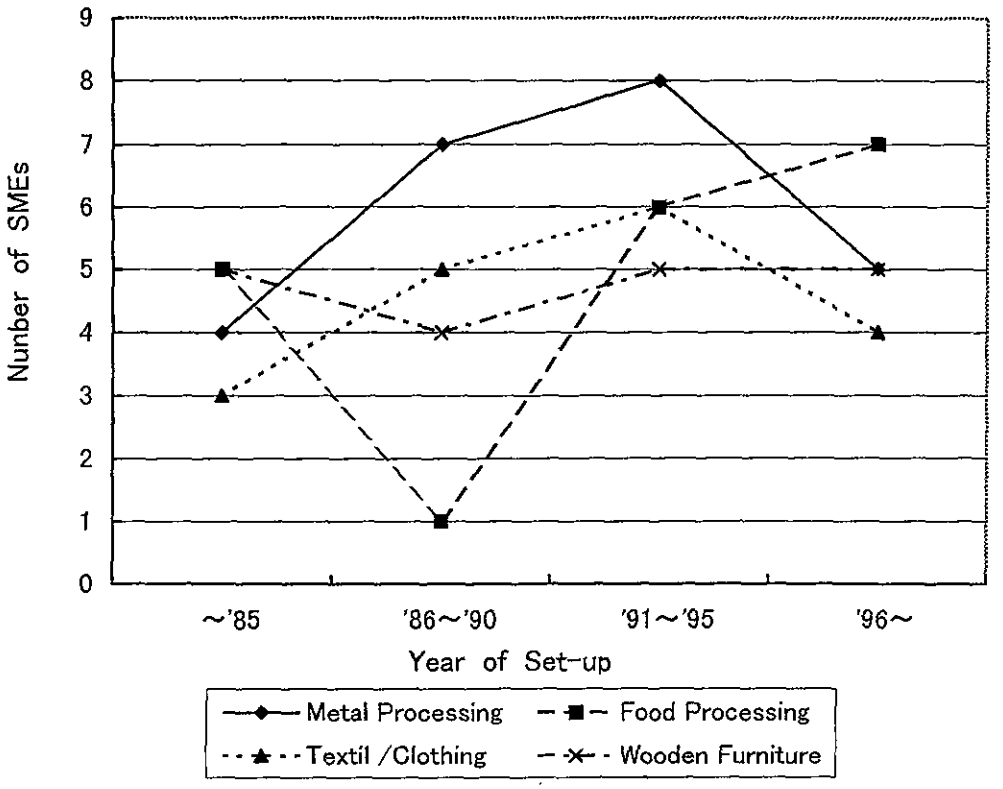


Fig.1 Year of Establishment

b) The general management situation is described below.

– Those enterprises which are managed by the owner, who has some managerial and technical expertise accumulated through the experience of working for a large enterprise, are generally performing well and enjoy steady growth.

– The predominance of dictatorial owners has prevented the emergence of reliable middle management, obstructing business development.

– Those enterprises where the white-led management has been indigenised tend to fall within the following descriptions.

• Those with only inherited equipment (whole or part) are not doing well in most cases.

• Those with inherited equipment as well as market are showing a reasonable business performance.

– Those enterprises which produce unique products (for example, reproduction furniture resembling antiques) or which specialise in certain products (for example, uniforms) are successful.

1-4 Problems Faced by Four Priority Industries

The visits to various enterprises found the problems outlined below. As problems which hinder development slightly vary from one industry to another, further details are given in 3.3 which deals with these industries separately.

- Because of the small domestic market, there is an ongoing process of bipolarisation into medium quality products (for the middle class in urban areas) and lower quality products (for the general public in rural areas).

- There has been a conspicuous increase of vary small enterprises in the informal sector in large cities (particularly in Harare). As a result, SMEs are felling pressure in such fields as wood furniture and the processing of thin metal (window frames and other products).

- The gaps between large enterprise and SMEs are particularly noticeable in the metal processing, food processing and wood furniture industries.

- Following market and trade liberalisation, the principal of the survival of the fittest has begun to penetrate industries due to reform of the previous industrial structure. Even large enterprises are facing a crisis of factory closure and/or production reduction.

- The business start-up and closure ratio of SMEs of 20 – 40 % is currently high depending on the type of business which is two or three times higher than that of industrialised countries. This high business start-up and closure ratio may indicate the dynamism of SMEs but is still a dangerous sign from the viewpoint of the stable development of SMEs. The introduction of administration measures designed to stabilise business operation by the government is desirable.

Further, the various problems faced by four priority industries are summarized in the following table from the viewpoints of technology, quality, profitability, marketing, management and labor, so refer to it.

Table 3 A List of Problems that SMEs in Zimbabwe Are Faced

	Outlined Problems	Corresponding Sectors	Measures to be Taken for Solution
Technology	· Production equipment is obsolete and is not maintained sufficiently.	All sectors	· Enhancement of training for the improvement of equipment maintenance and repairing skills.
	· Information of the newest technical trends and production equipment is insufficient.	All sectors	· Enhancement of technical and informational services by public organs, etc.
	· There are problems in the functions of products.	Metals, furniture	· Enhancement of consultations such as the offer of technology as well as support to designing, testing, prototype manufacturing, etc. by public organs, etc.
	· Delivery periods of product are not sufficiently managed. (Insufficient production management ability)	All sectors	· Enhancement of the guidance and consultation on production management skills.
Quality	· Poor quality of raw materials, auxiliary materials, and parts and accordingly poor quality of final products.	Metals, textile, furniture	· Expansion of the freedom in selecting supply sources.
	· Large dispersion in quality. (Insufficient quality management ability)	All sectors	· Enhancement of the guidance and consultation on quality management skills.
	· Deterioration due to improper use of jigs and tools, and auxiliary equipment.		
	· Quality suitable for domestic market cannot meet the quality requirement of the export market.	Metals, textile, furniture	· Enhancement of the guidance and consultation on machining skills.
		Metals, textile, furniture	· Establishment of polices for encouraging OEM, assigned production and exports, etc.
Profitability	· Low productivity due to the delay in rationalization and modernization of equipment.	All sectors	· Establishment of policies for fostering the modernization of production equipment.
	· Suppressed profitability due to the use of operating funds at a high interest rate.	All sectors	· Establishment of financing systems for small and medium-sized enterprises.
	· Suppressed profitability due to the inflow of foreign products in connection with economic liberalization.	Foods, textile	· Protection policies for domestic products within the permitted range (in terms of tariffs and taxes).
	· Suppressed profitability due to the loss of time in connection with the complexity of obtaining permissions, various procedures, and so on.	All sectors	· Improvement of administration efficiency through the rationalization and simplification of the operations of related organs.
	· Lowered competitive power due to the rise in cost in connection with the handicaps characteristic of an inland country.	Textile, furniture	· Promotion of cost reduction through the modernization and rationalization of custom clearance, distribution, and transportation.
Marketing	· Stable and continuous production is prevented by small sizes of domestic markets.	All sectors	· Expansion of markets through the promotion of exports; securing of order receiving opportunities on government procurement.
	· Information of market trends, new products, etc. is insufficient.	All sectors	· Enhancement of the collection of the information on foreign countries by public organs, etc.
	· Low image of products due to poor design, finishing, and packaging skills.	All sectors	· Enhancement of the guidance and consultation by public organs, etc. on industrial design.
	· Difficulty in participation in new markets due to the lack of new product developing ability.	Textile, furniture	· Enhancement of the guidance and consultation by public organs, etc. on the development of new products and manufacture of prototypes.
	· Small subcontract demand due to the underdevelopment of assembling industries.	Metals	· Enhancement of linkages between enterprises; promotion of work separation through the organization into associations or partnerships.
Management and Labor	· Difficulty in participation in new businesses due to insufficient training and/or learning in management skills.	All sectors	· Enhancement of professional education in the secondary educational course and the promotion of OJT.
	· Remarkable shortage of people of in the intermediate management layer (both managerial and technical).	All sectors	· Enhancement of managerial diagnosis and guidance as well as the promotion of OJT.
	· Manufacturing technology cannot be improved due to insufficient training and/or learning in skills.	All sectors	· Enhancement and fostering of professional training.

Note : The table shown in the above is a summary of the result of a hearing survey on local enterprise as performed by the technical group in this survey team.

2. METAL PROCESSING

LIST OF FACTORIES VISITED-METAL PROCESSING

DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ACCESSMENT	
20-May	MP-1	Managing Director	Location	Harare	Technology	3
			Capital	Z$ 4,000,000.	Qlty of Production	3
			Sales amount	Z$ 5,000,000.	Profitability	4
			No. of employee	48	Marketing	4
					Labor	3
					Total points:	17
20-May	MP-2	Operating Executive	Location	Harare	Technology	4
			Capital	Z$ 3,400,000.	Qlty of Production	4
			Sales amount	Z$ 8,512,000.	Profitability	3
			No. of employee	20 +30	Marketing	4
					Labor	3
					Total points:	14
20-May	MP-3	Admin. Manager	Location	Harare	Technology	3
			Capital		Qlty of Production	3
			Sales amount		Profitability	1
			No. of employee	30	Marketing	1
					Labor	1
					Total points:	9
21-May	MP-4	Managing Director	Location	Harare	Technology	4
			Capital	Z$ 32,000.	Qlty of Production	4
			Sales amount	Z$ 850,000.	Profitability	4
			No. of employee	27	Marketing	3
					Labor	3
					Total points:	18
21-May	MP-5	Managing Director	Location	Harare	Technology	3
			Capital	Z$ 550,000.	Qlty of Production	4
			Sales amount	Z$ 3,000,000.	Profitability	2
			No. of employee	13	Marketing	2
					Labor	2
					Total points:	13
21-May	MP-6	Managing Director	Location	Harare	Technology	4
			Capital	Z$ 199,000.	Qlty of Production	5
			Sales amount	Z$ 750,000.	Profitability	4
			No. of employee	10	Marketing	3
					Labor	3
					Total points:	19
22-May	MP-7	Chairman	Location	Harare	Technology	1
			Capital		Qlty of Production	1
			Sales amount		Profitability	3
			No. of employee	30	Marketing	4
					Labor	3
					Total points:	12
22-May	MP-8	Managing Director	Location	Harare	Technology	2
			Capital	Z$ 2,600,000.	Qlty of Production	2
			Sales amount	Z$ 7,200,000.	Profitability	3
			No. of employee	50	Marketing	3
					Labor	3
					Total points:	13
26-May	MP-9	Managing Director	Location	Bulawayo	Technology	2
			Capital	Z$ 32,000.	Qlty of Production	2
			Sales amount	Z$ 3,100,000.	Profitability	5
			No. of employee	36	Marketing	5
					Labor	4
					Total points:	18

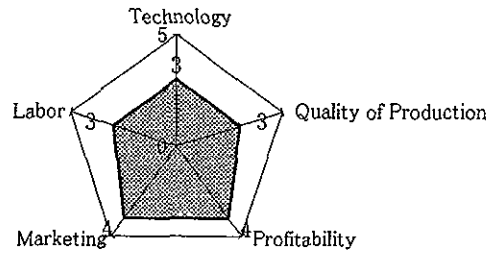
DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ACCESSMENT	
27-May	MP-10	Managing Director	Location	Bulawayo	Technology	4
			Capital	Z$ 200,000.	Qlty of Production	4
			Sales amount	Z$ 600,000.	Profitability	3
			No. of employee	10	Marketing	3
					Labor	4
					Total points:	18
27-May	MP-11	Managing Director	Location	Bulawayo	Technology	2
			Capital	Z$ 250,000.	Qlty of Production	2
			Sales amount	Z$ 4,800,000.	Profitability	5
			No. of employee	22 + 20~50	Marketing	5
					Labor	3
					Total points:	17
28-May	MP-12	Managing Director	Location	Bulawayo	Technology	2
			Capital	Z$ 110,000.	Qlty of Production	2
			Sales amount	Z$ 960,000.	Profitability	4
			No. of employee	4	Marketing	4
					Labor	2
					Total points:	14
28-May	MP-13	Managing Director	Location	Bulawayo	Technology	3
			Capital	Z$ 800,000.	Qlty of Production	3
			Sales amount	Z$ 1,200,000.	Profitability	3
			No. of employee	17	Marketing	3
					Labor	3
					Total points:	15
29-May	MP-14	Managing Director	Location	Bulawayo	Technology	5
			Capital		Qlty of Production	5
			Sales amount	Z$ 45,000,000.	Profitability	1
			No. of employee	365	Marketing	3
					Labor	3
					Total points:	17
1-Jun	MP-15	Managing Director	Location	Masvingo	Technology	5
			Capital	Z$ 485,000.	Qlty of Production	4
			Sales amount	Z$ 2,316,000.	Profitability	4
			No. of employee	20	Marketing	4
					Labor	4
					Total points:	21
1-Jun	MP-16	Managing Director	Location	Masvingo	Technology	2
			Capital	Z$ 180,000.	Qlty of Production	2
			Sales amount	Z$ 800,000.	Profitability	3
			No. of employee	15	Marketing	3
					Labor	3
					Total points:	13
1-Jun	MP-17	Director	Location	Masvingo	Technology	3
			Capital	Z$ 1,200,000.	Qlty of Production	4
			Sales amount	Z$ 1,200,000.	Profitability	3
			No. of employee	15	Marketing	3
					Labor	4
					Total points:	17
2-Jun	MP-18	Managing Director	Location	Kwekwe	Technology	4
			Capital	Z$ 2,111,000.	Qlty of Production	3
			Sales amount	Z$ 1,570,000.	Profitability	4
			No. of employee	49	Marketing	5
					Labor	4
					Total points:	20

DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ACCESSMENT	
2-Jun	MP-19	Managing Director	Location	Kwekwe	Technology	5
			Capital	Z$ 145,000.	Qlty of Production	5
			Sales amount	Z$ 373,000.	Profitability	3
			No. of employe	10	Marketing	3
					Labor	3
					Total points:	19
2-Jun	MP-20	Foundry Manager	Location	Kwekwe	Technology	3
			Capital	Z$ 1,500,000.	Qlty of Production	3
			Sales amount	Z$ 40,000,000.	Profitability	1
			No. of employe	40	Marketing	1
					Labor	3
					Total points:	11
3-Jun	MP-21	Managing Director	Location	Gweru	Technology	4
			Capital	Z$ 300,000.	Qlty of Production	3
			Sales amount	Z$ 410,000.	Profitability	4
			No. of employe	6	Marketing	2
					Labor	2
					Total points:	15
3-Jun	MP-22	Workshop Foreman	Location	Gweru	Technology	4
			Capital	Z$ 750,000.	Qlty of Production	3
			Sales amount	Z$ 600,000.	Profitability	3
			No. of employe	6	Marketing	2
					Labor	2
					Total points:	14
3-Jun	MP-23	Foundry Manager	Location	Gweru	Technology	5
			Capital	Z$ 27,000,000.	Qlty of Production	4
			Sales amount	Z$ 24,000,000.	Profitability	2
			No. of employe	200	Marketing	4
					Labor	4
					Total points:	19
5-Jun	MP-24	Managing Director	Location	Mutare	Technology	3
			Capital	Z$ 339,000.	Qlty of Production	3
			Sales amount	Z$ 1,090,000.	Profitability	3
			No. of employe	18	Marketing	4
					Labor	3
					Total points:	16
5-Jun	MP-25	Managing Director	Location	Mutare	Technology	4
			Capital	Z$ 145,000.	Qlty of Production	4
			Sales amount	Z$ 930,000.	Profitability	3
			No. of employe	20	Marketing	4
					Labor	4
					Total points:	19

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20-May-98	**Harare**	MP-1	**Managing Director**

Evaluation	Point*
Technology	3
Quality of Production	3
Profitability	4
Marketing	4
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital:4,000,000 Sales: Z$: 5,000,000 No. of Employee: 48

2. Activity of Company

2.1 Production items and production amount

Categories	Main products	Production amount	Remarks
Steel Cars	Wheel Barrows	100 cars / day	Maximum Production for each car
	Scotch Carts	8 cars / day	
	Water Bowsers	4 cars / day	
	Trailers	1 cars / day	
Steel Structures	Oil Tanks, Silos	1,000 tons / year	Total weight for each structure
	Chimneys		
	Structures for building		
	Conveyers		
	Stairs, Railings		

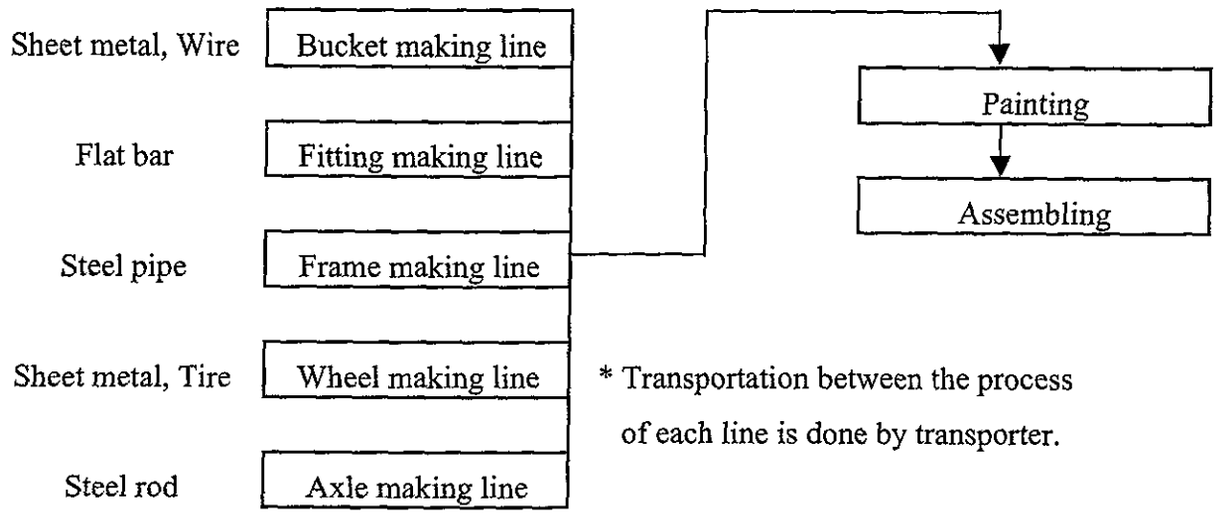
3. Findings and analysis

3.1 Making procedure of steel carts

(a) Specialized wheel making process

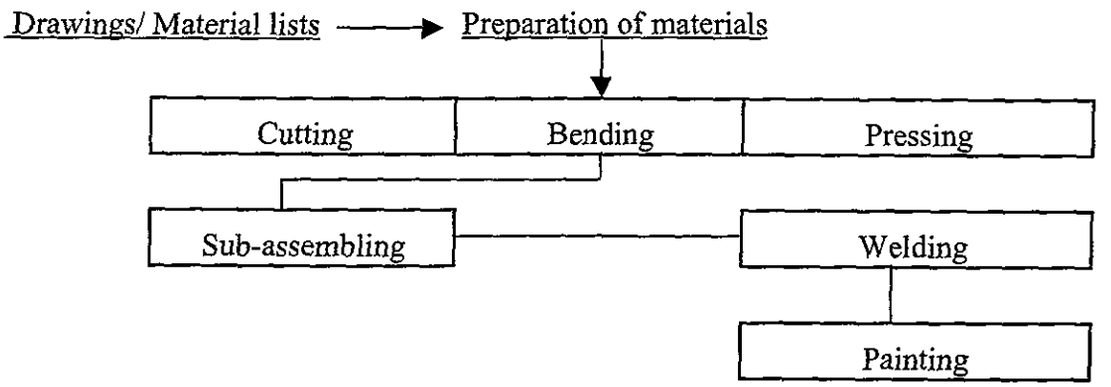
Wheels for Scotch carts are made from sheet metal using roller forming press. Wheels for wheel barrows are made from sheet metal using punching press and forming press, press dies are designed and made by managing director.

(b) Several cars and wheel barrows are made by the specialized mass-producing process. In the case of wheel barrows, specialized process line is as follows.



3.2 Making procedure of steel structures

(a) Making process



(b) Drawings and process engineering

-Drawings and material lists are made by the customer generally.

-Each process is proceeded by skilled worker based on the drawings without arranging process plans such as cutting plan, assembling plan, and so on.

(c) Manufacturing method

—Each process is proceeded step by step, therefore it takes long time. For example, delivery time of oil tank for industrial boilers is over 6 months after received order.

—There are no cranes in the factories. Heavy parts for assembly are handled by man power.

4. Advice

4.1 General arrangement

—No use materials such as steel scraps, scrapped cars, used tires, ruined batteries and so on are recommended to dispose.

—Pathway for transportation of goods and for safety guard is recommended to lay.

—Rearrangement of the machines and the working tables is needed to shorten transferring distance.

—Hoists or chain blocks are needed to assemble heavy structures.

4.2 Designing and process engineering

—To use bearings on the axle of wheel barrows is recommended. Because the axle is made by mild steel rod as rolled and seamed pipe as welded, the wheel does not turn round smoothly.

—To make process plans and quality requirements is recommended to proceed the process efficiently.

4.3 Quality

—After completed manufacturing, all the products must be checked and tested of the quality. If some defect or poor finishing is found, necessary remedy shall be done immediately by those who caused such defect or poor finishing.

DIAGNOSTIC STUDY REPORT - METAL PROCESSING

DATE	COMPANY CODE	DIAGNOSIS
8~9 June 1998	MP-1	FACTORY

1. Factory control

-1 Job order control structure of the factory is shown on the Fig. 1 as below.

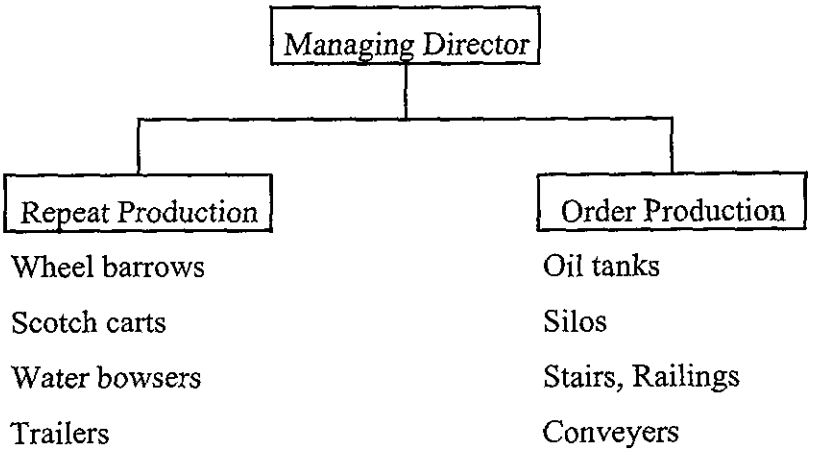


Fig.1 Job order control structure

-2 Production facility arrangement of the factory is shown on the Fig. 2 next page.

2. Manufacturing process

-1 The manufacturing process : As one of typical case of repeat production, the fabrication process flow (the Wheel Barrow) is shown on the Fig. 3 .

-2 Analysis of the manufacturing process

* Good point of the process is press forming technology using dies designed by the managing director.

* Bad points of the process are that,

① Those forming press are very old. They doesüft work well.

② Manufacturing facilities and working places are not well arranged. It takes many working time to transport the work pieces.

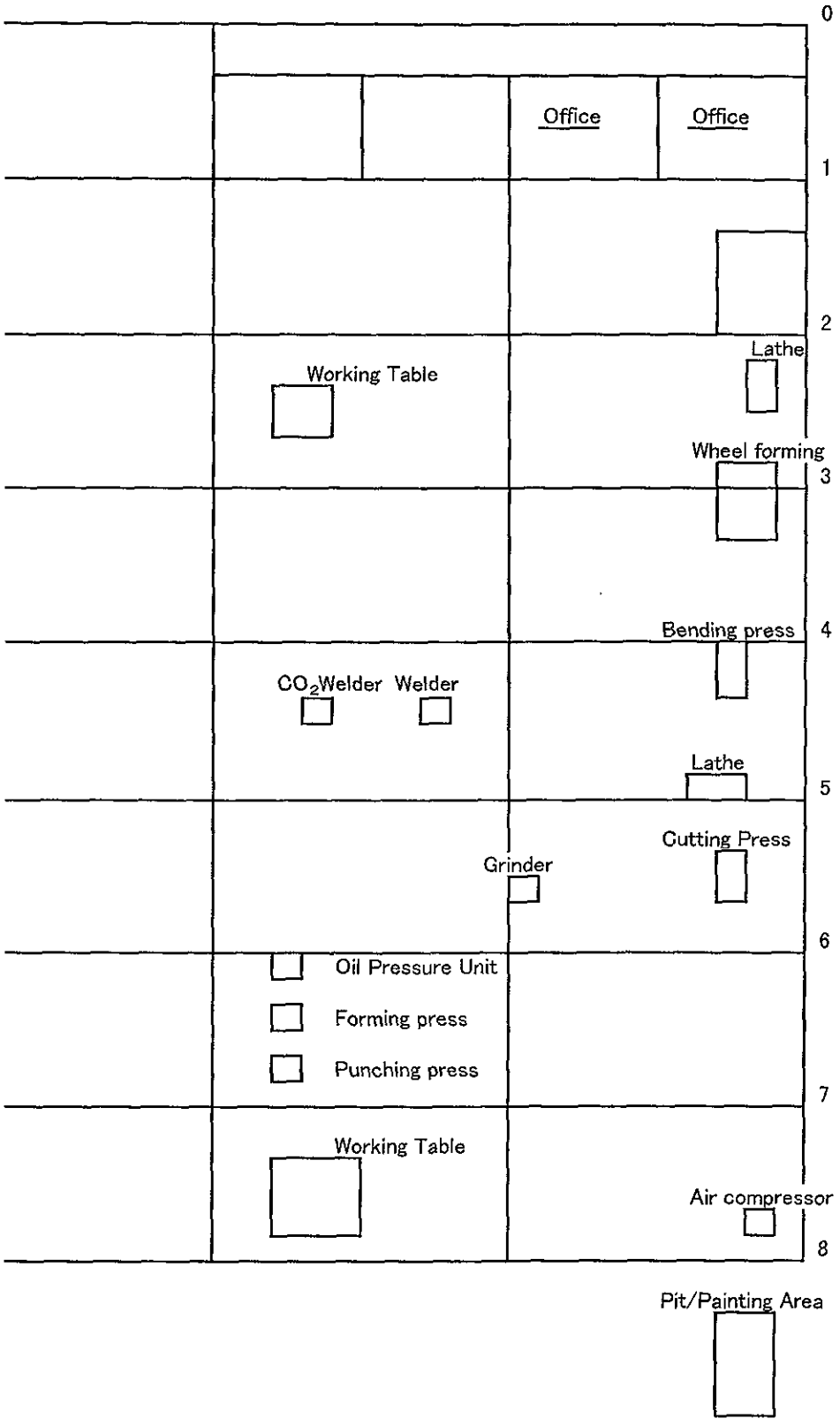


Fig. 2 Lay out of the factory MP-1

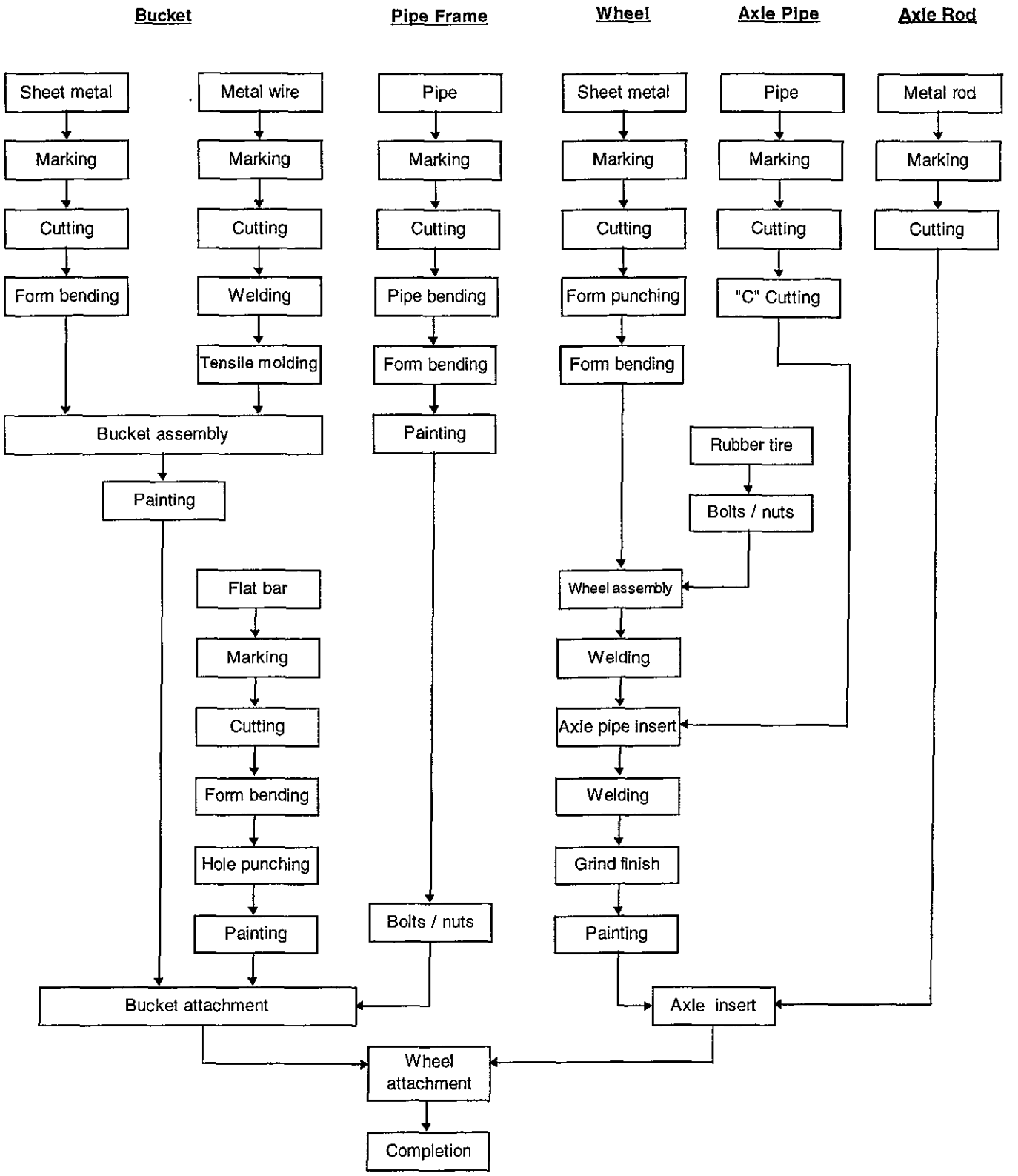


Fig. 3 Fabrication Process Flow (wheel Barrow)

3. Production technology

3-1 Product design

-1 Repeat production products are made by the skilled worker copying previous products.

① The drawings are not arranged and not used for the production.

② Dimensional accuracy or tolerance of the parts is not specified.

-2 Order production products are made by the skilled worker based on the drawings.

① The drawings are arranged by the customer.

② Dimensional tolerance and process requirements are specified on the drawings.

3-2 Production engineering

-1 Process engineering is made by the managing director.

The managing director designs dies for processing metal.

-2 The design has made only to make simple figure of the product, then the process to grade up function or to improve quality is neglected.

-3 The manufacturing is proceeding with their first stage production planning or method. They do not refine or improve the production process if some difficulty is found in the process.

For example :

① Bender pipe by press forming has large distortion on the section circle.

② Formed wheel sheet is accompanied with cracks on the rim.

(Those cracks are repair welded after assembled.)

③ The wheel does not turn round smoothly.

3-3 Production facilities

-1 The factory is not equipped with over head cranes or another lifting facilities.

All the lifting work and transportation of the work pieces are made by man power.

-2 The factory is equipped with specialized facilities to make steel wheels.

But any of those machines are old and they can repair those old machines hardly.

-3 Maintenance control :

* The machines are not inspected or maintained daily, before and/or after operation.

* Tools and Measures are not corrected or compensated periodically.

4. Production control

-1 The production control system is not applied in the company but the production planning is made by the managing director.

-2 He orders his plan to the workers and he purchases raw materials and parts.

-3 The products are delivered after check by the customer. If the customer point out defects, the defects are remedied and then delivered.

5. Quality Control

-1 The quality of the products is not controlled systematically in the company.
If some fault is found, the worker repairs them by his decision in the process.
The products are not tested or inspected by the qualified inspector.

-2 The products are not guaranteed but the customer accept them if there are no visual faults generally.

6. Productivity

-1 Operation of the factory

The factory is operating fully or with high level by sufficient order now.

-2 Productivity

The factory is operating with high productivity by the production planning to both products repeat production and order production.

7. Marketing

-1 Market

The products are sold through out country in Zimbabwe.

-2 Strategy

The managing director attempts to export their mass- producing products.
The managing director believes that the low price is the first and quality is the second to sell.

8. Comment

-1 The company is specialized to make carts, wheel barrows and order made steel fabrications. The company is successful now and near future.

-2 Quality of the products are acceptable in standard of Zimbabwe but it seems poor quality in international standard or compare with foreign made products.

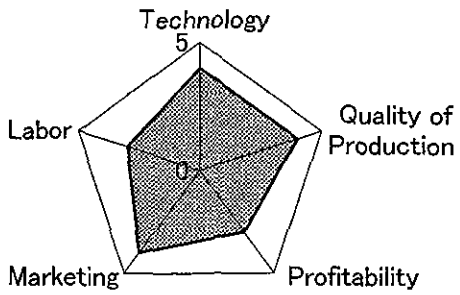
-3 To promote in future, the company should introduce new concept to managing and to production.

① Improvement of production control adopting delivery control, cost control, inventory control, material control.
② Improvement of quality control
③ Improvement of product design and production engineering
④ Improvement of production facilities

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	**INTERVIEWEE**
20-May-98	Harare	MP-2	**Operating Executive**

Evaluation	Point*
Technology	4
Quality of Production	4
Profitability	3
Marketing	4
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$3,400,000 Sales: Z$8,512,000 No. of Employee:Total : 20; Factory
30; Site

2. Activity of Company

- The company's activity is to design, to manufacture and to install for irrigation system .
- The factory is manufacturing for irrigation system parts ;
  - ·Aluminum piping and those fittings,
  - ·Several kind of small castings and those machining,
  - ·Small type of valves, pipe fittings, etc. are made from aluminum gravity die casting.
  - ·Large type of valves, pipe fittings, etc. are made from aluminum or copper alloy casting by green sand mold.
  - ·Sprinkler parts are made from brass by gravity die casting.

- The company has office, warehouse, testing room and 3 shops.
  - ·Warehouse ; purchased parts and manufactured parts are stocked with tag.
  - ·Laboratory ; equipped with cutting machine to detect casting defects or wall thickness.
  - ·Casting shop; equipped with aluminum melting furnace, cupola, induction furnace and etc..
  - ·Machining shop; equipped with well maintenanced machine tools such as Lathe, Milling, and etc..
  - ·Welding shop ; equipped with aluminum pipe cutting machine, TIG welder, and etc..

3. Findings and analysis

3.1 Design

- The irrigation system is designed simply to combine standardized parts.

3.2 Production Control is simplified.

- The products of the factory are standard parts. Their process is decided by worker's experience and the operating executive can control production easily by instructing of the number to be manufactured.

3.3 Quality Control is good controlled.

- Workers write down the names and numbers of inferior products found in the process and report them to operating executive on the daily working report.
- Inferior products are checked and investigated their cause by the operating executive.
- Almost of inferior or defective products are caused by casting defects which cause water leakage of the irrigation system.
- For example, shrinkage in the aluminum casting valve body was found over 10 % of them before. After the investigation, it is improved to 1～3 % .

4. Advice

- The company has ability of production technology and expected to develop as the company based in local Zimbabwe.

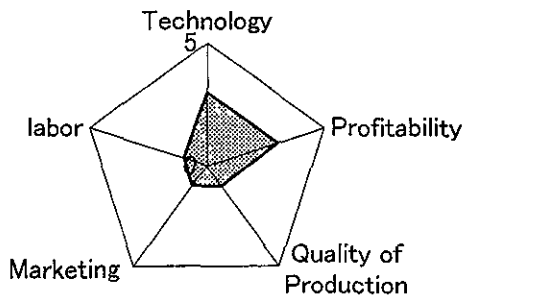
- Casting factory is to be fully sheltered by roof. If it comes rain, not only the working is stopped but also casting and melting work is very dangerous to the water.

- For irrigation system, generally steel pipes and cast iron valves are used but this company makes them using aluminum pipes and valves by their specified engineering.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20-May-98	**Harare**	**MP-3**	**Admin. Manager**

Evaluation	Point*
Technology	3
Profitability	3
Quality of Production	1
Marketing	1
labor	1



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital Z$ -500,000(dept) Sales : Z$ No. Employee : 30

2. Activities of the Company

- The company can make diamond fence, barbed wire, fencing poles and clamps, then the company can construct fencing on the site.
  But they can't get running money and so the factory isn't working now. They are only producing small lot of poles and clamps for fence.
- If they get the order of the construction of the fencing, they don't make fences in their factory, but they buy them from outside and supply them to the site. When they receive the money of the construction, they pay for the products.
- The design of the fencing is simple and to make the products of fencing, they don't need manufacturing technology or much experienced skill.
- The company's office and factory are one part of big factory building which used to be metal processing company owned by English owner. After English owner gave up to manage the metal processing company, the building were rent by 3 companies.
- The company's factory is large but the working place is only 1/4 of whole space the other is used as warehouse of various scraps such as old machines, steel scraps, papers etc. and car parking lot.

3. Findings and Analysis

- Their the biggest problem to be solved is the shortage of fund. If they receive inquiry such as fencing for the game land, they can't do the field survey for estimation due to lack of fund. Supposing that they can get the order, they don't have the money to buy the raw materials such as galvanized wire, steel pipes and sections.
  As a result, they can not survive as a manufacturing enterprise without the actory operation.

- To survive as a manufacturing enterprise, they need to acquire running money and should have the managing strategy to utilize their production ability within the fund. For example, instead of buying fencing products from outside, they should make the products by themselves competitively and they should cooperate with other company which has enough money to buy raw materials, or they should make and construct the fencing as a subcontractor.

4. Advice

- Useless stock materials in the factory are to be disposed. Concept of " To keep cleanliness and To put in order" must be adopted.

- To increase productivity ;

  ① Dimensional gauges and setting devices are to be applied to the process of cutting, drilling, welding, etc..

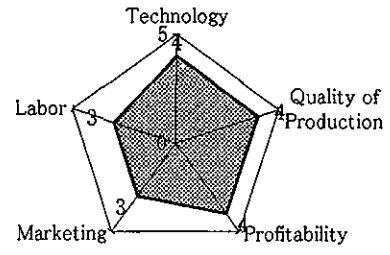
  ② Re-arrangement of machines are necessary to shorten material transportation and to widen man-working area.

— To keep delivery and to decrease stocks, concept of "Production Control" is necessary to introduce.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	**INTERVIEWEE**
21-May-98	Harare	MP-4	**Managing Director**

Evaluation	Point*
Technology	4
Quality of Production	4
Profitability	4
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital Z$:32,000 Sales: Z$: 850,000 No. of Employee: 27

2. Activity of Company

- The company is manufacturing mainly door frames, window frames and kitchen furniture.

- Distinctive feature of factory

All kind of metal products are made, window frame and door frame are specialized.

Main products	Production amount	Capacity
Window frame	1,500 set/month	
Door frame	2,500 set/month	250 set/day

- Production Facilities

The company is well equipped with light steel processing machinery and machine tools for die making.

3. Findings and analysis

-Making procedure for door frames are specialized and frames are made with high efficiency.

Specialized process line is consist from 5 process. One man works in one process continuously.

Maximum 250 sets of door frames can be made one day by 5 workers.

-Attachment such as hinges, door locks are made out of line using several machines.

-Quality is good.

There are no rusts and soils on the surface of sheet metal and semi-completed work.

4.Advice

-Keep working space between two process widely to enable to transfer the processed good. The processed goods shall be transferred immediately to the next process.

-To improve productivity,

Re-arrangement of the machines is needed to shorten transferring distance of the work.

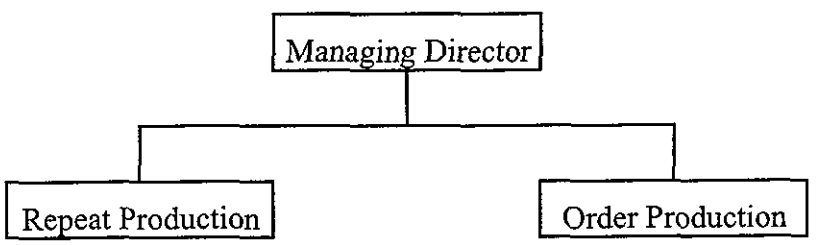
Newly setting material jigs are to be applied.

DIAGNOSTIC STUDY REPORT - METAL PROCESSING

DATE	COMPANY CODE	DIAGNOSIS
8~9 June 1998	MP-4	A. FACTORY B. MANAGEMENT

1. Factory control

-1 Job order control structure of the factory is shown on the Fig. 1 as below.



Window Flames
Door Frames

Catering Equipment
Security Equipment/ Money Box, etc..

Fig.1 Job order control structure

-2 Production facility arrangement of the factory is shown on the Fig. 2 .

2. Manufacturing process

-1 The manufacturing process : As one of typical case of repeat production, the fabrication process flow (Door Frame) is shown on the Fig. 3 .

-2 Analysis of the manufacturing process

* Good point of the process is divided flow work applying setting devices and gauges.

* Bad points of the process are that,

① Conveying devices are not applied to inter process of flow line.

- Semi-products are piled up in/out the factory.
- The work pieces are handled and transported by man power.

② Manufacturing facilities and working places are not well arranged.
It takes many working time to transport the work pieces.

③ Stainless sheet metal for kitchen furniture are poor welded.
It takes any working time to grind up and repair the welded portion.

3. Production technology

3-1 Product design

-1 Repeat production products are made by the skilled worker in accordance with the specification of "Standard Association of Zimbabwe".

-2 Order production products are made by the skilled worker based on his ideas and experience.

3-2 Production engineering

-1 All sheet and section metal work are made in the company.
They buy electric parts, rubber parts from out side of the company.

-2 Process engineering is made by the managing director, the engineer and/or the skilled worker.
The managing director and/or the engineer designs the setting devices and dies for the manufacturing process.

-3 The devices and dies are made roughly, then the engineer and/or the worker must finish them to act properly.

-4 The manufacturing is proceeding with the production planning or skilled worker's plan.
The engineer or skilled worker refines or improves the production process in their sense if some difficulty is found in the process.
But they do not take care to improve the quality and to decrease working hour.

3-3 Production facilities

-1 The factory is not equipped with over head cranes or another lifting facilities.
All the lifting work and transportation of the work pieces are made by man power.

-2 The factory is equipped with old metal processing facilities generally.
Sheet metal shearing press and machine tools for die making are new but those are manual work machine.

-3 Maintenance control :

* The machines are not inspected or maintained daily, before and/or after operation.
* Tools and Measures are not corrected or compensated periodically.

4. Production control

-1 The production control system is not applied in the company but the production planning is made by the managing director.

-2 He orders his plan to the workers and he purchases raw materials and parts.

-3 If the customer does not receive, those products are stocked in the factory.

5. Quality Control

-1 The quality is not controlled systematically in the company.
If some fault is found, the worker repairs them by his decision in the process.
The products are not tested or inspected by the qualified inspector.

-2 The products are not guaranteed but the customer accept them if there are no visual faults generally.

6. Productivity

-1 Operation of the factory
The factory is operating fully or with high level by sufficient order now.

-2 Productivity
The factory is operating with high productivity by the production planning to both products repeat production and order production.

7. Marketing

-1 Market

The products are sold local mainly.

-2 Strategy

The managing director believes that the demand for door frames and window frames will increase in future and they can get sufficient order from local market.

He attempts to get order of their order made products throughout domestic market.

8. Comment

-1 The company is specialized to make Door frames and Window frames.

Order made sheet metal products are made one by one by the experienced worker.

The productivity is higher level than another company. The company is successful now and near future.

-2 To develop in future, the company should introduce new concept to managing and to production.

① Improvement of production control adopting delivery control, cost control,

② Improvement of quality control

③ Improvement of product design and production engineering

④ Improvement of production facilities

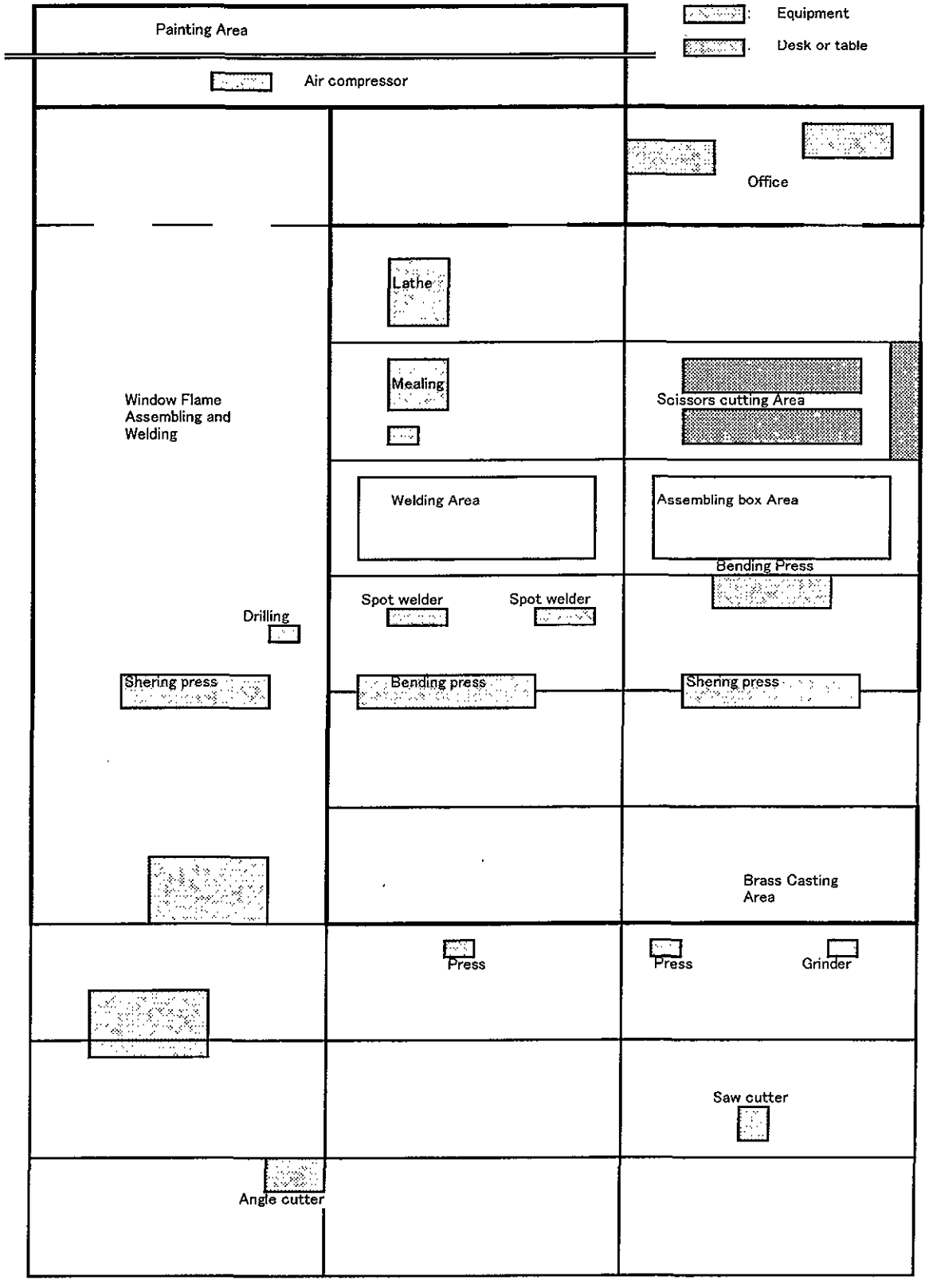


Fig.2 Lay out of the factory MP-4

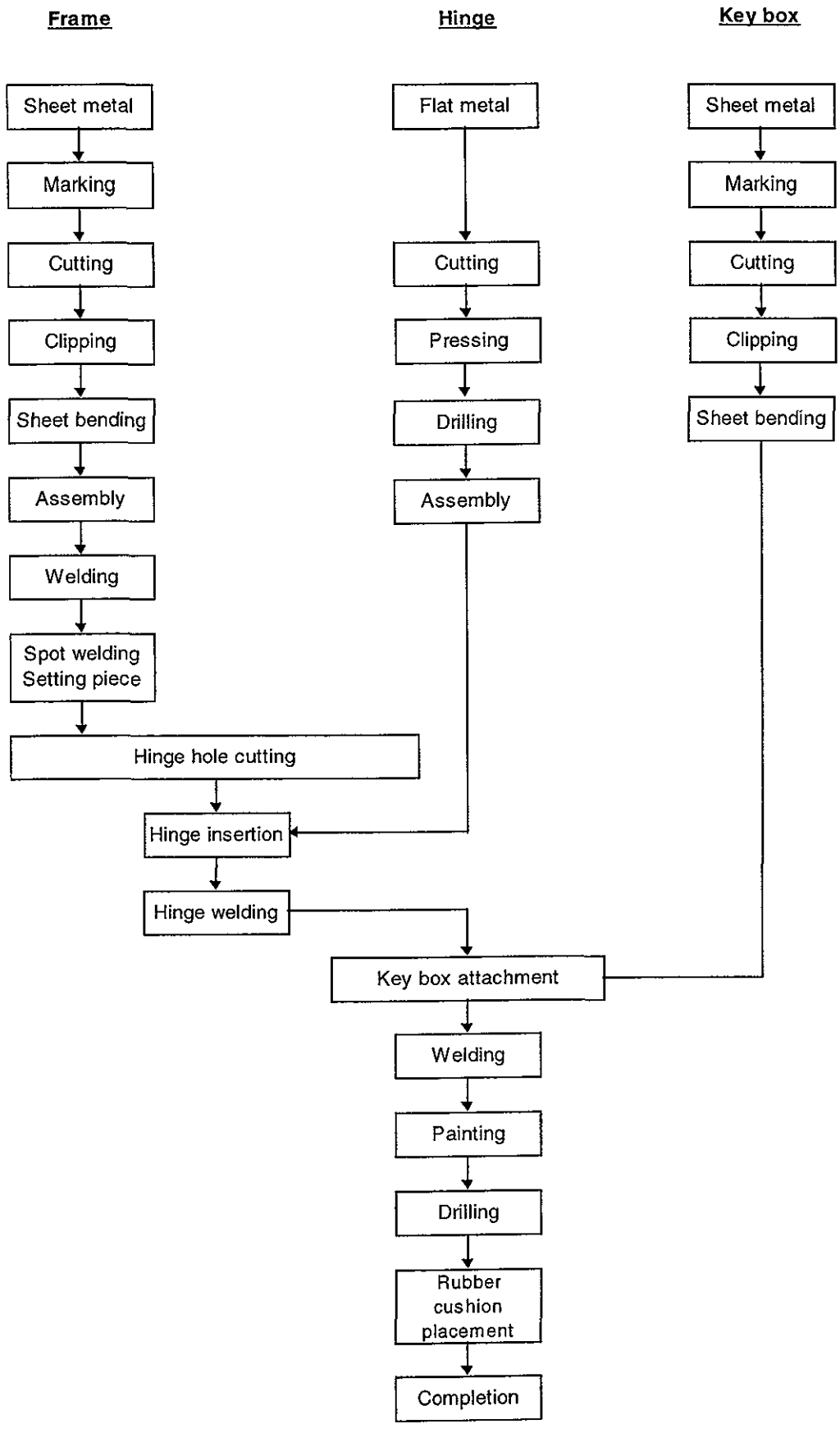


Fig.3 Fabrication Process Flow (Door Frame)

RESULTS OF DIAGOSTIC STUDY

FOR

A.P.METAL PRODUCTS

COMMENT

- Business Expansion by Steady Effort for Twelve Years
- Stable Demand of Door & Window Frames
- High Value Added by Catering & Security Equipment

PROFITABILITY

MARK	INDICATION	1995	1996	1997	Japanese Index
A1	Operating Profit to Net Sales	13.7	10.7	**-0.8**	4.7
A2	Gross Profit to Net Sales	25.3	20.8	30.6	24.7
A3	Operating Profit to Working Capital	13.8	15.2	**-1.6**	5.7
A4	Operating Capital to Turnover	1.0	1.4	2.1	1.3
A5	Selling & Admin. Expense to Sales	11.6	10.1	**31.3**	20.0

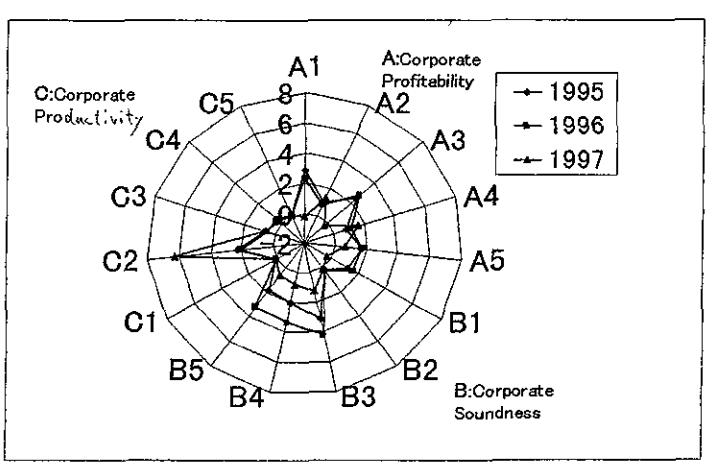
SOUNDNESS

MARK	INDICATION	1995	1996	1997	Japanese Index
B1	Net Worth to Total Capital	43.0	60.1	**-9.3**	36.6
B2	Interest Paid to Sales	6.4	5.1	**23.5**	1.5
B3	Fixed Assets to Long Term Capital	24.6	18.3	63.2	76.7
B4	Current Ratio	374.7	617.7	143.1	184.3
B5	Quick Ratio	275.2	481.5	93.9	150.1

PRODUCTIVITY

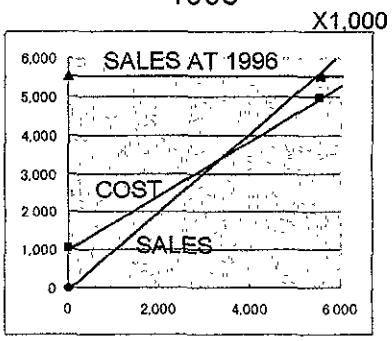
MARK	INDICATION	1995	1996	1997	Japanese Index
C1	Annual Production per Head	511	486	222	11062
C2	Personnel Expenses to Processed Amount	20.3	22.0	7.2	44.3
C3	Processed Amount to Net Sales	35.4	29.9	37.9	61.5
C4	Efficiency of Machinery Investment	1.8	2.7	1.6	7.6
C5	Machinery per Head	277	181	139	2819

RADAR CHART

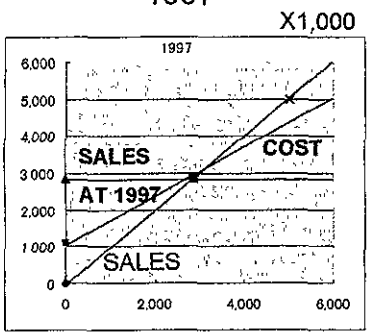


BREAK EVEN POINT ANALYSIS

1996



1997



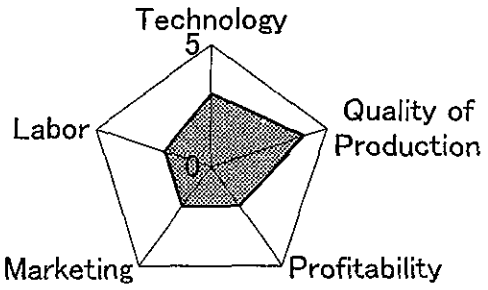
RECOMMENDATION

- Accurate Financial Report Consistent with Each Year
- Analysis and Measures against Change of Sales
- Improvement of Operating Rate of Facilities

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	**INTERVIEWEE**
21-May-98	Harare	MP-5	**Managing Director**

Evaluation	Point*
Technology	3
Quality of Production	4
Profitability	2
Marketing	2
Labor	2



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$550,000 Sales: Z$3,000,000 No. of Employee: 13

2. Activity of Company

- Managing Organization

Managing Director ——— The owner himself
Finance and Marketing Director ——— His wife
Technical Director ——— His yunger brother

- Production

The main production now is water pipe fittings such as elbows, tees, reducers, kitchen sink, trap, etc..

These products are made by machining from brass/steel rods and castings.

- Sales and production plan in 1998

Sales amount Z$ 3,700,000
Production amount 1,000,000 pieces

Actual sales and production forecasting in 1998

About 70 % of the plan

3. Findings and Analysis

- All the pipe fitting products are machined manually by the skilled worker.
  Machine tools such as lathes, milling, drilling machine are good maintained and cutting tools are used properly. Then, the quality of the products is good, especially pipe thread accuracy is maintained high level by the skilled worker though these products are not inspected to the accuracy of the pipe thread.

- They can make also steel fabrication by welding. They are making artistic steel works for exhibition by technical director's taste without drawings or specifications but they don't make steel structures for machinery specified by drawings.

4. Advice

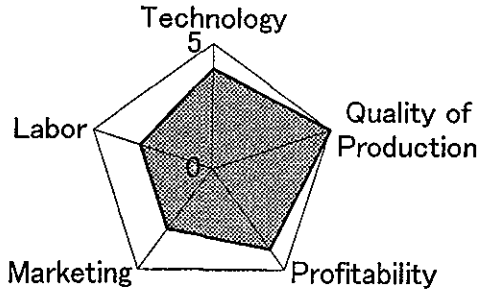
- It is important to know production engineering and technology of pipe fittings in technical advanced company.
  For example, the most efficient pipe fittings are made from malleable or ductile cast iron by mass-production line. Those castings are zinc-plated and machined automatically.

- The plan to develop in future
  They are planning to have foundry division which makes brass castings within 2 years. But it seems difficult to carry out their plan to develop because they have not production engineering and technology of castings. It is realistic for them to develop as the company specialized in machining. Castings are to be bought from specialized casting maker of their products. (Group company)

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	**INTERVIEWEE**
21-May-98	Harare	MP-6	**Managing Director**

Evaluation	Point*
Technology	4
Quality of Production	5
Profitability	4
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$199,000 Sales: Z$750,000 No. of Employee: 10

2. *Activity of Company*

- The company is manufacturing water pipe fittings such as water tap, sink, stopcock, sprinkler part, etc..

- The present production is 50~70 % of their capacity.

- Manufacturing process

Brass Casting ··· Gravity die casting using metal mold and resin sand core

↓

Machining ··· End, outside/inside surface is machined by lathe Threading

↓

Finishing/Polishing ··· Plating surface is polished.

↓

Plating ··· Outside chemical treatment factory

3. Findings and Analysis

- All the products are made manually by the skilled worker.

  The products are standard parts specified by the SAZ or International Standard.

- The factory is well organized and cleaned neatly, unnecessary things are not found anywhere.

- The appearance of the Products is very good.

  Brass casting : There is no casting defects on the surface. Casting surface is clean. Though dimensional tolerance is not specified, dimensional accuracy is maintained properly by the die casting and skill of the worker.

  Machining : The castings are machined properly by well maintained machine tools and setting jigs to keep dimensional accuracy.

  Polishing : After machined and finished, the surface to be plated is polished using polishing machine to as smooth as glass.

4. Advice

- It is recommended to improve productivity that ;

  ① Core sand mixingüc Small type sand mixer drive with electric motor shall be adopted instead of mixing by hand to make strong cores.

  ② Wooden box for in-process transportation shall be used instead of taking by hand.

  ③ Work pieces shall be laid on the setting table instead of laid on the concrete floor.

- The plan to develop in future

  Managing director has no clear plan for development in future. He want to get more order to make full operation now.

  Generally these standard parts are supplied by large scale enterprise who makes them by mass- producing line automatically.

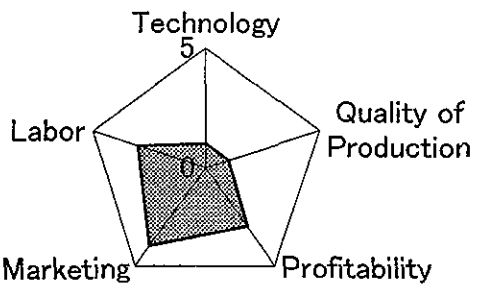
  This company must compete such large scale enterprise or imported products seller.

  This company will survive to the competition with large scale enterprises and develop in future if they can manage "Quality, Cost and Delivery" properly adopting concept of production control system.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
22-May-98	Harare	MP-7	Chairman

Evaluation	Point*
Technology	1
Quality of Productio	1
Profitability	3
Marketing	4
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$(not clear) Sales: Z$(not clear) No. of Employee: 30

2. Activity of Company

- The company is manufacturing gray cast iron products such as brake drums for lorries, counter weights for mining machines, fly wheels for diesel engine generators, and etc..

- The company have 2 division, one division is foundry equipped with cupola and green sand manual molding line and the other is machining division equipped with several kind of machine tools.

- The company is opened 6 month ago and the building of office and warehouse is under construction now.

- The production is started but they can not yet produce acceptable castings in steady operation.

It is impossible to determine monthly or annual production amount now.

3. Findings and Analysis

- Production of good cast products requires adherence to all necessary conditions throughout the entire casting process.
  The company is manufacturing ferrous castings now, but necessary conditions to make good casting is not provided.
  The casting products have some defects such as dimensional unbalance (by core moving or mold shift), blow holes, slag inclusion and etc..

- The castings is machined manually in the machining shop, there are insufficient machine tools and setting device to machine the large type brake drums.
  If the large type brake drums are cast in the casting shop satisfactory, they can machine only a part of them by one vertical lathe.

4. Advice

- The planning to do the production and sales of heavy machinery parts is very good.
  Mining machinery related parts, electricity generation related parts, agriculture machinery related parts, and etc. are essential parts for the industries in Zimbabwe.

- To manufacture good quality products and to reduce cost, it is recommended that ;
  ① Quality requirements of the order are to be checked and then casting plan must be made with information of process requirements to implement customer's requirements.
  ② The patterns must be made in accordance with the casting plan using shrink gauge.
  ③ Casting process are determined by the information of casting plan.
  ④ Cast products must be checked and defective products must be analyzed to find out its cause.
  ⑤ The action to prevent defective products and to reduce manufacturing cost, must be done to the process and the action shall be recorded on the casting plan.

- Sand preparation, Molding and Mold assembly

① Sand preparation ; Bentonite and water must be added properly after weighing. The mixed green sand must be checked sand properties such as water content, compressive strength, permeability, and etc..

② Molding flask must be made strongly by cast iron or steel plate. They use drum-can as flask for brake drum mold now, but this is impossible to stamp sand strongly and to handle without deforming of the mold.

③ Sand adhesion on the surface of the castings must be prevented.
To obtain clean cast surface, it is recommended to apply fine graphite mold coating by spraying or painting. Those coatings are sold by casting material sales company.

④ To assemble the cope and drug accurately, it is recommended to use lifting device such as hoist crane or chain block for heavy molds.

⑤ It is recommended to set weight on the top part of the assembled mold to avoid run out, excess fins and dimensional deformation.

- Melting and Pouring

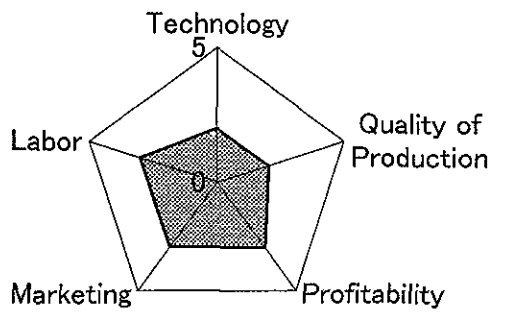
① The foundry has 2 set of 2 ton/hour cupolas. It is sufficient for production of parts single weight ; up to 100kg, monthly production ; about 100 tons.
But they are constructing large type cupola which is the biggest in Africa without relevant technological specification. They are planning to make heavy castings single weight over 10 tons. This plan seems to be reckless because they are not experienced and casting technology is not studied. The plan shall be reconsidered and the construction of large cupola shall be stopped immediately.

② To avoid slag inclusion, teapot type ladle is used now. This is effective.
It is recommended as more effective measure that gate and runner must be revised.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
26-May-98	***Harare***	**MP-8**	***Managing Director***

Evaluation	Point*
Technology	2
Quality of Productio	2
Profitability	3
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$2,600,000 Sales: Z$7,200,000 No. of Employee: 50

2. Activity of Company

- The company is manufacturing gray iron and steel casting parts for industrial use such as cultivator parts of tractor, wheels of freight wagons, and etc..

- The company has 2 shops in same building, one is casting shop equipped with High Frequency Induction Furnaces having one power truck and 3 furnaces and the other is machining shop equipped with several kind of machine tools.

- The company has acquired technology and equipment for making casting products under the guidance of the specialist (member of SIRDC) at 6 month ago.

- They can produce acceptable castings having no casting defects and their monthly production of castings is about 10 tons now. Their target of monthly production is 30 tons per month.

3. Findings and Analysis

- Castings are made by the worker with the instruction from the engineer.
  The engineer designs casting plan and decides the process requirements.
  ① Sand preparation ; Green sand is prepared by sand mixing mill properly.
  CO2 sand is prepared by the experienced worker by hand mixing.
  ② Molding by green sand, Core making by CO2 sand ;
  Those are made manually by man power.
  ③ Melting ; Steel scraps melted but chemical components is not analyzed.
  The company has no equipment to check chemical components.
  ④ Cutting risers, gates and casting head ; Those are gas-cut properly.
  ⑤ Finishing ; As cast products are finished and painted without annealing.

- Finished castings are machined by the skilled worker. The machine tools are well maintained.

4. Advice

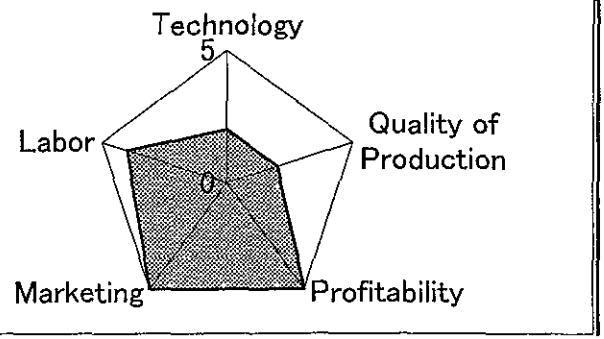
- Some difficulty is found to machine the cast surface ;
  ① It is impossible to machine sand or slag adhered surface.
  The surface to be machined must be thoroughly removed off sand or slag by grinder.
  ② Hardened surface by gas-cutting or repair-welding are annealed to soften.

- To guaranty the cast material, it is recommended that ;
  ① Carbon content is necessary to check for steel casting.
  ② Carbon equivalent value is necessary to check by CE meter for ferrous casting.
  ③ All steel castings are to be annealed to obtain proper mechanical properties.
  The structure of rapid cooled steel from melting point is very coarse structure, then the steel has poor mechanical properties.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
26-May-98	Burawayo	MP-9	Managing Director

Evaluation	Point*
Technology	2
Quality of Productio	2
Profitability	5
Marketing	5
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$1,500,000 Sales: Z$3,100,000 No. of Employee: 36

2. Activity of Company

- The company is manufacturing cast iron, brass and aluminum casting products.

Their typical products are ,

Iron castings ; Gate valves, Joints, Elbows, Tees for water piping.

Brass castings ; Valves for chemical use pump.

Aluminum castings ; Patterns for their castings.

- All castings are made manual green sand mold process with CO_2 sand core.

- Their monthly out put of production is about 40 tons.

- Quality of the casing is not so good in accordance with international standard but those are acceptable in Zimbabwe.

- All the casings are delivered after machined and painted. Almost all machining are made by outside and the company is specialized to make castings.

3. Findings and analysis

- The factory is moved 3 month ago and there is no rain shelter on the working area. The company has the plan to built up rain shelter till rainy season this year.

- The castings are carried out together with skilled and unskilled workers. The engineer experienced casting technology in large scale foundry is employed as foundry manager recently. The worker experienced for the cupola melting operation is employed and he works together with inexperienced worker.

- The company has to compete with large scale enterprises, and the company wins at low price and short delivery generally. But the quality of the castings are poor than those of products made by large scale enterprises.

- The company is poor equipped with casting facilities and transportation facilities, then the workers do all the process work and transportation by hands.

DIAGNOSTIC STUDY REPORT - METAL PROCESSING

DATE	COMPANY CODE	DIAGNOSIS
22~24 July 1998	MP-9	FACTORY

1. Factory control

* Functional organization diagram of the factory is shown on the Fig.1 .

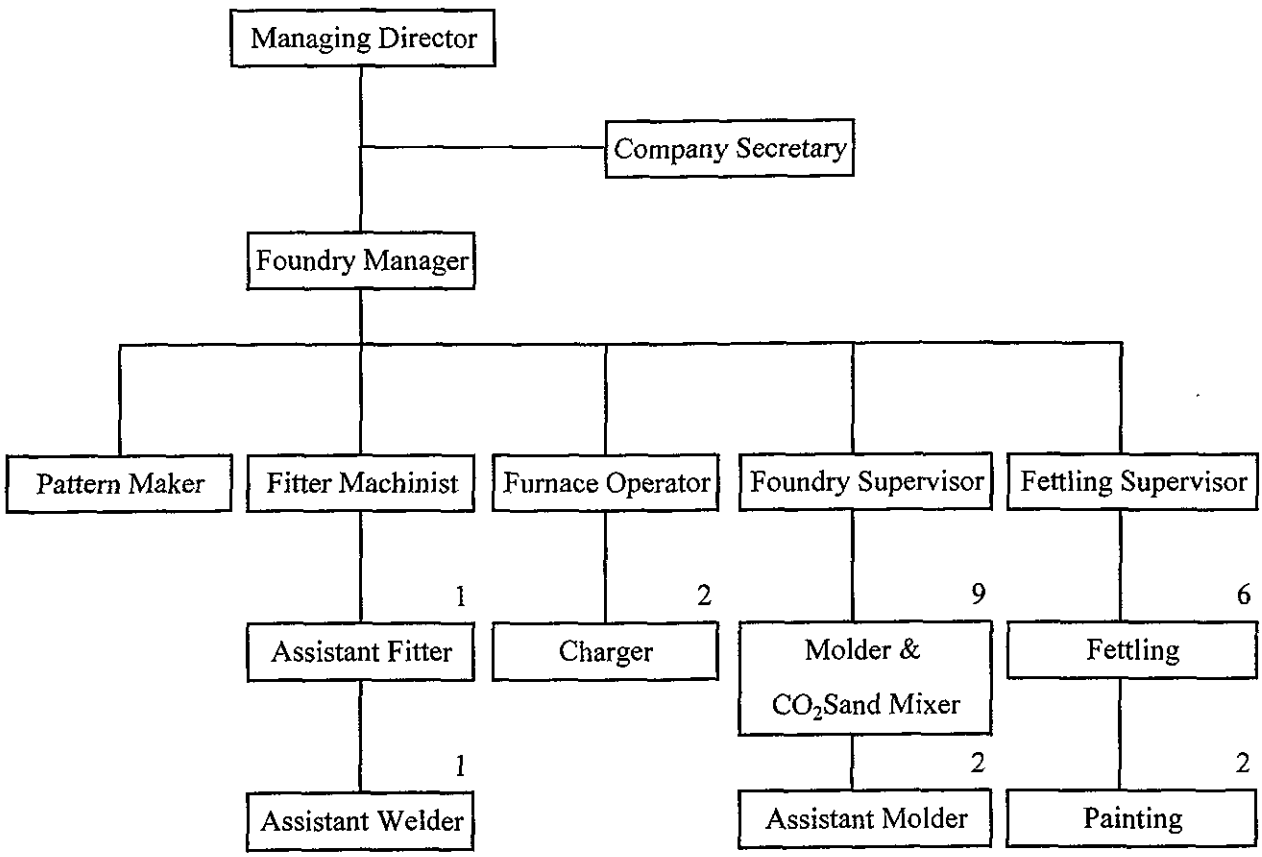


Fig. 1 Functional Organization Diagram

2. Manufacturing process

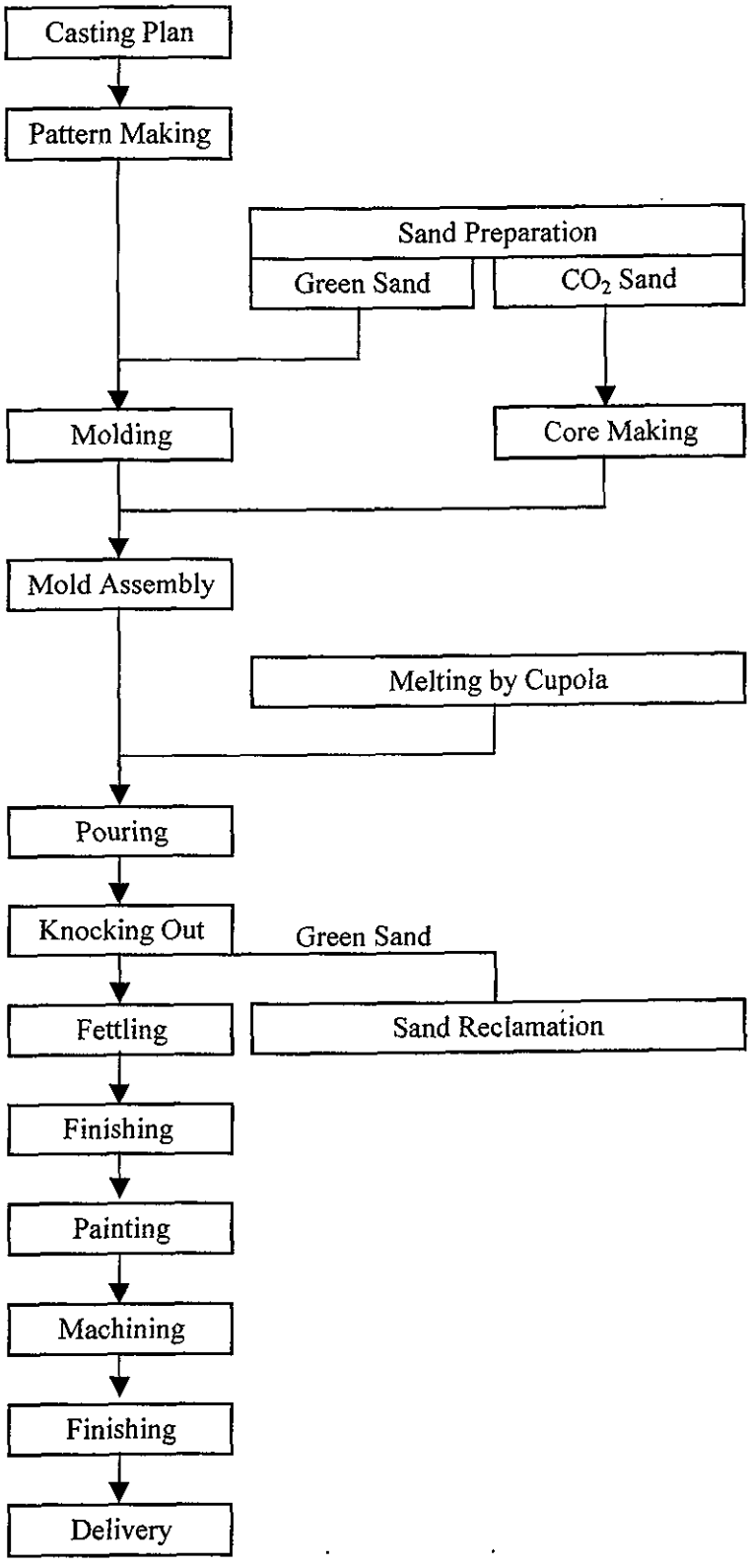


Fig.2 Casting Process Flow (Gray Cast Iron)

-1 The casting process of gray cast iron is shown on the Fig. 2 .

-2 Analysis of the casting process

Analysis of the casting process of the gray iron castings is shown Table 1 .

Process	Fact Found	Comment
Casting Plan	Casting plan is made for pattern making only.	Process requirements, revised history are to be filled on the plan.
Pattern Making	Good	Good
Sand Preparation	Green sand property is poor.	The sand should be mixed by sand mixer and controlled by test.
		Yellow sand should not be used.
	CO_2 sand property is ordinary.	It is better to add cushioning materials.
Molding and Core Making	Hand work by skilled worker with his method.	The worker should be taught and trained proper molding method.
	Coating is not applied.	Coating should be applied on the core and on the mold to avoid sand adhesion.
Assembling	Hand work by skilled worker with his method for large part.	Lifting mold and/or core device should be arranged to facilitate assemble work.
Melting	Cupola melting is available only for ordinary gray iron.	Design and operation of cupola is in-efficient. Melting temperature should be raised up. CE value or chemical components and physical properties are to be checked. The melt should be identified.
Pouring	Hand work by skilled worker with his method.	The temperature should be checked.
		The weight should be set properly.
Finishing	Hand work by skilled worker with his method.	Adhered sand should be removed out.
		Shot blasting is recommended in future.
Machining	Machining is ordered out side mainly.	Dimensional check should be done.

Table 1. Analysis of Casting Process

3. Casting technology

-1 The factory is operated based on man power to save facility cost and to save material cos and this operating policy makes their technology remain low level.

From a point of view of international standard, the casting technology of this company is low level.

-2 From a point of view of Zimbabwe standard, the casting technology of this company seems to be average level because they can make castings acceptable to the customer.

-3 Productivity is low level.

Production amoun : 500 tons/year

No of employees : 33

Productivity : 15 (1.3 tons/ month/man)

If the repeat products are made by machine molding, productivity will increase to over 40 easily. (For similar products, productivity is round 120 in the advanced factory.)

-4 Production engineering

The castings are made by the production engineering of skilled workers under the contro of foundry manager and managing director.

The foundry manager is the engineer who has been engineering manager of big foundry.

The furnace operator is much experienced to cupola melting in the big foundry.

-5 Production facilities

The factory equipped with poor facilities to make castings by industrial process.

* Main facilities ;

Molding	Concrete mixer for green sand mixing.	1 set	Old, well maintained
Melting	Small size cupola	1 set	Designed by M.D.
Finishing	Electric sander	a few sets	Heavy to handle
Machining	Lath, Drill machine, Table grinder	1 set each	Old
Common	Air compressor	2 sets	One is new

* Facilities to be equipped or improved

① Rain shelter for molding/pouring and melting ar

② Lifting device or hoist crane for large molding/a

③ Sand mixer and sand property tester

④ Cupola improvement and thermometer, Carbon Equivalent (CE) me

⑤ Weight for mold

4. Production control

-1 The production control system is not applied in the company but the production planning is made by the foundry manager.

-2 He orders his plan to the foundry supervisor.

-3 The products are stocked and after the customer checks the products, he receives them.

5. Quality Control

-1 The defective rejects are counted and reported to foundry manager by "Foundry Production and Scrap Report". Foundry manager controls quality to improve them.

-2 But the quality control system is not existing in the company.
The melt and the mold is not identified and the products are not tested or inspected.

-3 The products are not guaranteed but the customer accept them if there are no visual faults generally.

6. Profitability

-1 Operation of the factory
The factory is operating fully or with high level by sufficient order now.

-2 Profitability
The factory is operating with low facility cost and low material cost by the managing director's policy. They can compete with big company in price but they can not compete in quality.

7. Marketing

The products are sold through out country in Zimbabwe.
The managing director believes that the low price is the first and quality is the second to sell.

8. Comment

-1 Production of good cast products requires adherence to all necessary conditions throughout the entire casting process. Then good cast products can make with proper production engineering based upon theory and experience.

-2 This company has developed till now and will be developing near future by the power of sales and low cost production of concentrating man power.

-3 But production of concentrating manpower will reach the limit from the reason of raising labor cost, impossible to make large products, impossible to grade up quality, etc..

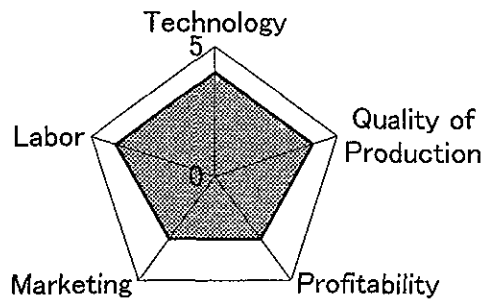
-4 To develop the company in future, the company should introduce new concept to managing and production as below.

① Improvement of production control adopting delivery control, cost control, inventory control, raw material control.
② Improvement of quality control
③ Improvement of casting plan and production engineering
④ Improvement of production facilities

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
27-May-98	Bulawayo	MP-10	Managing Director

Evaluation	Point*
Technology	4
Quality of Productior	4
Profitability	3
Marketing	3
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$200,000 Sales: Z$600,000 No. of Employee: 10

2. Activity of Company

- The company is manufacturing small non-ferrous casting products such as ornaments, buckles, key holders etc. and large copper or copper alloy casting products such as gates, fence, terminals and etc.

- The small products are cast by the spin casting (one of horizontal centrifugal casting) using rubber mold.

- The large products are made by the green sand mold process.

- The small products are designed by the managing director and shaped to the pattern by skilled workers. The large products are made in accordance with the customer's drawings/specifications or instructions.

3. Findings and analysis

- The technology of the spin casting is particular, the 4 sets of spin casting equipment are made in England and imported.

- The products by spin casting is limited to the shape thin and small and to the material low melting point such material as tin, zinc and aluminum alloys.
  It is impossible to cast copper alloys because the rubber mold is burn out at over 1,000 ℃.

- Manufacturing process of spin cast products for ornaments;

Designing	The products are designed by the managing director.
Pattern Making	Patterns are made by skilled worker.
Spin Casting	The material is melted and poured after measuring temperature.
Finishing	The cast work pieces are finished by hand work.
Polishing	The finished work pieces are polished one by one carefully.
Plating	Ornamental plating (gold/golden, silver, chromium.) is made by outside.

- The products by green sand mold are made manually by the skilled workers.
  Molding sand is prepared by hand mixing and the materials are melt by the crucible furnace heated by coke.

4. Advice and impression

① The factory is well controlled and kept clean. Production facilities are well arranged and well maintained. Patterns are stocked so as to right arrange on the shelf.

② Quality of the products is very good, completed ornamental products is very beautiful.

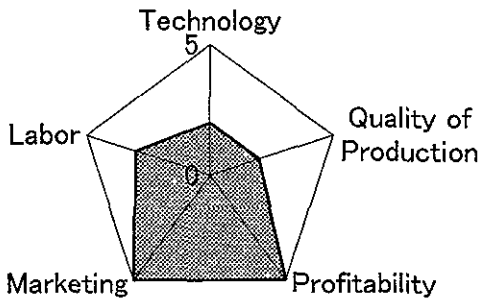
③ The managing director who is native white has wide information of the technology about non-ferrous casting.

④ In order to develop the business, it is recommended to produce the parts for industrial use such as electric terminals because those electric parts are imported now.
They can make them by their own casting technology.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
27-May-98	Burawayo	MP-11	Managing Director

Evaluation	Point*
Technology	2
Quality of Productior	2
Profitability	5
Marketing	5
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$250,000 Sales: Z$4,800,000 No. of Employee: 22 + Temporary 20~50

2. Activity of Company

- The company is manufacturing ,
  - ① Thermal insulation work for boiler, air conditioner of hotels, offices, etc..
  - ② Wooden furniture for school, church, home use, etc..
  - ③ Steel furniture for school, church, home use, etc..
  - ④ Steel fabrications for subsidiary fabrications of boiler plant, steel palettes, etc..

- The company is working at construction sites to make thermal insulation for domestic customers in Zimbabwe.

- The company is named for the purpose of developing the company by thermal engineering and new building is constructed recently to develop their thermal engineering business. But new building is used only as the warehouse for imported thermal insulation materials (rock wool) and the factory is not yet completed to shift their production facilities. Those products are made at the former factory.

3. Findings and analysis

- The company is managed and controlled by the managing director himself. The managing director is doing almost all business, sales and engineering with 3 secretaries. All the business is carried out by his idea and practice.

- Almost of all their former products were wooden furniture, steel furniture and window frames, but now they can get orders such as steel ladders, hand rails, etc. with the job information they get from the construction site of the thermal insulation work.

- They do the thermal insulation work and subsidiary fabrications of boiler plant as the sub-contractor of plant construction company.

4. Advice and impression

① The managing director is excellent to find the business of thermal engineering and the company is run by his idea and energy to implement the idea.

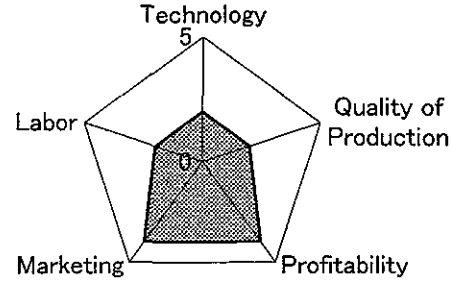
② It is recommended that the production facilities of new factory shall be arranged to minimize transportation of work pieces considering production process and create pathway with clear line in the factory.

③ It is recommended to adopt production control concept to both production in the factory and the working on the site.
Especially to save running money, it is very important that material control for the site work shall be properly controlled .
By using computer and soft ware to do production control, production control is operated easily if the company recognize the concept of the production control.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
28-May-98	Burawayo	MP-12	Managing Director

Evaluation	Point*
Technology	2
Quality of Production	2
Profitability	4
Marketing	4
Labor	2



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$110,000 Sales: Z$1,000,000 No. of Employee: 4

2. Activity of Company

- The company is manufacturing well pumps and suction pipes with foot valves.

- Manufacturing process of the products

Cutting pipe/flat bar/steel rod by machine
Machining / Bending
Thread cutting
Assembling
Painting

- The products are made by the 3 skilled workers those are all director. They can make the products without drawings and specifications if they are informed depth of the well.

- The products are sold by the sales manager.

3. Findings and analysis

- The pumps they make is traditional reciprocating pump. Almost of their products are man power drive type. They are developed motor or engine drive pumps now.

- The factory is equipped with old machine tools, Gas cutting units and electric welders.

- The products are sold to the public sectors for small village use.

4. Advice and impression

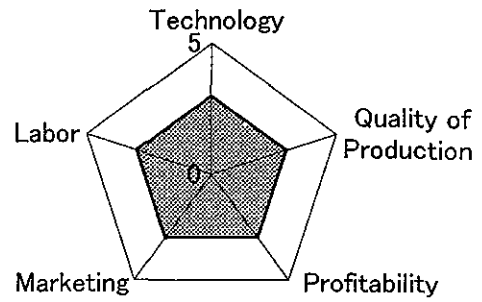
- The company is the manufacturer specialized to make well pumps.
  Their business is stable and steady now because they can get orders from public sectors.

- It seems that the company is concentrating on making traditional well pumps.
  If they are aggressive to make highly efficient pumps, it is recommended to re-design the pumps and improve the accuracy of machining and assembly.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
28-May-98	Burawayo	MP-13	Managing Director

Evaluation	Point*
Technology	3
Quality of Production	3
Profitability	3
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$800,000 Sales: Z$1,200,000 No. of Employee: 17

2. Activity of Company

- The company is manufacturing several kind of steel fabrications,
  - ① For buildings ; Gates, Fencing, Verandah, Window frames, etc.
  - ② Steel furniture ; Desks, Chairs, Tables, Shelves, Money box, etc..
  - ③ For construction ; Steel frames for buildings, Water tanks, Pressure vessels, etc..
  - ④ For cars/trailers ; Bodies of truck, Trailers, etc..

- The managing director has planning to expand factory to make steel fabrications more. He does almost all the business and production engineering.

- The managing director proposes his ideas to realize the customer's requirement and then get order.

- Many raw materials such as steel plates, pipes, sections, etc. are stocked so as they can make anything customer wants immediately.

3. Findings and analysis

- Manufacturing Process

① Manufacturing plan is made by the managing director with two person of engineers who can design the steel fabrications customer want to make.

② Production

Custom made products are made by skilled worker with unskilled worker from raw material arrangement to painting in accordance with the instruction of manufacturing plan. But welding is done by qualified skilled workers.

Standard products for repeat production are made by the specialized manufacturing process.

- Production Facilities and Arrangement

Production facilities is very old but those are maintained in order.
Lay out of the facilities is not good. Consideration to minimize transportation and to create pathway is not found in the factory.

- Quality of the products

The products are not inspected. When some defects or errors is found in the manufacturing process by the worker, those defects or errors are remedied by the worker without to record and to report.

Quality of the products is acceptable in the sense of the Zimbabwe.

4. Advice and Impression

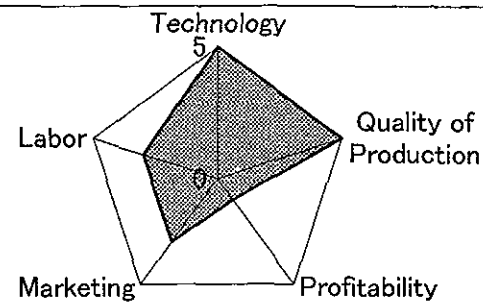
① It is recommended that the concept of the production control is to be adopted to decrease stock materials and stock products.

② It is recommended that the production facilities and working area are re-arranged and pathways are created.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
29-May-98	Burawayo	MP-14	Managing Director

Evaluation	Point*
Technology	5
Quality of Production	5
Profitability	1
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. *Outline of Company (Large Scale Enterprise)*

Capital: (Large Scale Capital) Sales: Z$45,000,000 No. of Employee: 365

2. Activity of Company

- The company is manufacturing several kind of castings, forgings and machining.

Max. unit weight tons/one	Ferrous Iron Casting	25	the largest in Zimbabwe.
	Steel Casting	15	the largest in Zimbabwe.
	Steel Forging	3	

Main Products	Mining Machinery	Abrasion resistant parts forJaw Crusher, Ball Mill, etc.
	Car and Truck	Brake Drums and Shoes, Lockers and Brackets, etc.
	Wagon and Coach	Wheels and Tires, Bogies, Bolsters, Connections, etc.
	Tools and Cutter	Bits, Cutter Tooth, Schanks, etc.

3. Findings and analysis *

* Findings are quoted partially from General Manager's Report of IDCZ.

- The company's core business has been in the supply of railway wheels and rolling stock spares. These have been produced under the licenses but the licenses are cancelled now. They must find new core business.

- As new core business, the company starts to manufacture of mining spares and equipment, automotive suspension spares and ground engaging tools.

- The company intends to work with industry associations, SIRDC, the Institution of Engineers, and technical colleges to carry out research and development on basic and functional device technologies.

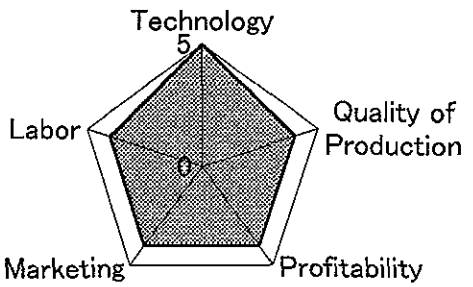
- The company is equipped with specialized continuous casting line for wheels of wagon but this casting line is not working now.

- The company is equipped with the largest casting facilities and machine tools in Zimbabwe.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
1-Jun-98	Masvingo	MP-15	Managing Director

Evaluation	Point*
Technology	5
Quality of Productior	4
Profitability	4
Marketing	4
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$485,500 Sales: Z$2,316,000 No. of Employee: 20

2. Activity of Company

- Organization of the company
  - ·Corrugation Tank Division
  - ·Fiber Glass Division
  - ·Engineering Division
  - ·Distribution Division
- The company is manufacturing with their specialized engineering and production line,
  - ·Galvanized sheet metal and Fiberglass water tanks with a minimum carrying capacity of 50 gallons. Tanks stands of various height.
  - ·Flue pipes for tobacco processing.
  - ·Pressure Tanks.
  - ·Gutters, Down pipes, Brackets, etc..
  - ·Grinding mill screens.
  - ·Fiberglass AVM Bus grills
  - ·Echo-master fire places.
  - ·All machining work and Repairs
  - ·Sheet metal fabrications and General engineering

3. Findings and analysis

- The managing director used to be an officer of a government and then he become independent and established the company.
  He has been managing his company aggressively on the basis of water related business from his connection to the government and his experience.

- Their main products is corrugation tanks for water which is specialized by their engineering and production technology.
  Specialized points by their engineering ;
  Designing of Tank, Tank stand, Piping system, etc..
  Material control --- Corrugated sheet metal is imported from SA.
  Roller bending of corrugated sheet metal with specialized roll.
  Assembly --- Roller bent corrugate sheets are soldered.
  Leakage Test

- The factory is equipped with well maintained facilities and kept clean in good order.
  The pathways are created in the factory so as to be able to access safely and speedy.

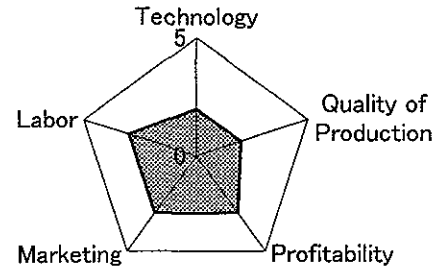
4. Advice and Impression

- The company is successful in both managing and production controlling with the products specialized by their technology.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
1-Jun-98	Masvingo	MP-16	Managing Director

Evaluation	Point*
Technology	2
Quality of Productio	2
Profitability	3
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

   Capital: Z$180,000 Sales: Z$800,000 No. of Employee: 15

2. Activity of Company

- The company has a shop to sell the products.

- The company is manufacturing home furniture, school furniture with steel legs, window frames, etc..

- The products are made by their sense with no manufacturing plan or specification based on their experience.

- The quality of the products is acceptable in the sense of the Customer.

3. Findings and analysis

- Legs and flames of the chairs, desks and tables are made from steel sections or steel pipes.

  Manufacturing procedure ;

Cutting	Disk cutting machine
Bending	Cold or hot bending by hand work
Assembling	Assembling by partial welding to set
Welding	Welded by skilled welder

- Chair boards and table boards are made by the processing of plywood.

  Plywood processing ;

  Cutting board

  Bending

  Finishing

- Manufacturing for the standard products (such as school furniture) are done by divided work of the specialized process line.

- Manufacturing for the individual products (such as window frames) are done by the skilled worker one by one.

4. Advice and Impression

- The manufacturing process line for the standard products is not so productive to repeat production. To improve the productivity of mass-products, it is better to divide the process work easy to work by un-skilled worker.

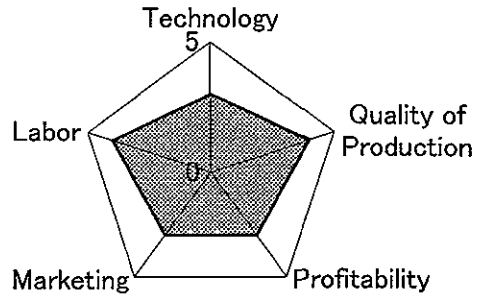
- Each process work is done by the worker not so experienced.

  He must be advised better way by the managing director or much experienced worker.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
1-Jun-98	**Masvingo**	**MP-17**	**Managing Director**

Evaluation	Point*
Technology	3
Quality of Productio	4
Profitability	3
Marketing	3
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$1,200,000 Sales: Z$1,200,000 No. of Employee: 15

2. Activity of Company

- The company is manufacturing ornamental steel racks, legs of tables and metallic home furniture.

- The managing director is one of members of "Development Association" and the company is started with guidance and support of the Association.

The company is expected to specialize products in high quality metal furniture for guest rooms and the managing director is attempting to sell those products in the domestic market throughout the Zimbabwe.

3. Findings and analysis

- The factories is small and equipped with machine tools, disk cutting machine and sheet metal shearing machine.

- They sell good designed and beautiful steel furniture but fabricate only steel pipe frames or legs for their products in the factory now.

  Ornamental plating and painting is made at outside.

  Ornamental non-ferrous parts are made at outside.

- They also manufacture popular type steel furniture made from steel sections by themselves.

- At the visiting time the factory, they are doing another work. That is repair of textbooks using sheet metal shearing machine.

4. Advice and Impression

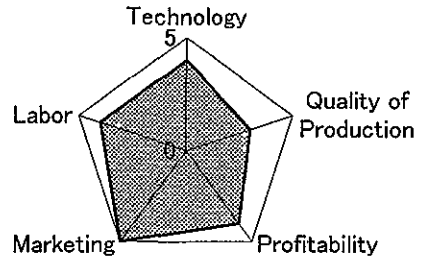
- This area is an upcountry with a small population so that there is disadvantage for enterprises of metal processing.

  But it seems that they are successful to manage metal processing company by making high value added small products.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
2-Jun-98	Kwekwe	MP-18	Managing Director

Evaluation	Point*
Technology	4
Quality of Productior	3
Profitability	4
Marketing	5
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$2,000,000 Sales: Z$1,570,000 No. of Employee: 49

2. Activity of Company

- The company has a shop to sell several kind of miscellaneous goods, for example ;
  Electric motors, Tools, Electronics products, Home use apparatus and etc..
  Those goods are purchased from outside of the company.

- The company is active to construct the fences throughout countries.

- The company is also manufacturing many kind of metal processing products and wooden work products and the products are sold throughout countries in Zimbabwe.
  ① Diamond fences, Steel nets, Steel props, Door frames, window frames, etc.
  ② Car bodies, Scotch cart, Wheel barrows, etc.
  ③ Steel frames for building, Twist bars for concrete reinforcement, etc.
  ④ Ferrous and non-ferrous Castings for living necessities such as pots, pans, etc.
  ⑤ Wooden furniture such as chests, chairs, desks, etc.

3. Findings and analysis

- The factory is equipped with light metal processing machines and wood processing machines,

Fences	Old manual type fencing machine, etc..
School Furniture	Old manual type metal processing machines, etc..
Window Frames	New processing machines, Spot welders, etc..
Car bodies, Carts	Surface finishing tools, Painting apparatus, etc..
Castings	Cupola, Crucible furnace, Green sand , etc..
Wooden Furniture	Wood processing machines and tools, etc..

- Machines and working area is well arranged in the building, The materials and work pieces are well ordered and the factory is kept clean.

- Quality of the products is good. The products are well finished and beautiful.

- The company has 7 trucks and the products are transported throughout the country.

4. Advice

- The managing director is the earnest business man. He had been trained business and experienced production technology in the medium scale enterprise. Then, he became independent. He established private company with his wife.

- The company's activity is wide but the products are limited standardized goods those they can make repeat production. There are many stock of the products in the factory.

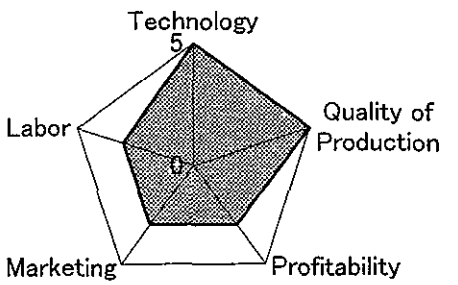
- The products at present, are made by experienced workers with no drawings, but they should develop design capability to cater their new products.

It is recommended to improve production technology to manufacture quality products.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
2-Jun-98	Kwekwe	MP-19	Managing Director

Evaluation	Point*
Technology	5
Quality of Productio	5
Profitability	3
Marketing	3
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$145,000 Sales: Z$373,000 No. of Employee: 10

2. Activity of Company

- The company is manufacturing Gate and Window frames.

- Those products are sold throughout countries in Zimbabwe through trading company.

- Sales promotion ;

Show room in the factory--- Customers place order after viewing exhibited products.

Participation to the exhibition --- Foreign customers interested in their products

3. Findings and analysis

- The managing director himself is designing and manufacturing the products.

- The company is equipped with a few section metal processing facilities.
  Manufacturing is proceeded by hand work and they don't attempt to divide manufacturing work except painting.

- The factory is clean and well ordered. No scrapped materials or residual materials are found on the floor.

- Design and quality of the products are good. The welded portions are well finished by grinding.

4. Advice

- They make the products one by one in accordance with the managing director's order with no drawings and specifications of customer.
  The customer order them with no specifications after seeing the samples in show room.
  As the results, they can get order from local client only.

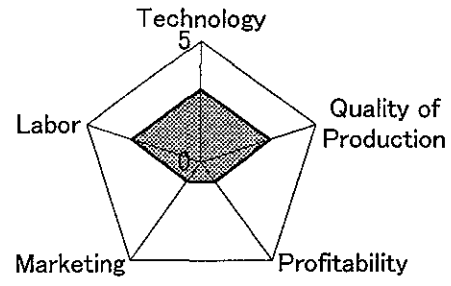
- To expand sales widely, it is better to tie up or to rink with trading company who can promote the sales more actively.

- To manufacture the products more and to complete in short period,
  it is recommended that job order shall be made by the drawings based on the manufacturing plan.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
2-Jun-98	Kwekwe	MP-20	Foundry manager

Evaluation	Point*
Technology	3
Quality of Productio	3
Profitability	1
Marketing	1
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company (Foundry Division of Large Scale Enterprise)

Capital: Z$15,000,000 Sales: Z$40,000,000 No. of Employee: 40

120 before

2. Activity of Company

- The company is large scale enterprise.

The company was established to make ingot cases for iron and steel making. But the demand for those products is very small recently because iron and steel making process is changed to continuous casting process. Therefore the company is forced to keep low operation.

The company intends to make castings for maintenance parts for iron and steel making now and the worker is decreased to 40 from 120 before.

- The foundry division is manufacturing

Casting parts for maintenance of blast furnaces, smelting furnaces, etc.

Ingot cases, Slag pots for iron making, Ferro- chrome making

- Production amount of the castings

2,600 tons/year

3. Findings and analysis

- The foundry is equipped with big facilities for making large size castings but those facilities are almost no working now.

- The foundry is equipped with large cupola ; capacity of 8 tons/hr but it is too large to make small castings they attempt to make.

- To make steel casting, they pour steel melt at steel making division after assembled up the mold. The molds are transported to steel making division.

- They can make non- ferrous castings but the order of non- ferrous castings is seldom.

4. Advice

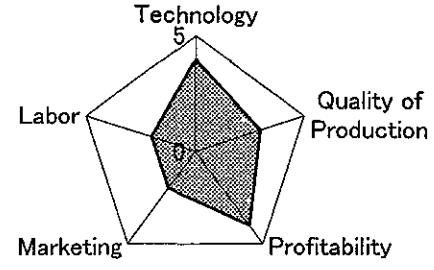
- In Japan, since 1970 continuous casting technology has been introduced in the steel making lines. Then, ingot case making foundries produce more than 2,000 tons/month, must change their products to survive. These big factories succeeded in the change of products with rationalization of their production process and restructuring of the company.

- The foundry division is faced to choose whether they would turn to manufacture small products or continue big products. They wouldn't be survive without rationalization and restructuring.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
3-Jun-98	Gweru	MP-21	Managing Director

Evaluation	Point*
Technology	4
Quality of Production	3
Profitability	4
Marketing	2
Labor	2



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$300,000 Sales: Z$410,000 No. of Employee: 6

2. Activity of Company

- The company is manufacturing steel structures,

Customer	Typical products
for Homes	Gates, Burglar bars
for Buildings	Door frames, Window frames
for Farmers	Water carts, Scotch carts
for Motor Cars	Trailers, Exhaust pipes, Car shades

- The company is stocking many of car scraps and tires for recycling them.

3. Findings and analysis

- The company is equipped with light scale metal processing equipment and wooden processing equipment. They are old but well maintained.

- The products are made by the managing director's ideas and his production planning without using drawings or specifications.

- To make the products competitive, stocked scrapped materials are re-used to the parts of their products.
  For example ; Wheels, Tires and Wheel bearings of the scrapped cars are re- used to the scotch carts and trailers they manufacture.

- Based on farmer's requirements, the connecting rod of the scotch carts is made by wood instead of steel pipe for convenience of farmer's use.

- The company is faced to the problems,
  ① Shortage of the running money : because of the delay of payment.
  ② Shortage of the order : because their sales is for local only, they can't get orders from all over the country.

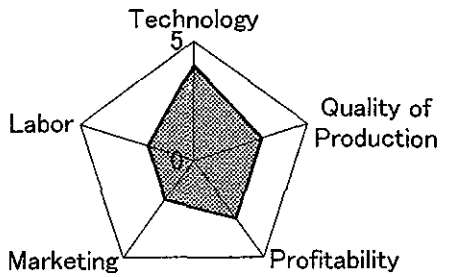
4. Advice

- The managing director is much experienced to make steel structures and very aggressive to design the products based on the customer's requirements.
  Customer is limited in local and then the products quality come to acceptable level for local use only.
  To sell their products throughout country in Zimbabwe,
  ① It is necessary to link with trading company.
  ② Design and quality of the products shall be improved so as to satisfy user's need.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
3-Jun-98	Gweru	MP-22	Workshop Foreman

Evaluation	Point*
Technology	4
Quality of Productio	3
Profitability	3
Marketing	2
Labor	2



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$750,000 Sales: Z$600,000 No. of Employee: 6

2. Activity of Company

- The company is manufacturing Metal Processing Machines, Playing Equipment, etc..

For example ;

Machines	Bending Press, Fencing Machine, etc..
Playing Equipment	Steel structured Swings, Roundabout, etc..
Drink Server	"Toy Drinks" both type of automatic and manual.
Steel Furniture	School desks and chairs, etc..

- On the wide ground of the factory, their products are exhibited on expectation to sell.

- Customer comes to the company and after seeing and checking those exhibited products, customer buys exhibited product or places order with his requirements.

3. Findings and analysis

- All workers including the foreman are well experienced technicians.

- They make the machine as copying without drawings or specifications.

- Essential parts such as bearings, gears, electric parts, etc. are used recycled parts.
They can buy those parts hardly because those are imported.
Then, they must keep the scrapped cars, machines, steel structures for recycling.

- Their produced machines act well though those are made as copied machine.
Compared with original old machine, those copied new machines are beautiful and work smoothly.

4. Advice

- They think that they can't to sell their products without exhibition except standard products such as school furniture.
But they don't advertise on the news paper to sell more, they believe the best method to sell is to exhibit their products on the site and expect customer come to the factory.

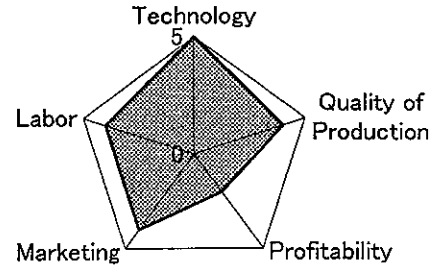
- To promote the metal processing company in Zimbabwe, to make production facilities without importing them is very important. This company has manufacturing technology to make them, but their technology is limited to copy old fashioned simple machines.

Therefore, it is advisable to develop some extent of design engineering capability to boost home made machines.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
3-Jun-98	Gweru	MP-23	Foundry Manager

Evaluation	Point*
Technology	5
Quality of Production	4
Profitability	2
Marketing	4
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company (Casting Division of Large Scale Enterprise)

Capital: Z$27,000,000 Sales: Z$24,000,000 No. of Employee: 200

2. Activity of Company

- The company is large scale enterprise.

The company has specialized casting division as makes :

Grey cast iron castings, Ductile iron castings, White iron castings, etc..

- The casting division is manufacturing

Casting parts for farm machinery, industrial machinery, mining machinery, etc.

Casting parts for water pipes, pipe fittings, manholes etc.

- Production amount of the castings

100~200 tons/month (change by casting size)

3. Findings and analysis

- The casting division is full equipped with the facilities to make high quality castings.

Pattern Shop	Casting plan is made by fore man
Casting shop	Molding Line/small size
	Molding Line/medium size
	Centrifugal Casting Line
	Melting by Cupolas
	Melting by HF Induction Furnaces
	Finishing
	Heat-treatment
	Shot-blasting
Machining shop	Machining for the products required to machine
Laboratory	Chemical analysis, Hardness check, etc.

* Manual Molding Shop for large size castings is not operated now.

- The production is controlled by the production and quality control systems.
  Notices of production schedules are found on the wall in the factory.

4. Advice

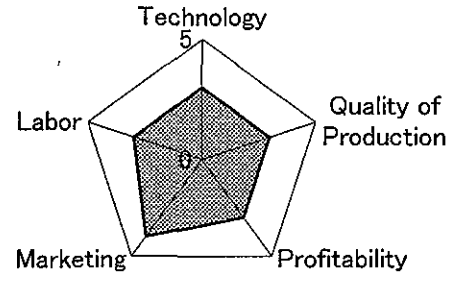
- Quality of the casting is good.

- To assure the quality, it is recommended to improve their quality control system adopting identification (ID) of the melt and mold to give them traceability.
  If some defect is found, the same lot of the products shall be checked easily.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
5-Jun-98	Mutare	MP-24	Managing Director

Evaluation	Point*
Technology	3
Quality of Production	3
Profitability	3
Marketing	4
Labor	3



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$340,000 Sales: Z$1,090,000 No. of Employee: 18

2. Activity of Company

- The company is manufacturing threaded parts, coffee mill, and steel fabrications.
  Threaded parts : international standard bolt and nuts, long bolt by order, etc.
  Coffee mill : copy product of the mill made by Portugal
  Steel fabrication: hot water boilers, several steel fabrications for plants

- Standard bolts and nuts are bought from out side and stocked.

- Special bolts and nuts are machined from metal bars in the factory by order.
  They can make also gears by order.

3. Findings and analysis

- The managing director is much experienced as the skilled lathe machine worker.

- The company is equipped with well maintained machine tools and old sheet metal processing machines.

- The company is manufacturing steel fabrications for the coffee mill plant in accordance with the requirements of coffee mill plant manager.
  As the plant machinery are imported, they make attachments or auxiliary parts of the plant. Their products are the hoppers, sorting bean machines, conveyers, etc..

  Maintenance of the plant is ordered to the company with supplying spare parts or materials.

- Quality of the products
  Threaded parts : very good
  Coffee mill : bad (poor finishing and poor function), acceptable in Zimbabwe
  Steel fabrication for plant : good

4. Advice

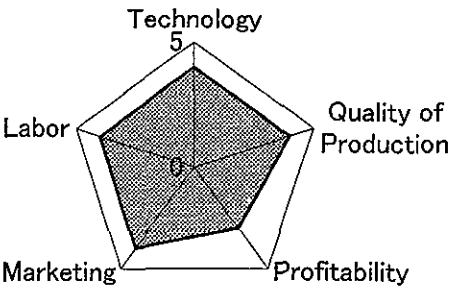
- It seems that the company has the linkage with the big company as subsidiary. They think that the contract is made with independent policy and they do not want to be ordered as subsidiary. It is advisable to expand their activities that the company shall take charge in maintenance of the plant of the big company as subsidiary.

- The company is specialized by threaded products but the sales amount is smaller than steel fabrications. To develop the company as the steel fabricator for plants, the company is expected to grade up their product design and production technology.

FIELD SURVEY REPORT - METAL PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
5-Jun-98	Mutare	MP-25	Managing Director

Evaluation	Point*
Technology	4
Quality of Productior	4
Profitability	3
Marketing	4
Labor	4



(*1-Very Bad, 2- Bad, 3-Average, 4-Good, 5-Very Good)

1. Outline of Company

Capital: Z$4,400,000 Sales: Z$930,000 No. of Employee: 20

2. Activity of Company

- The company is manufacturing sheet metal processing products and brass castings .
  Main products : Window frames, Door frames, Window latches, Window rocks etc..

- The company has brass casting division. The castings is made by gravity die casing.
  Those products are window rock parts (levers, bolts, nuts, etc.).

- The managing director makes production plan and designs tools and jigs for production.
  He had much experienced manufacturing technology in the private company before and then he founded his company at five years ago.

3. Findings and analysis

- The factory is well equipped with metal processing machines and kept clean.

- The manufacturing process for repeat production is done by the process line efficiently. The process work is proceeding by not so skilled worker using setting jigs and tools properly.

- The arrangement of machines and raw material stores in the factory is good and tools and jigs are well maintained.

- The quality of the products are good.

4. Advice

- Dies for punching out are worn away so the fins come on the sheet metal. The fins are removed out by sander now.
It is recommended that dies should be made by tool steel and quenched instead of plain carbon (mild) steel .

- The materials and processed work pieces are put down on the floor now.
It is recommended to create setting stand to reduce worker's physical fatigue and improve productivity.

- The managing director is aggressive to the business and he has plan to expand his business by making all parts instead of buying from outside.
The parts they are buying now is small parts such as bolts, nuts, screws, hinges, etc..
But it seems better to re-study his plan because he will not get return on the investment for production of such small parts. The plan to make them shall be limited to the parts that they can make with existing facilities and production technology.

3. FOOD PROCESSING

LIST OF FACTORIES VISITED-FOOD PROCESSING

DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ASSESSMENT	
20-May	FP-1	Managing Director	Location	Harare	Technology	3
			Capital	Z$ 32,000.	Qlty of Production	3
			Sales amount	Z$ 8,568,000.	Profitability	3
			No. of employee	46	Marketing	4
					Labor	3
					Total points:	16
20-May	FP-2	Managing Director	Location	Harare	Technology	3
			Capital		Qlty of Production	3
			Sales amount		Profitability	3
			No. of employee		Marketing	2
					Labor	3
					Total points:	14
20-May	FP-3	Managing Director	Location	Harare	Technology	3
			Capital	Z$ 75,000.	Qlty of Production	2
			Sales amount	Z$ 5,000,000.	Profitability	3
			No. of employee	49	Marketing	3
					Labor	3
					Total points:	14
21-May	FP-4	Managing Director	Location	Harare	Technology	4
			Capital	Z$ 200,000.	Qlty of Production	4
			Sales amount	Z$ 9,000,000.	Profitability	3
			No. of employee	80	Marketing	4
					Labor	4
					Total points:	19
21-May	FP-5	Managing Director	Location	Harare	Technology	3
			Capital		Qlty of Production	3
			Sales amount		Profitability	3
			No. of employee		Marketing	3
					Labor	2
					Total points:	14
21-May	FP-6		Location	Harare	Technology	
			Capital		Qlty of Production	
			Sales amount		Profitability	
			No. of employee		Marketing	
					Labor	
					Total points:	0
22-May	FP-7	Factory Manager	Location	Harare	Technology	3
			Capital		Qlty of Production	2
			Sales amount	Z$ 3,000,000.	Profitability	3
			No. of employee	21	Marketing	2
					Labor	3
					Total points:	13
22-May	FP-8	Chief Excutive Officer	Location	Harare	Technology	4
			Capital	Z$ 500,000.	Qlty of Production	4
			Sales amount		Profitability	3
			No. of employee	30	Marketing	3
					Labor	3
					Total points:	17
26-May	FP-9	Managing Director	Location	Bulawayo	Technology	3
			Capital		Qlty of Production	3
			Sales amount		Profitability	3
			No. of employee	10	Marketing	3
					Labor	4
					Total points:	16

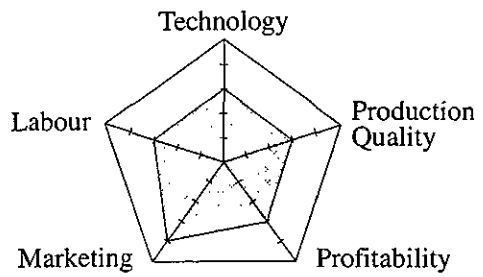
DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ASSESSMENT	
27-May	FP-10	Managing Director	Location	Bulawayo	Technology	4
			Capital	Z$ 3,000,000.	Qlty of Production	3
			Sales amount	Z$ 12,000,000.	Profitability	3
			No. of employee	20	Marketing	3
					Labor	3
					Total points:	16
27-May	FP-11	Director	Location	Bulawayo	Technology	3
			Capital	Z$ 9,900.	Qlty of Production	3
			Sales amount	Z$ 2,000,000.	Profitability	3
			No. of employee	17	Marketing	3
					Labor	3
					Total points:	15
28-May	FP-12	Managing Director	Location	Bulawayo	Technology	3
			Capital		Qlty of Production	3
			Sales amount	Z$ 2,000,000.	Profitability	3
			No. of employee	10	Marketing	4
					Labor	3
					Total points:	16
28-May	FP-13	Admin. & Finance Mgr.	Location	Bulawayo	Technology	4
			Capital	Z$ 200,000.	Qlty of Production	4
			Sales amount	Z$ 9,000,000.	Profitability	4
			No. of employee	80	Marketing	4
					Labor	4
					Total points:	20
29-May	FP-14	Director	Location	Bulawayo	Technology	2
			Capital	Z$ 260,000.	Qlty of Production	2
			Sales amount	Z$ 2,500,000.	Profitability	3
			No. of employee	12	Marketing	3
					Labor	3
					Total points:	13
1-Jun	FP-15	Director	Location	Masvingo	Technology	3
			Capital	Z$ 34,000.	Qlty of Production	3
			Sales amount	Z$ 1,585,000.	Profitability	4
			No. of employee	30	Marketing	3
					Labor	3
					Total points:	16
1-Jun	FP-16	Managing Director	Location	Masvingo	Technology	4
			Capital	Z$ 250,000.	Qlty of Production	4
			Sales amount	Z$ 1,500,000.	Profitability	3
			No. of employee	35	Marketing	3
					Labor	3
					Total points:	17
2-Jun	FP-17	Brewery Manager	Location	Kwekwe	Technology	4
			Capital		Qlty of Production	3
			Sales amount		Profitability	3
			No. of employee		Marketing	3
					Labor	3
					Total points:	16
2-Jun	FP-18	Sales Representative	Location	Kwekwe	Technology	3
			Capital	Z$ 117,000.	Qlty of Production	3
			Sales amount	Z$ 930,000.	Profitability	3
			No. of employee	18	Marketing	4
					Labor	3
					Total points:	16
3-Jun	FP-19	Brewery Manager	Location	Gweru	Technology	4
			Capital		Qlty of Production	3
			Sales amount		Profitability	3
			No. of employee		Marketing	3
					Labor	3
					Total points:	16

DATE	COMPANY CODE	INTERVIEWEE	COMPANY'S PROFILE		ASSESSMENT	
3-Jun	FP-20	Manager	Location	Gweru	Technology	3
			Capital		Qlty of Production	3
			Sales amount	Z$ 9,600,000.	Profitability	3
			No. of employee	36	Marketing	4
					Labor	3
					Total points:	16
5-Jun	FP-21	General Manager	Location	Mutare	Technology	4
			Capital	Z$ 3,000,000.	Qlty of Production	4
			Sales amount	Z$ 36,000,000.	Profitability	4
			No. of employee	224	Marketing	3
					Labor	3
					Total points:	18
5-Jun	FP-22	Managing Director	Location	Mutare	Technology	3
			Capital		Qlty of Production	3
			Sales amount	Z$ 5,000,000.	Profitability	3
			No. of employee	33	Marketing	3
					Labor	3
					Total points:	15

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-1	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	4
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 32,000 Sales : Z$ 8,568,000 Number of Employees : 46

Product	Annual productions
1) Maize meal	1,896 tons
2) Cooking oil	192 liters
3) Salt	100 tons
4) Others (Rice, Beans, etc.)	50 tons

2. Activities

(1) This is a flour mill which is located in an industrial park. The main factory where the entire shopfloor can be observed from the first floor produces maize meal (sales ratio: 80%). Salt and other items are packed in separate rooms. Sunflower oil (sales ratio: 10%) is produced in a separate factory.

(2) The owner is a doctor of crop science and used to work for the government.

(3) Hammer mills were used at the beginning but roll mills were installed in 1997 to produce higher grade meal.

(4) The number of shopfloor workers is 24. There are three shifts and each shift has eight full-time workers for raw material supply (two), the processing of by-products (three), flour milling (two) and measuring (1).

(5) There is a five year plan for future development, aimed at the firm establishment of the maize meal and sunflower oil businesses, followed by diversification. There are strong expectations in regard to the import of Japanese technologies.

3. Problems

(1) Because of the shortage of working capital, the mill operation rate in 1997 remained at 40%.

(2) The machine maintenance is inadequate.

(3) Raw material and product quality checks rely on human senses, such as vision.

(4) Although cleaning is conducted three times a day, raw materials and milled flour on the floor are highly noticeable.

4. Evaluation/Advice

(1) The provision of working capital (for the purchase of maize) is a much more pressing issue than technical problems.

(2) The owner is quite forward looking and is eager to diversify the companyís activities based on its present businesses.

DIAGNOSTIC STUDY REPORT - FOOD PROCESSING

- Date : 8~9 June 1998
- Factory Code : FP-1
- Products:
  Currently the company is producing maize meal in Harare and cooking oil in Magunje.

  —Maize meal production is around 20 tons a day. It is packed in 2kg ~ 50kg bags.

  —Cooking oil production is around 600 liters a day. It is bottled in 500ml to 2 liters bottles.

1. Present Conditions of the Factory

(1) Processing Flow Chart of Maize Mill

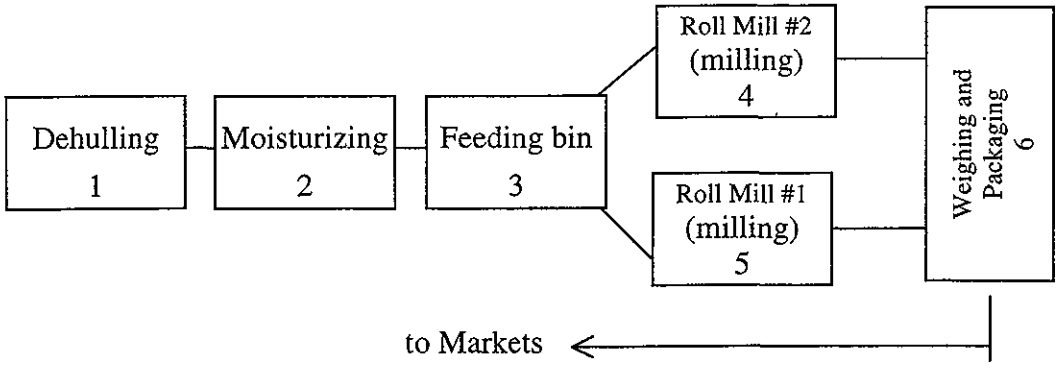
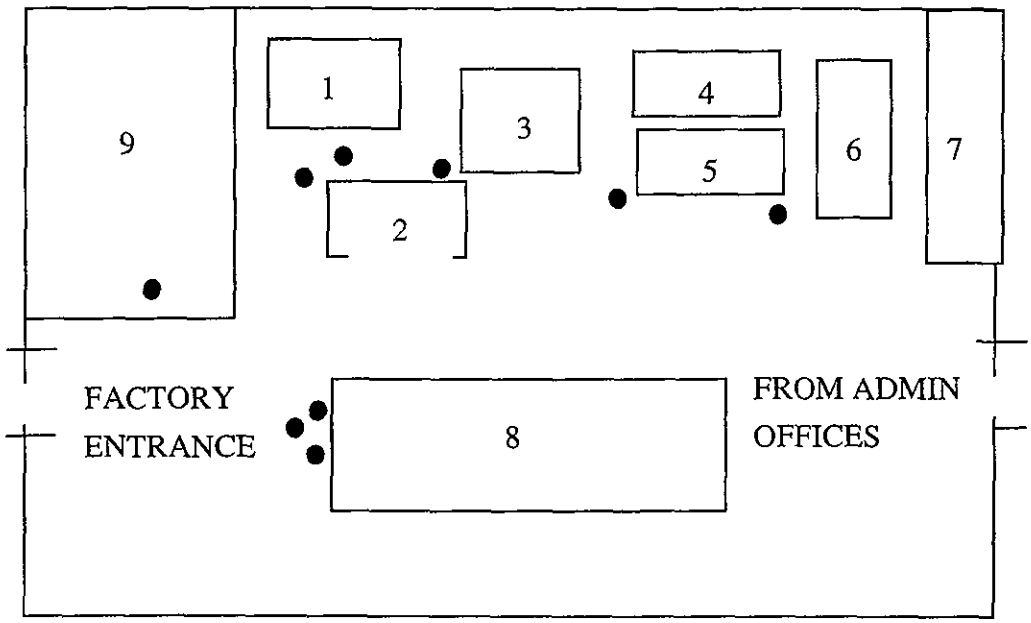


Fig. 2.2.1 Processing Flow Chart of Maize Mill



1..... *dehuller machine*
2..... moisturizing bin
3..... feeding bin
4+5....roll mills
6..... weighing, packaging section
7..... *stock of finished product*
8..... bags of by-product bran (for livestock and poultry farmers)
9..... warehouse for materials
●..... workers.

Fig. 2.2.2 Location Map of the Equipment and Workers

(2) Policy of the Company

1) To manufacture maize meal and sunflower oil efficiently in order to offer quality products to customers at affordable prices, and

2) To develop other new products such as bread, cakes, etc. in future in order to meet the requirement of the society.

2. Results of the Diagnostic Survey

(1) Operation skills are low

The workers' operation skills are low, but at present there is no immediate solution for this due to the lack of a reliable operation manual.
A manual for machinery operation needs to be prepared as soon as possible.

(2) Machinery maintenance is poor

There is no good coordination between the maintenance team and management as to the periodical maintenance system and the ordering of spare parts. As a result, a proper maintenance manual is not available and the necessary spare parts are in short supply.

(3) Training of workers is inadequate

The workers are not given enough training opportunities. Consequently, their basic skills are low.

(4) The company faces an acute shortage of working capital for purchasing raw materials such as maize, sunflower seeds, etc. As a result, production has to be halted until management can obtain the necessary funds.

(5) Yield recording system is not functioning

Although there is a recording system for yield, it is not clearly understood by the workers.

(6) Quality of the final product (maize meal) is only passable. The quality is poor because the quality test is done visually to determine ① whiteness and ② coarseness/fineness and is therefore influenced by the testers own-preferences.

(7) Machinery installed is not adequate to meet demand

The machinery and equipment at the preparation stage are not enough to enhance milling operations. For example, the dehulling machinery needs renewal and the introduction of a remover is required. The latter is needed, because there seem to be a lot of impurities in the raw materials.

3. Recommendations

(1) Improvement of productivity

1) The production facilities should be operated regularly without interruption based on a proper production plan. In order to do so, the company should endeavour to secure the necessary funds for operation and keep an adequate stock of essential spare parts on hand.

2) Reduction of wastage of raw materials

The careless spilling of raw materials and maize meal while weighing and packaging should be prevented.

3) Measuring and weighing techniques should be developed for all stages of production. In order to do so, ① weighing scales should always be properly maintained, and ② weighing and measuring skills should be developed among the workers concerned.

(2) Introduction of an advanced quality control system

1) Testing of products

At present, the factory uses a "sensual", "physical" or "cooking" method to determine the quality of a product. These methods, however, are not always effectively carried out because they tend to lack consistency. Therefore, it is recommended that ① a simple testing apparatus be introduced and ② testing techniques among the workers in charge should be developed and promoted.

2) Quality assurance of raw materials

The company should prepare "a suitable raw materials acceptance standard." This would assure the quality of the purchased raw materials before they (materials) are fed into the processing lines.

(3) Improvement of production lines

In order to improve labour efficiency and productivity, the employment of the following items is highly recommended:

1) Preparation of working tables for manual work

2) Introduction of efficient carts for the transfer of raw materials and products

3) Introduction of an effective warehouse management system

4) Floor layout should be modified

The ideal floor layout would be U-shaped to facilitate a smooth, undisturbed flow of materials and products.

(4) Training of workers

The following training items are considered indispensable:

1) Preparation of an operation standard and a machinery maintenance standard

2) Use of graphs in recording daily yields — total volume and the ratio of materials to. final products

3) Encouragement of the proposals and recommendations from the workers for production improvement, improvement of working environment, etc. with the aim of establishing an incentive system for workers.

4) Introduction and effective use of "5S" activities
"5Ss" are as follows:

	Japanese	English
1st S	Seiri	Sort out
2nd S	Seiton	Organize
3rd S	Seiso	Cleaning
4th S	Seiketsu	Maintenance
5th S	Shitsuke	Training

The practice of 5S activities is vitally important for improving both productivity and the quality of products at a food processing company.

(5) Other items to be recommended

1) Improvement of daily reporting and communication systems within the company

2) Introduction of quality standards

3 Introduction of a sound cost management system

4) Introduction of periodical inventory systems

5) Improvement of packaging technology and management

6) Improvement of package designs

7) Improvement of product labeling, including explanation for ingredients, cooking instructions, expiration date of consumption, etc.

8) Introduction of safety management system

9) Introduction of environmental protection rules

(6) Comments on the future plan of the company

The company plans to expand its product lines as follows:

1) To start flour milling, and

2) To develop such new products as "stick" snacks and other confectioneries made of maize

The consultant's opinion about the above is as follows:

1) It is a good idea to produce new quality products which big companies are currently not producing.

2) Some suggestions for possible new products to be developed are as follows:

   ① Instant soup, instant stew, instant porridge (sadza) with the use of wheat or maize powder

   ② "Protein powder" or "Nutritious powder" made from a mixture of soybean/maize powder and other ingredients

CERTIFICATE

OF

ANALYSIS

NO. 8128320118-2

DATE 15 July 1998

LICENCED BY JAPANESE GOVERNMENT

JAPAN GRAIN INSPECTION ASSOCIATION

Messrs. AKIKAZU AOYAGI (SYES Co., Ltd.)

COPY

Vessel :

Shipment : From to arrived on

Commodity : FP-1 Millers "Maize-meal"

THIS INSPECTION IS CARRIED OUT IN THE BEST OF OUR KNOWLEDGES AND ABILITIES. THE CERTIFICATE IS ISSUED ON THE UNDERSTANDING THAT OUR RESPONSIBILITY IS LIMITED TO THE EXERCISE OF REASONABLE CARES.

The inspection results are as follows:

Analytical Results :	Item	Element
	Moisture	12.9 %
	Fat	2.7 %

* *

The details of the above mentioned were duly analyzed by our analysts of Japan Grain Inspection Association, Central Research Laboratory.

JAPAN GRAIN INSPECTION ASSOCIATION CENTRAL LABORATORY

JAPAN GRAIN INSPECTION ASSOCIATION

Kazuyoshi Katsube

Kazuyoshi Katsube
Head of Analytical Staffs

CHECKED BY H M

CERTIFICATE OF ANALYSIS

NO. 8128320118-3

DATE 15 July 1998

LICENCED BY JAPANESE GOVERNMENT

JAPAN GRAIN INSPECTION ASSOCIATION

Messrs. AKIKAZU AOYAGI (SYES Co., Ltd.)

ORIGINAL

Vessel :

Shipment : From to arrived on

Commodity : FP-1 Millers "Maize-extrafine"

THIS INSPECTION IS CARRIED OUT IN THE BEST OF OUR KNOWLEDGES AND ABILITIES. THE CERTIFICATE IS ISSUED ON THE UNDERSTANDING THAT OUR RESPONSIBILITY IS LIMITED TO THE EXERCISE OF REASONABLE CARES.

The inspection results are as follows:

Analytical Results :	Item	Element
	Moisture	14.1 %
	Fat	1.8 %

* *

The details of the above mentioned were duly analyzed by our analysts of Japan Grain Inspection Association, Central Research Laboratory.

JAPAN GRAIN INSPECTION ASSOCIATION CENTRAL LABORATORY

JAPAN GRAIN INSPECTION ASSOCIATION

Kazuyoshi Katsube

Kazuyoshi Katsube
Head of Analytical Staffs

CHECKED BY H. M.

RESULTS OF DIAGNOSTIC STUDY

FOR

FP-1

COMMENT

- Business with Excellent Customers
  ...TM, OK, etc.
- Modernization of Production Facilities
- Expansion of Business to Allied Field

PROFITABILITY

MARK	INDICATION	1995	1996	1997	Japanese Index
A1	Operating Profit to Net Sales	-0.4	1.8	0.7	4.0
A2	Gross Profit to Net Sales	18.9	12.0	19.5	23.5
A3	Operating Profit to Working Capital	-1.3	14.9	3.0	4.7
A4	Operating Capital to Turnover	3.4	8.2	4.2	1.1
A5	Selling & Admin. Expense to Sales	19.3	10.2	18.8	19.5

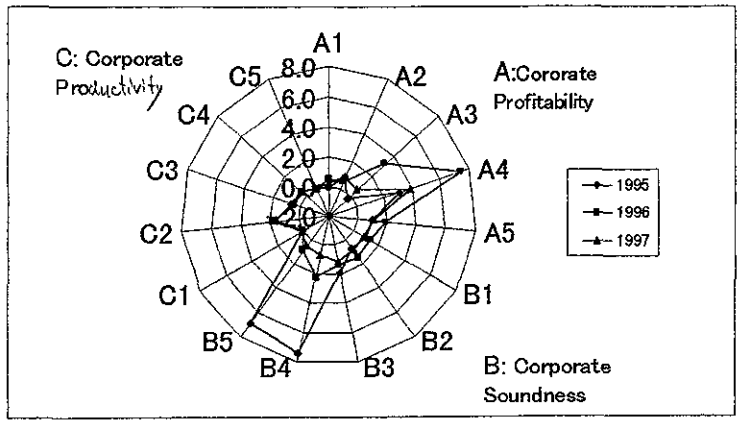
SOUNDNESS

MARK	INDICATION	1995	1996	1997	Japanese Index
B1	Net Worth to Total Capital	42.7	52.7	31.3	42.8
B2	Interest Paid to Sales	2.2	1.1	1.8	1.5
B3	Fixed Assets to Long Term Capital	54.3	76.8	91.7	102.5
B4	Current Ratio	1191.1	345.4	112.5	160.5
B5	Quick Ratio	937.9	114.2	68.5	136.4

PRODUCTIVITY

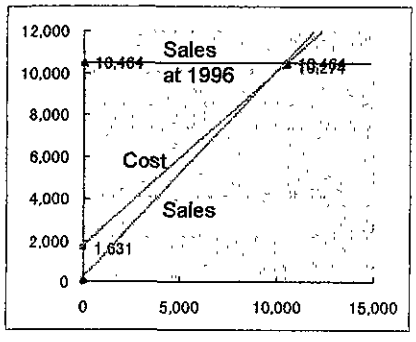
MARK	INDICATION	1995	1996	1997	Japanese Index
C1	Annual Production per Head	153	230	390	15386
C2	Personnel Expenses to Processed Amount	20.2	18.3	20.2	32.7
C3	Processed Amount to Net Sales	29.0	17.4	28.3	45.6
C4	Efficiency of Machinery Investment	1.9	2.0	2.2	4.6
C5	Machinery per Head	81	113	180	6280

RADAR CHART



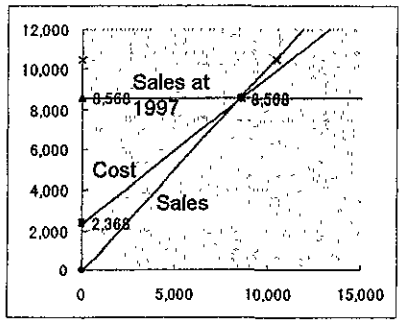
BREAK EVEN POINT ANALYSIS

1996



X1,000

1997



X1,000

RECOMMENDATION

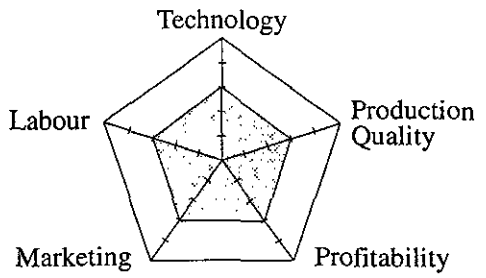
- Improvement of Yield Ratio
  ...Reduction of Waste of Material

- Stocktaking of Material as Well as Products at the End of Terms
  ...Reduction of Idle Stock

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-2	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : N/A Number of Employees : 25

2. Activities

(1) This is a family-run flour mill which is located in an industrial park.

(2) The grinding mills are second-hand hammer types imported from South Africa.

(3) Apart from the main equipment, mechanisation has been slow. Female workers manually select the raw materials using a simple screen table.

(4) There is only one shift of nine hours.

(5) While the storage of finished products receives careful attention, such as panel storage rather than direct stacking on the floor and classified shelves for packaging materials, there is still room for improvement. One example of the shortcomings is the inadequate sealing of packed products.

3. Problems

(1) Despite the daily production capacity of 20 tons, the actual production volume is only six tons/day.

- The operation rate of 30% makes sound business management difficult as the break-even point is set at 10 tons/day.
- This low operation rate is caused by insufficient working capital. Raw material suppliers demand advance payment while buyers pay 60 days after delivery.

(2) The machines are rather old.

- The company hopes to diversify its business through the procurement of new machines (made in Italy) but lacks sufficient funds.

(3) There is no engineer responsible for machine maintenance and quality control.

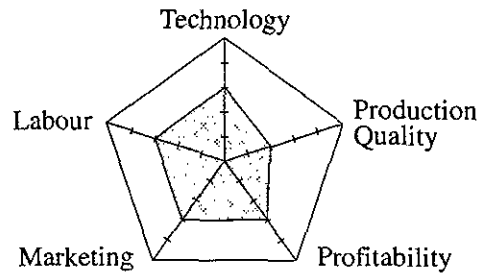
4. Evaluation/Advice

The owner entered the flour milling business in 1995 from a different type of business and is eager to develop the present business (in addition to the above-mentioned diversification, export enquiries have been made to the company from Botswana and Zambia, etc.). However, the shortage of working capital is a stumbling block.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-3	Managing Director

Evaluation	Points *
Technology	3
Production Quality	2
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 75,000 Sales : Z$ 5 million Number of Employees : 49

2. Activities

(1) The present owners (two partners) took over the company on payment of Z$ 4 million to the previous owner and started the new company in 1997.

(2) Because the main products are juices, there are annual business fluctuations with summer being the busiest season. An application has been made for government authorisation for the production of alcoholic drinks in winter.

(3) The juices, in fact, do not contain real fruit juice and are made of citric acid, colourings, essence (flavouring) and preservatives). Therefore, the quality is not particularly high.

(4) The market size for this type of drink is said to be Z$ 18 - 20 million/year and the company is confident that it can dominate upto one-third of the market.

(5) The equipment is rather old even though some indigenous ideas are employed to make the best use of the existing equipment. While vertical pillow filling machines are used for bagging, capping is manually conducted.

(6) Measurement of the sugar content using a hydrometer is the only inspection conducted at the factory.

(7) Because of the high profitability, a new factory is being sought in Botswana.

3. Problems

(1) There is no thorough quality control and the stacking of packaging materials in the factory is disorderly.

(2) The lack of a heating process results in products with a relatively short life.

(3) Technical strength is lacking as the production process cannot flexibly change the mixing ratios of ingredients to meet changing market needs.

(4) The pillow filling machines often break down.

4. Evaluation/Advice

(1) Efforts must be made to create a hygienic factory environment.

(2) The technical strength should be improved so that appropriate production methods and ingredient mixing ratios can be employed.

(3) Apart from the sugar content, the pH value must be checked.

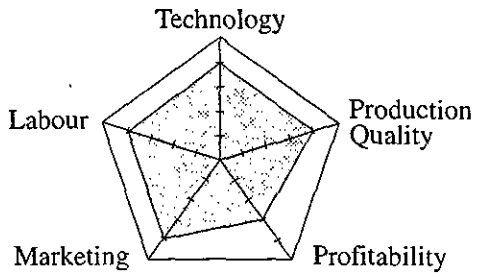
(4) There are character products for children among the current products and this idea is commendable.

(5) The workers are very lively as they work to upbeat music.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
21st May, 1998	Harare	FP-4	Managing Director

Evaluation	Points *
Technology	4
Production Quality	4
Profitability	3
Marketing	4
Labour	4



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 200,000 Sales : Z$ 9 million Number of Employees : 80

2. Activities

(1) The company has been run by a white family for 14 years.

(2) Personal customers mainly consist of middle or upper-class indigenous people. The products are also delivered 3 - 4 times/day to hotels and supermarkets.

(3) There is a large parking space along the main street. There is a shop area immediately inside the entrance to the building and the bakery is located behind the shop area. Part of the bakery (final baking stage) can be seen from the shop area (with the possible effect of increasing the trust of customers).

(4) The workers are well-dressed (the shop assistants wear a GI hat), giving the impression of cleanliness. Careful attention is paid to hygiene as gloves are worn to handle the hamburgers, etc. in order to avoid direct contact.

(5) The quality of the products appears higher than that of other bakeries as they are soft and finely textured. There are 40 - 45 different items, consisting of breads (50%), buns and cakes (26%) and biscuits and doughnuts (24%).

(6) Each process is either partitioned or is located in a separate room in the factory.

(7) The standard range of equipment is in place. The use of rotary ovens indicates the more careful planning of this company than other companies. The moulding machine for muffins is said to have been devised by the managing director. The fermentation conditions are set at a relative humidity of 90% and a temperature of 40°C.

(8) Part of the floor is painted (probably with vinyl paint) and the workrooms are cleaned twice a day to keep them clean.

(9) Quality control relies entirely on a sixth sense of the managing director. Visual inspection and testing are the only inspections which are conducted to check product quality as it is believed that the customers conduct their own quality checks.

(10) Three TV monitors are installed in the office of the managing director located upstairs. From this office, the workrooms can be seen through a glass panel and instructions are given via a transceiver, indicating that a reasonable production control system is in place.

(11) Raw material inventory control is conducted both weekly and monthly. In principle, the products are sold on a daily basis so that there is no overnight stock.

(12) The company has the following R & D and future plans.

① Research is in progress to produce long-life products (biscuits).
② The export of products, including those referred to in ① above, is anticipated.
③ The development of a franchise network in Zimbabwe is hoped for.

3. Problems

(1) Prior to considering the export of products, careful examination of the companyís financial situation (in regard to customs duties and the loan interest rate of as high as 38%) is required. The high interest rate and other obstacles exist despite the low profit margin.

(2) Equipment maintenance must be properly conducted.

(3) New technologies (possibly from Japan) are required. The company hopes for an appropriate response by the government to deal with its problems.

4. Evaluation/Advice

(1) The company shows a positive managerial attitude, vindicated by the following observations.

① The company adopts a rational process as well as production control regime.
② The company has a vision for the future.

(2) Reasonable hygiene control is in place.

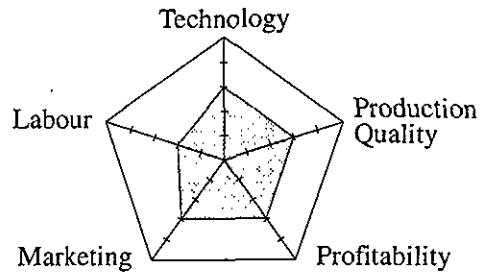
(3) A sixth sense is still relied upon in terms of product quality inspection.

(4) The company is almost a model for other small and medium-size bakeries.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-5	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	3
Labour	2



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 1 million Sales : Z$ 4 million Number of Employees : 40

2. Activities

(1) The factory is located in an industrial park.

(2) The main product is vegetable protein (soybeans) which accounts for 50% of the annual turnover. This product is recognised in Zimbabwe as a rich nutritional food and sales are said to be quite favourable. It is exported to Zambia and Malawi. Other products are dog food (30%) and breadcrumbs.

(3) The vegetable protein is produced by the extruder method. Water (5% in volume) is added to ground soybeans, followed by additional water (15 - 20%) to mechanically prepare the final product by the heating process.

(4) The factory is small and crowded. The machinery layout appears inappropriate. There is a lack of order inside the factory and a feeling of cleanliness is missing.

(5) The annual turnover in 1997 increased by 30% on the previous year with a profit margin of 30%.

(6) It is planned to move to a new factory.

3. Problems

(1) There is a question of how to finance the new factory.

(2) There are many areas for the factoryís improvement as a food processing factory.

(3) The only engineer is the managing director.

(4) There is no in-house quality control capability (quality control is entrusted to a university or research institute of an industrial association).

4. Evaluation/Advice

(1) In addition to marketable products, the positive attitude of the managing director suggests that the company has a promising future.

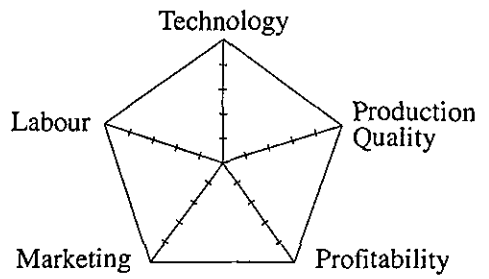
(2) However, there are shortcomings in terms of factory control and technical strength.

(3) It is hoped that the technical strength will be improved to develop new products to suit the market needs.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-6	–

Evaluation	Points *
Technology	-
Production Quality	-
Profitability	-
Marketing	-
Labour	-



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

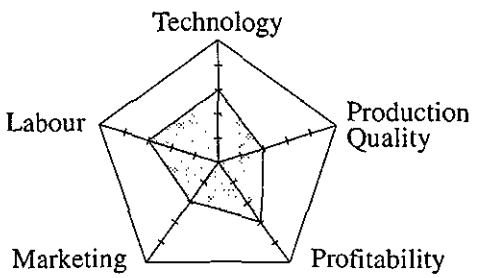
1. Outline of Company

The company produces bread. Due to a mix-up inside the company, the managing director was absent at the time of the visit. Consequently, no interview was conducted to obtain information.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
20th May, 1998	Harare	FP-7	Factory Manager

Evaluation	Points *
Technology	3
Production Quality	2
Profitability	3
Marketing	2
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : Z$ 3 million Number of Employees : 21

2. Activities

(1) This is an in-store bakery located in a shopping centre.

(2) As the managing director was unavailable, the factory manager was interviewed.

(3) The products are slightly firm bread, a variety of buns and doughnuts.

- Daily production : 1,900 loaves of bread, of which 240 are broad loaves
- Daily sales : approximately Z$ 10,000 with a profit ratio of some 38%

(4) While the raw material storage area is partitioned off, the bakery generally appears disorderly. The area around frying equipment is particularly untidy.

(5) Flour is purchased from a large company (Blue Ribbon Brand).

3. Problems

(1) In general, the equipment is old and is not well maintained. Rust can be observed although this may well be the result of the equipment materials rather than a lack of proper maintenance.

(2) The flour quality is not uniform. The water content level increases from October to December in particular.

(3) The market competition in Harare is intensifying.

4. Evaluation/Advice

(1) The company expressed its desire to establish technical cooperation with a Japanese company. In the meantime, a plan is said to be in progress to establish a large factory with a European partner.

(2) It is also planned to establish a venture business to produce dry fruit with a view to its export to Europe.

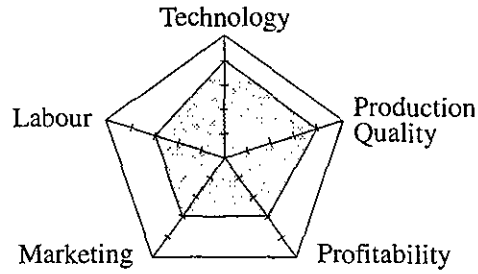
These plans illustrate the forward-looking attitude of the owner.

(3) The production of higher quality bread is desirable to survive the increasing competition.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
22nd May, 1998	Harare	FP-8	Managing Director

Evaluation	Points *
Technology	4
Production Quality	4
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 500,000 Sales : N/A Number of Employees : 30

2. Activities

(1) This is a flour mill which was established with the financial aid of the DANIDA (Denmark).

(2) Accordingly, all of the production machines were made in Denmark and are inscribed with the name of the manufacturer, i.e. SKIOLD.

(3) There are two roll mills for maize and salt is packed in a separate room.

(4) The marketing outlets are local bakeries. Products are also exported to Malawai and other countries.

(5) The factory space is small and the machines have been installed side by side with little room in-between them. The operation rate is almost 100%. The daily production volume is 10 tons but there is an aggressive plan to increase it to 100 tons within several years.

(6) Although it is said that cleaning is conducted several times a day, the entire factory is covered with flour. There are holes in the metal netting and midges can be found inside the factory.

(7) The owner (father of the interviewee) used to be a truck driver transporting fruit to Zambia. He opened a retail shop in Zimbabwe in the late 1980ís and has expanded to four bakeries today.

(8) Probably because of the business development upto the present, negotiations are said to be in progress with a Danish company to establish a joint venture for the export of sun-dried fruit to Europe as the next step after flour milling.

(9) Interest is expressed in the establishment of a joint venture with a Japanese company through JICA. Such interest appears to be prompted by the use of two, four ton Toyota vehicles. The interviewee strongly hopes to learn Japanese technologies and know-how.

3. Problems

(1) The local electricity supply is inadequate.

(2) There is a shortage of working capital. While payment to raw material suppliers is made on a cash-on-delivery basis, there is a delay of 30 days between product delivery and payment.

(3) Both the interest rate and customs duties are high.

(4) The delivery control is inadequate.

(5) Quality inspection is entrusted outside the company.

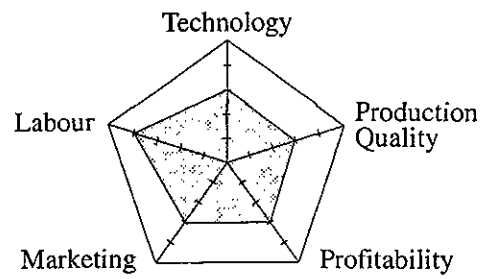
4. Evaluation/Advice

The company entered the flour milling business in 1996 on the basis of its chain of four bakeries. Further development of the flour milling business is anticipated together with the progress of the planned new dry fruit business.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
26th May, 1998	Bulawayo	FP-9	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	3
Labour	4



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : N/A Number of Employees : 10

2. Activities

(1) The front of the building is used as a store which sells soft drinks and maize meal, etc. and the flour mill is located at the back.

(2) The business originally commenced with the sale of soft drinks and others and the maize milling business started in 1997.

(3) This is a family-run business with the husband and wife acting as the managing director and director-cum-manager respectively.

(4) The production capacity is 1,500 kg/day on a nine hour working basis. Full operation is not achieved because of the shortage of working capital to purchase maize. At present, a bank loan is being requested but a positive response may be difficult.

(5) The products are maize meal (70%; 5 kg bags for ordinary consumers) and animal feed (30%).

(6) The sales prices are Z$ 20/5 kg bag for maize meal and Z$ 78/50 kg bag for feed. The raw material (maize) cost is Z$ 2,400/ton.

(7) The factory floor is clean and tidy (sweeping is conducted as required) and indoor hand-washing facilities are provided. The products are stacked in an orderly manner. The usual inventory level is approximately 60 bags.

(8) The maize is purchased from the Grain Market Board (GMB) using a stamp book.

(9) Only visual inspection is conducted constantly.

(10) The interviewee hopes to learn more about business management but the cost of training at a government-run training centre is prohibitive (Z$ 4,000 - 8,000 for 3/4 days) for a small firm like this one.

3. Problems

(1) Maize meal is the staple food for local people and there is a constant demand. The factory operation rate is low due to insufficient funds for the purchase of maize.

(2) Impurities and foreign matters are removed by a simple method during the production process before the maize is processed. There is no acceptance inspection on the grounds that the maize is purchased from the GMB.

(3) As only visual inspection is conducted during the production process and of the final product, quality control appears inadequate. The rationale for this may be that any problem should be reported by the customers who immediately use the product.

4. Evaluation/Advice

(1) The forward-looking business stance is illustrated by the presence of a plan to establish a new flour mill in a different location and also by the display of PR posters.

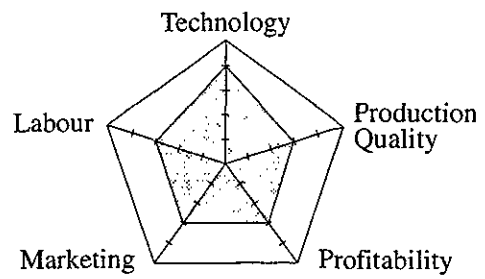
(2) There are small hand-washing facilities in the factory, suggesting some awareness of the importance of the 5 Ss (five basic requirements for factory operation).

(3) A box-type platform car equipped with a pulley should be provided so that flour from the hammer mill can be directly fed into bags.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
27th May, 1998	Bulawayo	FP-10	Managing Director

Evaluation	Points *
Technology	4
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 3 million Sales : Z$ 12 million Number of Employees : 20

2. Activities

(1) This is a family business run by a married couple.

(2) Maize, i.e. the raw material, is directly purchased from farmers.

(3) There is a separate warehouse for raw material storage.

(4) Raw material selection is conducted manually outdoors. Purple grains can be observed in the purchased maize.

(5) The daily production capacity is 15 tons.

(6) The yield loss is as high as 20%.

(7) The truck owned by the company is quite old and lacks a rear mirror. The company hopes to purchase a second-hand Japanese truck.

3. Problems

(1) The direct purchase from farmers means inconsistent maize quality.

(2) Although the warehouse for maize storage is a separate building, the untidy stacking is liable to result in rat and insect damage.

(3) The machine parts cannot be procured in Zimbabwe.

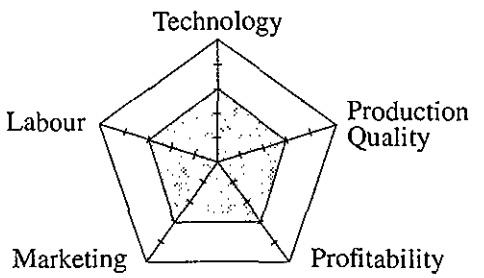
4. Evaluation/Advice

While it is a good practice to have separate warehouses for maize and products, they should both be tidily as well as cleanly stored.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
27th May, 1998	Bulawayo	FP-11	Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 90,000 Sales : Z$ N/A Number of Employees : 17

2. Activities

(1) Although maize milling commenced in 1994, other businesses started seven years ago.

(2) There is a well at the centre of the premises and concrete blocks used to be made. Chicken farming and flour milling are currently conducted on the same premises.

(3) 1,500 chickens are raised, requiring 50 kg of feed produced in-house.

(4) The factory cannot be said to be a specialist flour mill as chickens are hung upside down, albeit in a different room.

(5) Even though there are four roll mills, they do not appear to be busily operating.

(6) Spidersí webs can be observed at the corners of the ceiling. The factory is more like a feed factory than a food processing factory.

(7) The bags for the maize meal were designed by the interviewee and the construction of an entirely new factory building is planned.

3. Problems

(1) There is a shortage of working capital.

(2) The distribution cost is increasing.

(3) The maintenance of machinery is inadequate.

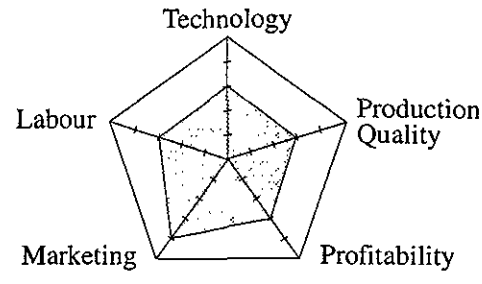
4. Evaluation/Advice

Continuation of the present situation is undesirable for a food processing factory. It is hoped that the construction of a new factory building will ensure production in a hygienic environment.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
28th May, 1998	Bulawayo	FP-12	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	4
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 900,000 Sales : Z$ 2.7 million Number of Employees : 10

2. Activities

(1) The company produces maize meal using roll mills which are the Roff K-2 model with a standard hourly milling capacity of 500 - 800 kg.

(2) While there are two shifts, only two male workers work on the night shift which specialises in flour milling. The packaging work is done in the morning. It ends by 11:00.

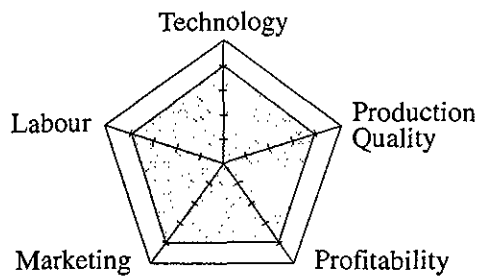
(3) The owner himself is engaged in marketing activities.

(4) Compared to similar other companies, production activities appear to be more systematic as they are based on the actually ordered volume.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
28th May, 1998	Bulawayo	FP-13	Directors

Evaluation	Points *
Technology	4
Production Quality	4
Profitability	4
Marketing	4
Labour	4



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 300,000 Sales : Z$ 42 million Number of Employees : 80

Products: (1) maize meal (2) sorghum
(3) packed salt (4) animal feed

2. Activities

(1) This milling company is backed by an investment company. Possibly because of this, the production scale is larger than in the case of those companies run by an individual owner or family. The business operation is firmly established.

(2) Out of the 80 employees, 69 are believed to be factory workers and the 11 others (including six women) are engaged in work which is not directly related to production. (Given the fact that there are three shifts, each shift is believed to consist of 23 workers.)

(3) The site is large and there is a siding line through the back gate for the delivery of raw materials. (Trucks are used for the delivery of products.)

(4) There is a courtyard which can accommodate any extension of the building in the future.

(5) The main product is maize meal but sorgham meal is also produced. The companyís share of the local maize meal market is said to be 67%. In addition, the company produces packaged salt.

(6) Inside the factory, milling and packing are conducted in neighbouring rooms and, therefore, the products are protected from milling dust. The packaged products are tidily stacked in a storage area which is fenced off by wire netting and the storage conditions are good.

(7) One notable feature of the companyís operation is tempering (water content adjustment) which is not conducted by other mills.

(8) As far as the basic milling equipment is concerned, Roff mills are used as in the case of other mills. In the packing area, more advanced machinery is used, including a digital scale and a semi-automatic heat sealer. It is planned to upgrade the sealer to an automatic sealer.

(9) In regard to quality control, the company currently lacks any analytical instruments, suggesting reliance on human senses, including visual inspection. The company is considering the purchase of such instruments from South Africa in the future.

(10) There are minor points for improvement, including the use of imperfect aluminium buckets and the inaccuracy of the weighing machine (not the digital scale). However, the overall production control regime is far better than that of other mills.

(11) Future plans include ① the construction of a new factory in Harare (to be opened by the end of 1998) and ② the possible launching of the new business of producing wheat flour.

3. Evaluation/Advice

(1) The factory gives the impression of a properly run factory.

(2) Unlike other mills, the company has an active investment plan, possibly because it is backed by an investment company.

(3) There are strong expectations in regard to the transfer of Japanese technologies regarding flour milling, etc. The company uses Japanese computers and vehicles (not verified).

(4) The company is aware of the importance of producing high quality products and maintaining a hygienic working environment. The purchase of analytical instruments for quality control is necessary.

(5) The concept of business management of the interviewees is appropriate for the future development of the company.

(6) This company should be regarded as a role model for the business development of other mills.

DIAGNOSTIC STUDY REPORT - FOOD PROCESSING

Date of Diagnosis: 22nd - 23rd July, 1998

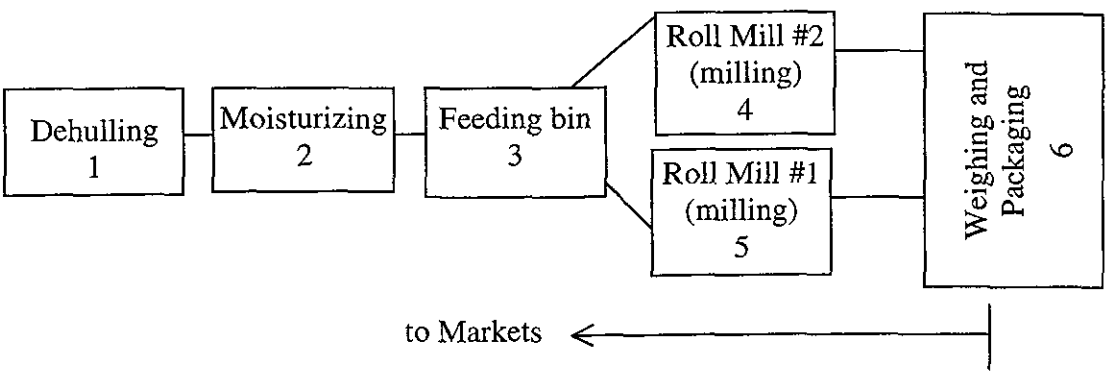
Factory Code: FP-13

Type of Business: *Food processing (flour milling)*

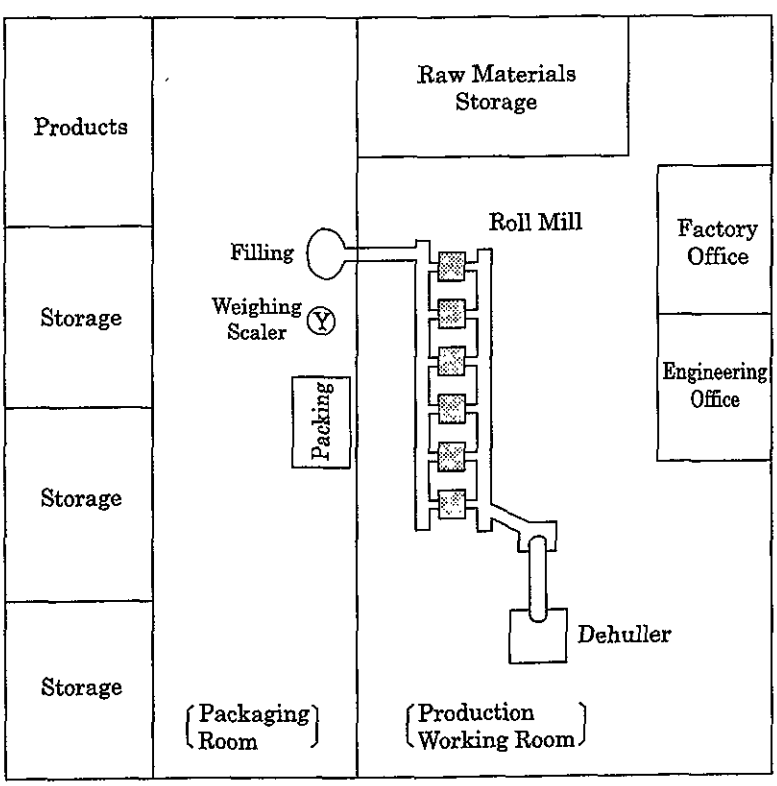
Products: (1) maize meal, (2) sorghum, (3) packed salt, (4) animal feed

(1) Present State of Company

a) Production Flow Chart (Flour Milling)



b) Factory Floor Layout



Factory Locaton Map

c) Business Policies

① To expand the existing maize meal business by means of constructing a new factory in the capital, Harare

② To commence a new wheat flour milling business

③ To improve the quality control together with the development of new products

(2) Diagnosis Results

a) Although the technical strength is evident, it is insufficient. Production control is conducted by an engineer who received specialist education on food processing at a Danish college. The production volume is properly recorded but the lack of quality control equipment makes quality inspection inadequate.

b) Although some consideration is given to machine maintenance, it is insufficient. An engineering specialist is assigned the supervision of machine operation but the machine maintenance must be improved.

c) The education of the factory workers is mixed with satisfactory and unsatisfactory elements.

① Education to clarify the picture of production is provided by means of asking workers to record production data in the form of a daily production report.

② Meanwhile, education on hygiene is inadequate. For example, outdoor shoes and dirty cloths are placed on top of the raw materials (maize).

d) A system of recording the daily production activities is in place. Daily records are kept on the acceptance of raw materials, shipping of products, target production volume and actual results and state of machine maintenance. Any problem arising from ordinary daily production can, therefore, be dealt with.

e) The product quality is mainly suitable for early consumption and appears unsuitable for long storage. The analysis results of the ingredients indicate a fat content of more than 1%, implying quality degradation after long storage (Certificate of Analysis).

f) Packing work does not appear to be smoothly conducted.

g) The hygiene and environmental arrangements are insufficient.

(3) Recommendations

a) Improvement of Productivity and Yield

① The yield is established by the raw materials received, products and derivatives (such byproducts as bran used as animal feed) and the yield rates are calculated daily. This data must be actively used to improve both the productivity and yield. For example, the production volume and yield rate can be made daily into graphs for display in the factory so that any decline of the yield rate can be immediately investigated to identify the cause(s) faster than is the present case.

② Due to the use of an open system, flour is scattered by the milling machine. There is a marked spillage of bran at the outlet. The installation of a cover to collect the spilled bran is required.

b) Confirmation of Quality and Procurement of Quality Inspection Apparatus

① The quality analysis results are shown in The Attached Certificate of Analysis. At present, the products are quickly consumed and a problem of quality should not occur. If the need for long-term storage arises in the future, an appropriate milling method must be introduced.

② No quality inspection tools/apparatus are available. It is currently planned to procure a moisture meter from South Africa. In addition, measuring apparatus for the grain distribution, fat content and microbes, etc. should be procured.

③ Using the apparatus described in ① above, a self-reliant inspection regime together with inspection relying on human senses by means of vision and cooling will be established.

c) Process Improvement

① The screw-type pipe to feed the milled flour to the packing room is suspended. A stand should be introduced to fix the pipe in order to avoid abrasion.

② The chair used by machine maintenance staff to repair machines is unstable. A stable chair or ladder should be used in view of work safety.

③ Broken buckets (metal buckets with an uneven edge), etc. are used as measuring tools. These are inefficient and possibly lead to the inclusion of pieces of metal

in the flour. They should be replaced by appropriate tools (such as stainless scoops).

④ Underlay panels must be used for the storage of raw materials and products to prevent contamination and quality degradation (such panels are only partly used at present).

⑤ The rationalisation of packing work is currently in progress, including the installation of a semi-automatic heat sealer. The installation of an automatic line for continuous filling and packing work is recommended. (The installation of such a line is said to be already under consideration by the company.)

d) Employee Education

① The employees should be made thoroughly aware of the importance of hygiene.

② The 5S (seiri, seiton, seiketsu, seiso and shitsuke) movement should be promoted.

e) Improvement of Hygiene and Environment

① Flour from the milling room is scattered in the warehouse where packing materials are stored and old tyres and metal bars are also stored in the same warehouse. A clean environment should be created with the installation of covers and the separate storage of engineering tools, etc.

② Bran is temporarily stored in the open air and is eaten by rats and sparrows. The present recovery every three days should preferably be increased to every day.

f) Technology Transfer for Development of New Businesses/Products

① The company hopes to enter the wheat flour business. The relevant advice was provided, including an explanation of the milling methods used in Japan.

② Development of new products: Ideas and samples of possible new products were presented for the exchange of opinions.

(i) maize snacks (curls), (ii) roux (concentrated paste to make stew and rice with hashed meat), iii) instant gruel (rice)

Strong interest was expressed in instant gruel.

③ Establishment of development team: The marketing director is also currently in charge of product development. Advice was provided in regard to the establishment of a development team consisting of approximately one male and one female full-time members to consolidate the product development system.

CERTIFICATE

OF

ANALYSIS

NO. 8128320118-1

DATE 15 July 1998

LICENCED BY JAPANESE GOVERNMENT

JAPAN GRAIN INSPECTION ASSOCIATION

Messrs. AKIKAZU AOYAGI (SYES Co., Ltd.)

COPY

Vessel :

Shipment : From to arrived on

Commodity : FP-13 Foods "Maize meal"

THIS INSPECTION IS CARRIED OUT IN THE BEST OF OUR KNOWLEDGES AND ABILITIES. THE CERTIFICATE IS ISSUED ON THE UNDERSTANDING THAT OUR RESPONSIBILITY IS LIMITED TO THE EXERCISE OF REASONABLE CARES.

The inspection results are as follows:

Analytical Results :	Item	Element
	Moisture	14.2 %
	Fat	3.4 %

* *

The details of the above mentioned were duly analyzed by our analysts of Japan Grain Inspection Association, Central Research Laboratory.

JAPAN GRAIN INSPECTION ASSOCIATION CENTRAL LABORATORY

JAPAN GRAIN INSPECTION ASSOCIATION

Kazuyoshi Katsube

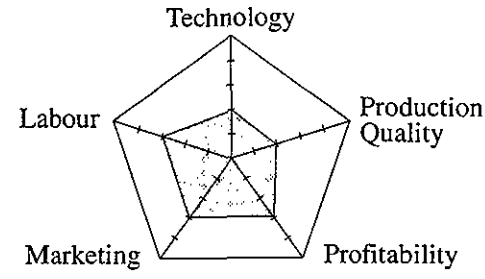
Kazuyoshi Katsube
Head of Analytical Staffs

CHECKED BY H. M.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
28th May, 1998	Bulawayo	FP-14	Manager

Evaluation	Points *
Technology	2
Production Quality	2
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 260,000 Sales : Z$ 2.5 million Number of Employees : 12

2. Activities

(1) The factory constitutes the flour mill division of a family-run group which has six retail shops.

(2) The factory building is located at the centre of a large site where buses and large trucks are dismantled (another business of this group).

(3) Maize meal is constantly delivered to the six shops of the group and is also sold to other retailers at a weekly rate of some 50 tons.

3. Problems

(1) There is a problem of insufficient working capital.

(2) Packaging materials are bought in bulk (a yearís supply of 20 tons although the actual quantity of sheets is unknown).

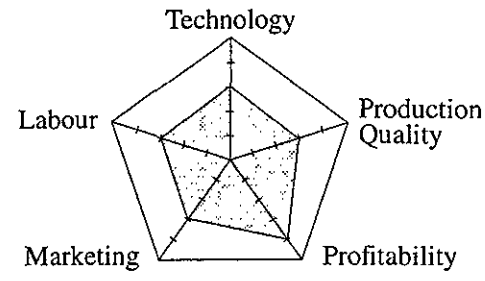
4. Evaluation/Advice

As the production activities are conducted in an open environment, the inside of the factory is dusty. The packaging materials in storage are also dusty because of the lack of any protective covering. Sparrows can be seen pecking the grain on the factory floor. While this may appear idyllic, future improvement of the working environment is required.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
1st June, 1998	Mvsingo	FP-15	Managing Director

s	Points *
Technology	3
Production Quality	3
Profitability	4
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 34,000 Sales : Z$ 1,585,000 million Number of Employees : 30

2. Activities

(1) A variety of products are made, ranging from juices (75%) and cereals (15%) to jerky and dry fruit (10%).

(2) The machinery operation rate is estimated to be around 25% on average.

(3) The juice products are of the concentrated type and are mainly marketed in Zimbabwe. The pH value which is one indicator of quality is between 3.2 and 3.5. Some 3,000 bottles are produced daily.

(4) The cereal products are mainly exported to South Africa.

(5) Dry bananas are also produced.

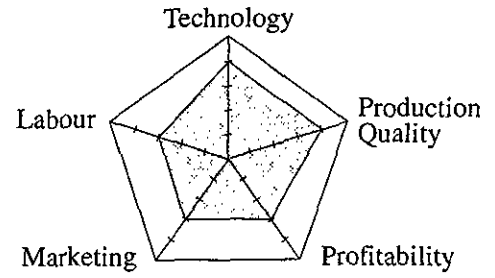
3. Evaluation Advice

As the building was formerly used for different industrial activities (something related to steel manufacture), its configuration, such as the position of gutters, is not particularly good for food processing purposes. However, it is skillfully used. It is planned to construct a new factory, indicating the possibility of future development.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
1st June, 1998	Gutu	FP-16	Manager

Evaluation	Points *
Technology	4
Production Quality	4
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 250,000 Sales : Z$ 1.5 million Number of Employees : 35

2. Activities

(1) The raw materials (sunflowers) are locally produced and bought from local farmers.

(2) The expellers were made in Japan and purchased through a Japanese trading company. It is planned to expand the facilities for further business development.

(3) The product (sunflower oil) is exported to Congo and Tanzania (export share: 30%) in addition to be sold in the domestic market.

3. Problems

(1) There is a problem of insufficient working capital.

(2) The machine maintenance is unsatisfactory.

(3) The price of sunflowers has increased due to a drought which has also created a supply shortage.

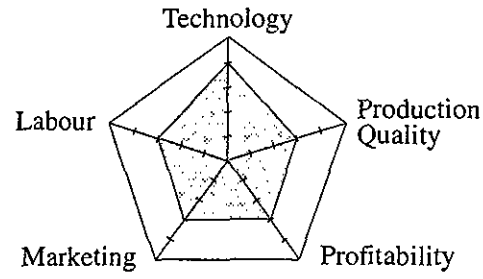
4. Evaluation/Advice

The business field of the company should be fostered as an industry which is closely lined to the local community.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
2nd June, 1998	Kwekwe	FP-17	Brewery Manager

Evaluation	Points *
Technology	4
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : N/A Number of Employees : 172

2. Activities

(1) This factory produces traditional beer.

(2) The beer is made from maize, wheat, sorghum and malt with added water for fermentation.

(3) The quality standards are a pH value of 3.6, an alcohol content of 3.5%, a viscosity of 55 and a total solids content of 29%.

(4) The product is commonly understood as a foodstuff rather than a nutritious drink. A sticky appearance like that of unrefined sake (Japanese rice wine) and a degree of sourness are required. Accordingly, the relevant quality standards differ from those for ordinary beer as the viscosity and acidity are important.

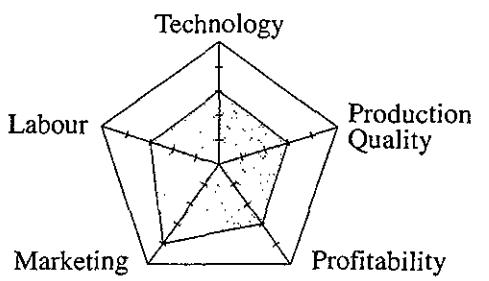
(5) A pH meter and viscometer are used to judge the product quality. However, the latter is hand-made and the company hopes to acquire a more accurate viscometer from Japan.

(6) It is apparent that the company has established itself as a business entity deeply rooted in the local community.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
2nd June, 1998	Kwekwe	FP-18	Sales Representative

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	4
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 32,000 Sales : Z$ 2.27 million Number of Employees : 18

2. Activities

(1) The factory produces sunflower oil.

(2) The expeller was made in India and is not new.

(3) The factory is said to process 750 - 800 kg of raw materials a day, suggesting a daily production volume of some 240 kg.

(4) The owner retired from the company for which he had worked for 25 years due to business retrenchment and started the present business with the financial assistance and training (two weeks) of the Ministry of Labour. He provided 35% of the capital himself and borrowed the rest at an annual interest rate of 15% on the grounds that he could increase the borrowing upto Z$ 120,000.

(5) The product prices are Z$ 14 for a 750 ml bottle and Z$ 8 for a 378 ml bottle.

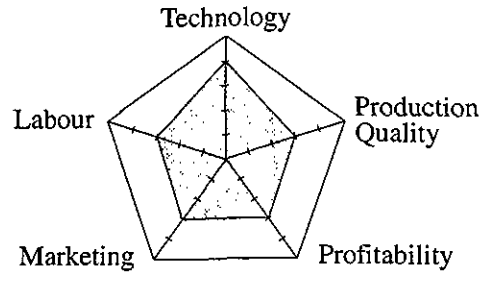
3. Problems

Maintenance of the expeller is difficult as it is a second-hand expeller which was made in India.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
3rd June, 1998	Gweru	FP-19	Director

Evaluation	Points *
Technology	4
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : Z$ 14.16 million Number of Employees : 148 (48 full-time)

2. Activities

(1) The company produces traditional beer.

(2) The products are classified into the following four types.

① For business use
② One litre disposable pack
③ Two litre disposable pack
④ Five litre disposal pack

The third and fourth types account for a large proportion of the business.

(3) The production volume is 12 million litres/month.

(4) The main raw material is maize and the malt comes from Kwekwe. Lactic acid is added.

(5) The alcohol content of the final product is slightly less than 4%.

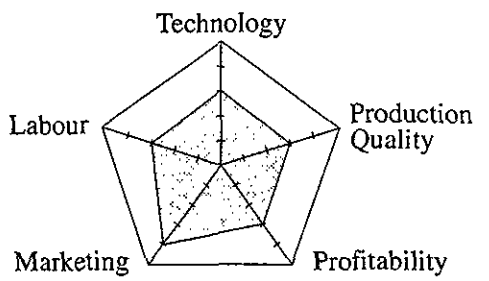
3. Evaluation/Advice

This appears to be a successful example of a municipal-run manufacturer of traditional beer.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
3rd June, 1998	Gweru	FP-20	Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	4
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : Z$ 9.6 million Number of Employees : 36

2. Activities

(1) The products are bread (80%) and biscuits (20%).

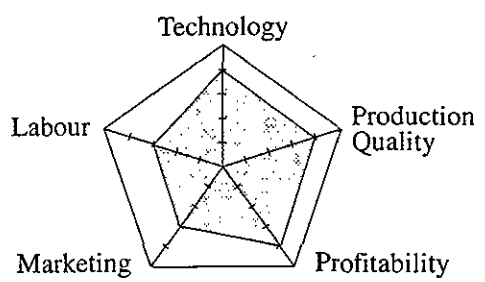
(2) As the company mainly operates as a wholesaler, the sales unit is one dozen.

(3) The main office is located in Harare but this company appears to be well rooted as a local wholesale bakery.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
5th June, 1998	Mutare	FP-21	General Manager and Brewer

Evaluation	Points *
Technology	4
Production Quality	4
Profitability	4
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : Z$ 3 million Sales : Z$ 36 million Number of Employees : 224 (including sales staff)

2. Activities

(1) The company originally produced traditional beer but has expanded to sourcing and marketing beer-related merchandise. The marketed products are own traditional beer (29%), ordinary beer (55%), tobacco, crisps and wine, etc. (16%).

(2) At present, the company is a 100% subsidiary of the Mutare Municipal Authority.

(3) There has been a gradual but steady increase of the direct sales outlets to the present 21 stores, including those outside Mutare.

(4) The inside of the factory is very clean. Production is automated.

(5) The main raw material is maize and three different types of malt are used.

(6) As the final product passes through a strainer, it is very smooth to drink.

(7) The company has a 60% market share in Mutare and the main rival is Chibuku Co., Ltd.

3. Problems

(1) The loan interest rate is very high (38%).

(2) Product distribution poses a problem as the current fleet of three, 14 ton trucks is inadequate.

(3) The packing machine is antiquated (purchased 30 years ago).

4. Evaluation/Advice

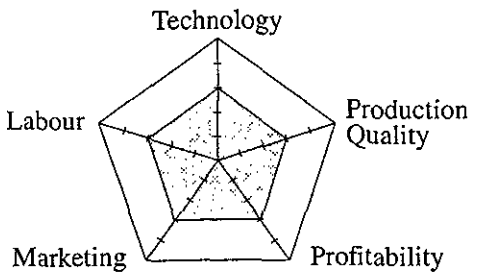
(1) The level of cleanliness inside the factory is impressive.

(2) The development of a chain of direct sales outlets and the successful sourcing and marketing of products related to the main product provide an interesting example of business expansion.

FIELD SURVEY REPORT - FOOD PROCESSING

DATE	LOCATION	COMPANY CODE	INTERVIEWEE
5th June, 1998	Mutare	FP-22	Managing Director

Evaluation	Points *
Technology	3
Production Quality	3
Profitability	3
Marketing	3
Labour	3



(* 1 = Very Poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very Good)

1. Outline of Company

Capital : N/A Sales : Z$ 5 million Number of Employees : 33

2. Activities

(1) The company is owned and run by a white permanent resident.

(2) The machines were made in Europe even though they cost three times more than domestically manufactured machines. The German machine is the favourite (for making dough and other purposes).

(3) The production volume is 7,200 - 8,400 loaves of bread/day.

(4) All of the raw materials, i.e. wheat flour, yeast and oil, are domestic products.

(5) The business appears to be stable as it caters for the needs of the local community.