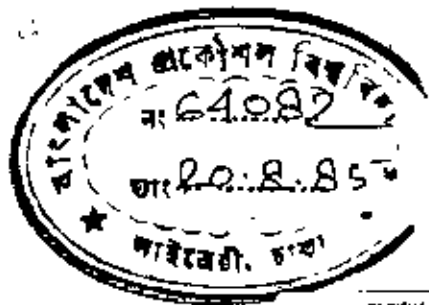


DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEM (MIS)
IN A MEDIUM SCALE ENGINEERING PLANT IN BANGLADESH

A project thesis submitted to the Department of Industrial
& Production Engineering, Bangladesh University of Engineering and
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degree of MASTER OF ENGINEERING (IV)

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CERTIFICATE

This is to certify that this work has been done by
me and it has not been submitted elsewhere for the award
of any degree or diploma.

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DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEM (MIS)
IN A MEDIUM SCALE ENGINEERING PLANT IN BANGLADESH




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August, 1995

Author

ABSTRACT

It has been recognized that the manufacturing industries of the country like in other developing countries is seriously suffering due to lack of application of proper management techniques. This results, in most situation that, management might take incorrect and wrong decisions. It has been stressed that absence of proper information system is the major single factor for this manufacture situation. It is found that some times, the decision takes unduly long time which lead to loss of the system performance. As a result, a large amount of financial loss is observed in the industry. In the present work it is proposed that the situation can be improved by introducing modern technique of Management Information System (MIS).

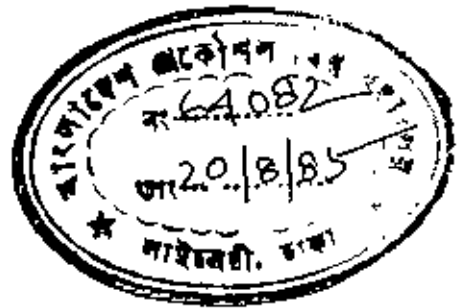
A conceptual framework of MIS, its design and possible scope of application in a medium scale Engineering Unit has been endeavoured. The fundamental activities of MIS such as establishment of a MIS division with proper manpower development, creation of an information data bank, establishing information link with appropriate feed-back mechanism, reconciliation of existing data in the MIS format have been initiated. In the present work the following areas of study were undertaken:

- : The existing information system critically reviewed and studied
- : the drawbacks of present system were identified
- : the possibility of developing a management information system was investigated

For ultimate computerization of the MIS a data format for example for the FTC department has been designed. It is suggested that similar formats may be designed for other sub-systems. It is further suggested that existing information are to be reconciled.

CHAPTER - 1

INTRODUCTION



In the Business world today, the (business) system has taken a shape of such complex nature that it is becoming increasingly difficult to manage and cope up with the pace of growth without resorting to appropriate management tool. Thus the system when depicted diagrammatically in Fig. 1.1 reveals the externalities and their influence on the business system. It is the fact that it is more than sum of its parts that makes a system of its working so difficult. The totality of the business system has to be considered during its operation and management. In this context the entire system comprising of parts and sub-parts must be threaded to act as a single entity.

The management system may be ranked with all the arguments controversies and logics, as the most important part of the entire business system and perhaps ^{one of} the most neglected in many situations. In consequence the manufacturing industry has been suffering, the situation mostly prevails in the least industrially developed countries. Thus in a country like Bangladesh it is no exception.

1.1 System Concept of Business:

The rudiments of a new and increasingly important method of analysing business, known as the system approach, will be discussed in this section.

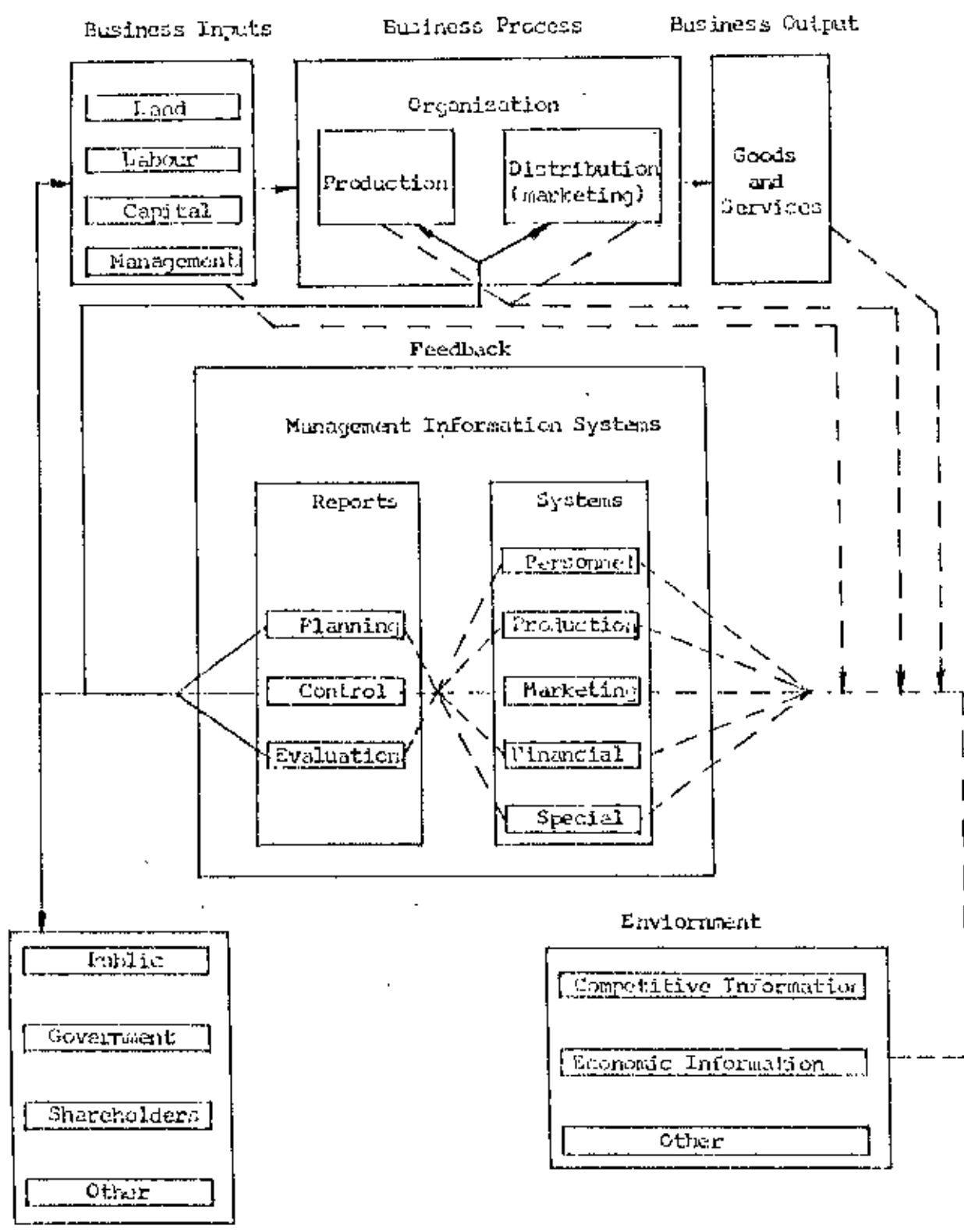


Fig. 1.1 : Business System

A system consists of two or more elements and the relationship among them.

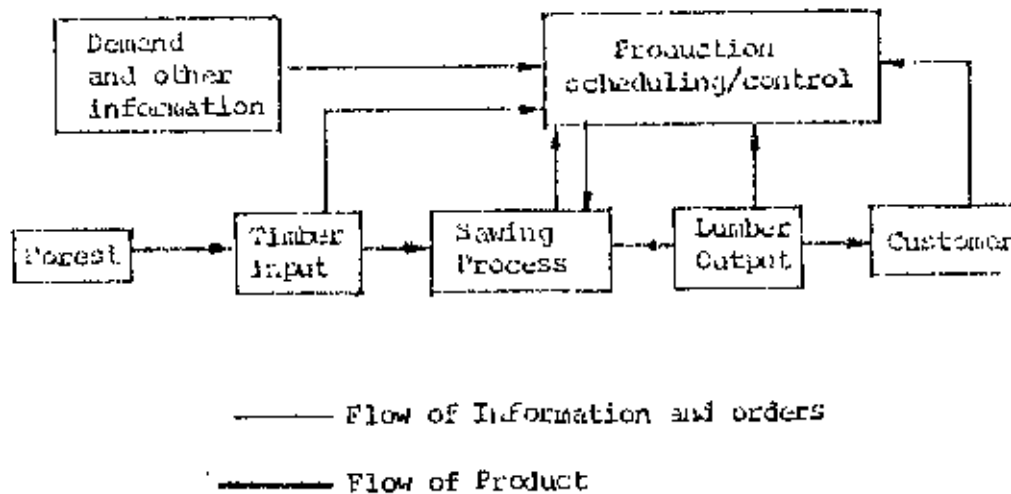


Fig. 1.2 : Business system of a lumber mill

However, a system must have elements and relationship that have been carefully selected with a specific objective in mind. The elements and relationship are chosen to achieve the specific purpose of illustrating the business system. A typical business system is shown in Fig. 1.2

Two important reasons for using the concept of systems in studying the problems of business. System provide a model for thought - a way of ordering thought processes - and the systems approach can be applied to all problems.

Business systems

It is useful to see business as an open system which is in turn a complex of subsystems geared to handle inputs and to transform them into products or output coordinated by a network of communications.

In business, the management must formulate objectives and pursue them by making decisions on alternate sources of action. For instance, deciding on a product and what quantities to produce involve relationships among (i) the production department, which is most efficient producing a few products in large quantities, (ii) the sales force, which wants many products in order to satisfy customers quickly, and (iii) financial management, which does not want large inventories because they tie up money that could be invested elsewhere. All these elements of the business system must be coordinated to produce those numbers of selected products which will bring in satisfactory profit.

Business produces goods and services to be sold to customers to satisfy their wants and needs. The prices at which these goods and services are sold allow the firm to get back all its costs of doing business, and to earn an additional amount called profit. Profit is the chief measure of business success. In order to be profitable, a business must satisfy the needs and desires of its customers.

1.2 Manufacturing System:

The system of a business which produces the finished product for the customer after transformation of raw materials is called manufacturing system. It provides the physical output of the product. In the early stages of the development of a product, the manufacturing system work closely with other systems in planning, so that manufacturing management can make suggestions for production that will save time, effort, and money without impairing the design of the products.

Manufacturing management is very complex. Decisions must be made about manpower, machinery, money and materials. Inventories of parts must be maintained and the proper machinery and equipment must be combined with labour. All these activities, although performed within the manufacturing system must be closely co-ordinated with the overall system of the firm.

Production, either directly or indirectly, affects all system. There are three basic types of manufacturing companies which are classified as basic producer's, converters, fabricators. The basic manufacturer uses natural resources to produce raw materials for other production. The converter uses those raw materials and changes them into a variety of products for either direct sale or other production. Fabrication takes the converter's products and transforms it into a variety of products. Fabrication works usually either as a job shop

or an assembly line production. The job shops makes a variety of products in an intermittent-type operation. Orders are received for a variety of products and in varying numbers. The production line, or assembly line, on the other hand, produces a steady stream of a limited variety of products.

1.3 Why Manufacturing Industry is Suffering:

Bangladesh is an agricultural country. A substantial share of foreign currency comes from the agricultural products. In order to attain self sufficiency, whether it should move towards rapid industrialization, is, yet to be decided. However during the last decade a positive shift towards this objective is increasingly seen. But the scope of the present work does not permit to go in-depth on this subject of study. However, the present work will be restricted in investigating, at a micro-level, an aspect of a manufacturing system of a medium size engineering plant. This is the information flow system and its effect on the production system. At this point, a brief discussion, on the reasons of poor performance of the manufacturing units is made.

Most of the manufacturing units are suffering from various problems of which management problem is ^{the} predominant one. These units are gradually becoming losing concerns. Among the major problems, the following may be enumerated:

- i) Management Problem: Traditional management techniques are still in use where the techniques of operations research and recent developments of quantitative techniques of management are not used in this context.
- ii) Government's softer import policy of spare and replaceable parts.
- iii) Manpower training: Lack of skilled manpower due to lack of systematic development of trained personnel.
- iv) Lack of production planning and control: Lack of systematic applications of production planning and control technique.
- v) Lack of proper market survey & forecasting.
- vi) Economic & Political factors: Lack of government's clearcut policy of industrialization in which political factor sometimes plays a key factor.
- vii) Absence of an effective information system and data base management information system.

Probably, developed manufacturing industries, today, gives stronger emphasize on the last items of the above list i.e. effective Management Information System. And this is unfortunately, ^{one of} the most neglected area of the countries' industry. Thus a modest start to work on this area of information system is the primary objective of the present work.

1.4 The Scope and Objectives of the Present Work

Taking correct management decision at the right time is one of the major factors in proper operation of a system. Due to lack of proper information, most of ^{the} time, management takes decisions which are proved to be wrong. Sometimes, the decision takes unduly long time which lead to loss of the system performance. As a result, a large amount of financial loss is observed in the industrial sector. This situation can be improved by introducing modern tools of Management Information System (MIS) for making management decision.

Time to time, MIS division collect data from various sources to build-up a data bank. MIS division provides right information in right time for management in making decision.

The aims and objectives of the present work are as follows:

- i) To study the existing information system.
- ii) To identify the drawbacks of present system.
- iii) To investigate the possibility of developing a management information system for the unit.

For the present work, the research is located in a manufacturing unit in Chittagong (Gallea-Habib Lbl.). The unit manufactures ^{machineries &} spare parts for the jute and the textile industries of the country.

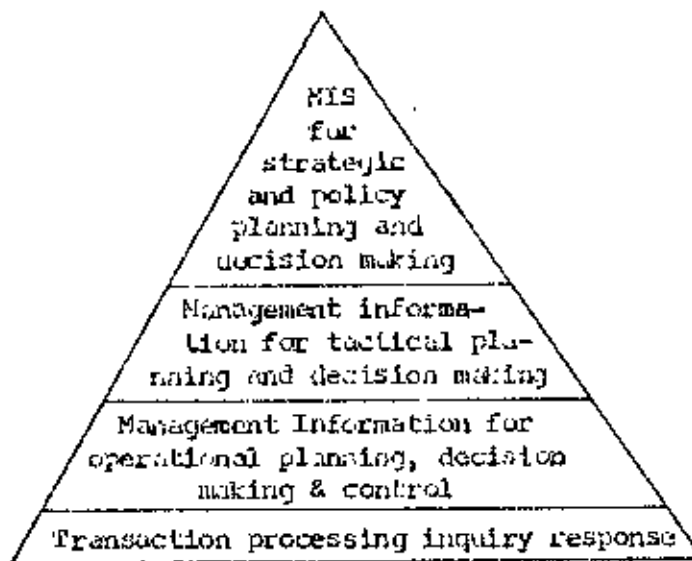
CHAPTER - 2

LITERATURE SURVEY & BACKGROUND STUDY

Management Information System (MIS) is an information system that in addition to providing all necessary transaction processing for an organization, provides information and processing support for management and decision functions. Computer has added a new and powerful technology to information systems, so that computer-base information system can be radically different from systems using manual or electromechanical processing. Although the MIS has been defined differently in different situations yet it has few common purposes and objectives.

DAVIS⁽¹⁾ defines management information system as an integrated, man/machine system for providing information to support the operations, management, and decision-making functions in an organization.

Management information system can be described as a pyramid structure in which the bottom layer consists of the information for transaction processing, status inquiries, etc., the next level consists of information resources in support of the day to day operations, operation management, the third level consists of information system resources in support of the planning and policy making by higher level of management. Diagrammatically this hierarchical definition of MIS could be shown as follows:



Many of the ideas of MIS are an extension of ideas proposed by managerial accounting and management science. The MIS concept extends the function of the information system well beyond the operational level to a system for providing information resources in support of the management decision and planning areas. The user of a MIS has access to an extensive data base and to a model bank consisting of analysis models, processing models, decision making models, planning models and others.

MURDICK⁽²⁾ reported that, in the past, managers sought information from miscellaneous - haphazard - sources and processed the information on a personal basis. Too often they failed to ask for information concerning the impact of a decision in one area or other areas of the company.

The purpose of an MIS is to raise the process of managing from the level of piecemeal spotty information, intuitive guesswork, and isolated problem solving to the level of systems insights, systems information,

sophisticated data processings and systems problem solving. It is a powerful method for aiding managers in solving problems and making decisions.

ROSENBLUTH⁽³⁾ stated that Management Information System is an information system with the specific objective of helping management run a business. It has three basic activities; (1) to measure events and attributes, (2) to store data for later retrieval and use, and (3) to communicate information to decision makers (usually management). Management Information System, which provides the communication links among all the parts of the system and which achieves the necessary coordination, planning, and control.

Identical approach to understand MIS is forwarded by O'BRIEN⁽⁴⁾ that the effective MIS does specific things in response to specific requirements. It furnishes relevant data in useful form to the right person, at the right time, for use in management decisions. MIS is the system which generates that information often already supposed to be in the hands of management. He stressed that in almost all cases, the development of an MIS includes the reuse of much of the previously developed technology in systems, computers, and management technique.

In the context of application of MIS in a developing country, AZIM⁽⁵⁾ stated that information has become a vital tool for efficient and effective management of an organization, be it in the public sector or in private sector. MIS design and its communication network need

careful and systematic analysis. It optimizes the interrelationship

between time, cost and semantics i.e. the right persons should get

the right information at the right time at the minimum cost. Hence

development of MIS can not take place overnight. It is time consuming

activity. MIS approach, and possible application in developing econo-

mics such as banking sector in Bangladesh, KHALID⁽⁶⁾ emphasized that

Management Information Systems are many to many people. The effective

MIS does specific things in response to specific requirements. It fur-

nishes relevant data in useful form to the right person, at the right

time, for use in management decision. He carried out a detailed study

and found that a heaps of information collected by a bank from a system,

in some of the cases, there is no relationship and in some cases, it is

same information and useless to management. How this huge pool of infor-

mation can be used for management decision? This is the fundamental

basis and insight to development of MIS. In conclusion he could fore-

see that tremendous benefits could be derived by MIS. He strongly pro-

posed that MIS division will have to be implemented in the commercial

banking sector for preserving the data which are collected from differ-

ent sources and place suitable information to management for decision

making.

(7)
King

reported a case study of "International Medical Instruments,

Inc." that they used MIS in their business system after 1973. They started

working on how to improve the sales and find out the bottleneck of the sys-

tem. After a thorough investigation it was concluded that there existed lack of

Information flow among the business due to which a large number of orders were cancelled. If they preserved all information properly, then they could be able to increase the sales output. Thus they introduced the MIS division in this business in the year 1973. After implementation of MIS the sales position improve from \$17.8 million in the year 1973 to \$35.0 million in the year 1978.

Developing country like INDIA also introduced MIS in their business unit like bank, industries, hospital, etc.

Studying literatures and works on MIS has evolved the following points:-

- i) There has been constantly increasing complexity and growth in size of many organizations, resulting in expanding information demands, the shortage of specialized human skills - these and other factors have increased the interest in a disciplined and analytical approach to the gathering, storage, processing, selection and dissemination of information.
- ii) Increasingly MIS are designed to take advantage of modern tools (e.g. electronic data processing, data communications, microfilm, word processing) and techniques (e.g. operations research, systems analysis).
- iii) A fundamental consideration in the design and development of MIS is determining which is the vital information needed for maintaining and extending the organization at desired levels of growth.

- iv) The MIS should be viewed as essentially dynamic and subject to continual review and renewal.

MOYEL⁽⁸⁾ commented with some degree of suspicion that the success of MIS is highly dependent on the availability of particularly competent executives and technicians who are versed in the organization's policies and procedures and the new managerial technologies of computer, system analysis, management sciences etc.

While the MIS promises significant benefits in providing management with improved knowledge aids for decision-making, there is need for relatively substantial commitments of time and money for its design, development and maintenance, etc.

In Bangladesh, there has been slower pace in thinking in terms of MIS if not its implementation. There is no measure of the great loss the country's industries are incurring for lack of possibly only the MIS as one of the many other influential factors. The present work may be considered as one of the starters in this line of work.

CHAPTER - 3

A STUDY OF EXISTING MANAGEMENT SYSTEM WITH EMPHASIS ON THE PRESENT INFORMATION SYSTEM

The objective of the present chapter is to study existing information system of the organization and critically examine its defects; thereby improved information system namely, Management Information System has been proposed. It would be wise to study the organizational structure and its influence on the information flow and product flow systems. This is given in the following sections.

3.1 Company Background

Galfra-Habib Ltd. is a spare parts and machine manufacturing plant for the Jute and Textile Mills of the country. It also produces spare parts of general engineering industry such as Agriculture, fertilizer factory, tea processing plant, tobacco plant, etc. The unit have started functioning from 1968. The essential and main raw materials such as pig iron, lime stone, ^{specialized} steel shaft, steel plates & sheet, steel tubes, joist, angles, and other important items are imported. The factory is the biggest manufacturer of spare parts of the jute industry. Thus the growth and performance would depend on the maintaining of tight production plan and control.

The plant was under private entrepreneurship till 1971 when it was nationalized and was placed under Ship Building Corporation. In 1976 Galfra-Habib was placed under Jute Mills Corporation (JMC) because

basically the machine tools of this unit were installed for manufacture of jute spares and machineries. The increased demand for spare parts by the jute mills put pressure on the plant. But the production capacity of Galfra-Habib were not enough to meet this increased demand. Thus expansion of facility became necessary. The development work of facility expansion in Galfra-Habib took place in two phases. A heat treatment facility was installed in the first phase. In the second phase, the machine shop was modernized by installing few improved machine tools. A forging facility, probably, in the third phase is under-way.

Present strength of the unit is

Officers	42 nos.
Staffs	157 "
Workers	369 "
Area	20.93 Acre

Total Assets 97.2 Million taka, as per balance sheet for the year 1983-84

Annual production target about 45 million taka, for the year 1983-84.

The organization structure of the plant is now described in the following section.

3.2 Organization Structure:

An organization chart of Galfra-Habil Ltd. is shown in Fig. 31. The structure of the chart is basically of line-staff type. The functions and responsibilities of the various executives are detailed below and also shown diagrammatically in fig. 3-A.

Senior Deputy Chief Accountant is responsible for financial activities of the organization such as product costing, annual budget preparation, economic evaluation, fund allocation for future expansion, development work and material procurement, etc. He is also responsible for record keeping of all payments. He maintains accounts of the plant and is directly accountable to the General Manager.

Commercial Manager is responsible for procurement of both local and foreign purchase item. He is also responsible for marketing of the product which would require Market study, demand analysis, sales forecasting, advertisement order procurement, sales service and sales policy.

Manager Administration is responsible for administration of the organization. He is specially responsible for, employment of workers and staff, fixation of salaries and facilities, planning for development work for the benefits of the employees, manpower recruitment and training. Medical, security, transport, welfare, store, personnel section are

also under direct control of Manager Administration.

Deputy General Manager is overall responsible for production and administration of shop floor. He also looks after the overall administration of the organisation. He manages the production programme of different customers, delivery target, material & manpower planning. To solve the technical problem, he provides valuable suggestions to the General Manager such as facility expansion, training of employees, transfer of technology, procurement of modern machineries and equipment, etc.

Manager Production Planning & Control (PPC) is responsible for product scheduling, product design, material planning, pattern making, technical clarification and delivery scheduling. He also prepares the estimate sheet of the product before final production. Tentative delivery date is set by the Manager (PPC) after analysis of work volume and available facilities in the plant. He is directly accountable to Deputy General Manager.

Manager (Work's) is specially responsible for maintaining the various delivery schedules. His responsibility is to distribute the job in various work stations within as per schedule. Manager (Work's) performs the following activities, such as, tool planning & procurement, workers employment & training, development of technology, and suggesting facility expansion to the higher authority. He is responsible for quality of the product, and overall administration of ^{the} work shop.

Deputy Chief Engineering Maintenance is responsible for maintenance of electrical machineries, repairing of breakdowns of machineries and equipment in the plant. His objective is to reduce the breakdown hour of organization due to mechanical and electrical failures.

The production system of the plant is interacted by these above units in terms of product and information flow. The performance of the plant is thus affected not by the single production system only but by the integrated whole of the plant. This requires not only quality inputs (man, material, machines) for its better performance but better delivery needs the most consideration. Thus in effect requires an integrated information system which also helps making right management decisions. The following section discusses the existing information system.

3.3 Existing Information System:

The information network as depicted in fig. 3.3 is complex and cumbersome where tracing of information flow is rather difficult. The production flow and information flow are interrelated and mostly overlapping. Thus it would not be easy to study the two systems independently. But such a study is necessary to investigate the degree complexity in the total system. The product and information flows are described in the following sections.

3.3.1 Product flow system:

The product flow diagram is shown in Fig. 3.2. It all starts from the customer order. The sales department receives job orders from customers. In some cases samples are given with the order; in most-cases drawings are supplied by the customer. In few cases no sample or drawing are supplied. Sales department places the internal job order to production control department based on the job order with sufficient technical clarification so that, it can prepare

- i) the product drawing
- ii) the estimate sheet
- iii) the planning sheet.

Production control department returns the estimate sheet with the delivery date to sales department via the accounts department for intimation to the customer. Simultaneously production department informs purchase department to procure materials and other necessary items if these are not available in the store. When information regarding availability of materials are confirmed by the store, production control then releases route card with economic batch size to foundry and work shop for production. As per schedule and programme of production control. Foundry shop does the necessary castings and get them checked by the quality control department. The accepted blanks are then passed to the store with intimation to production control department. The production control releases the route card with drawing to workshop for machining operation. As per

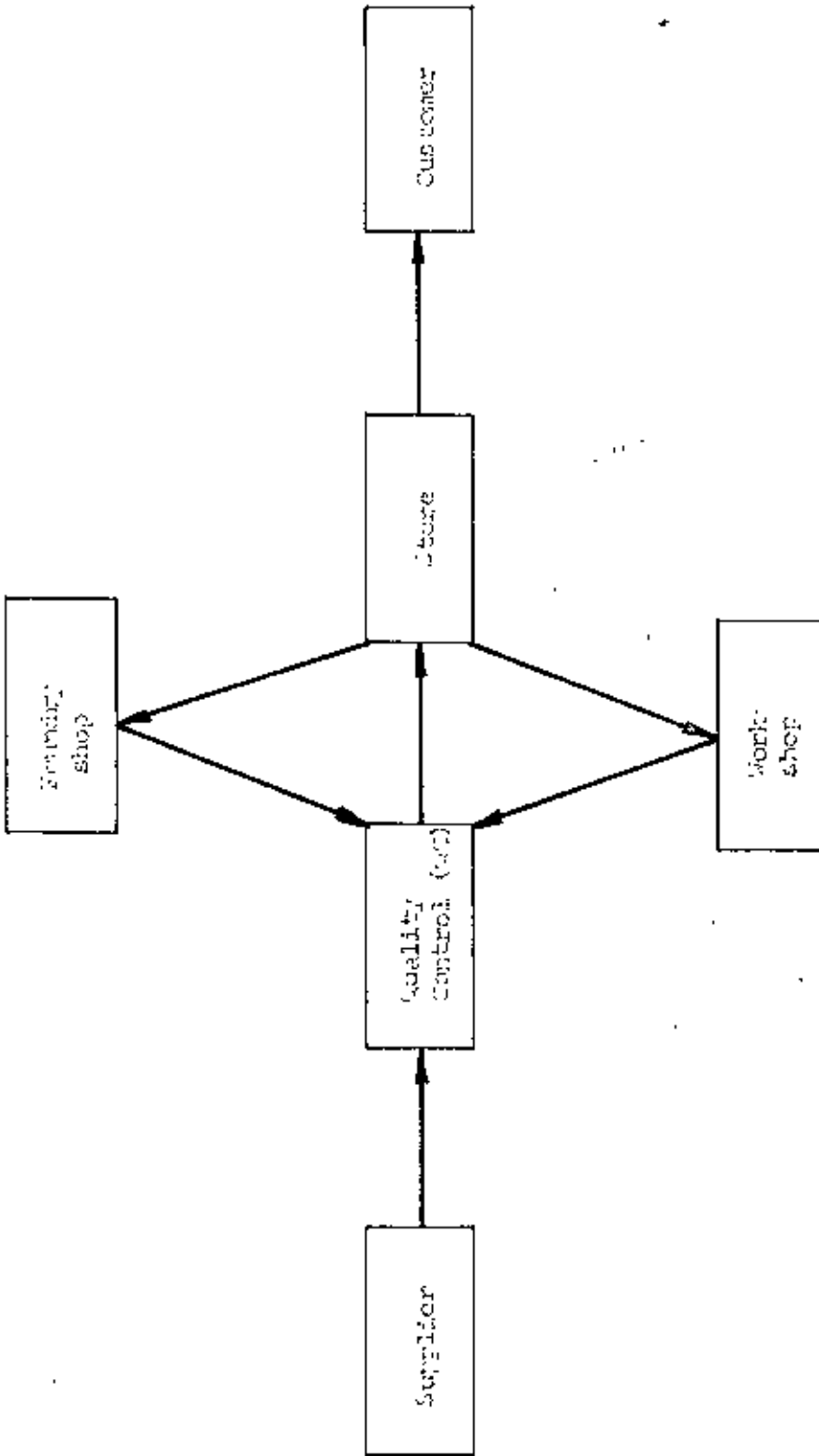


Fig. 3.2 : Existing product flow diagram.

instruction of production control department (delivery date, operation sequence, etc.) workshop collects materials from store for machining operation. Workshop completes all the machining operation with continuous checking operation by operation, by the quality control department. After completion of all operations, all the materials of the lot comes to inspection table for final checking, ^{by} quality control department. It checks each and every individual operation with the drawing and collect all defective items and gives clearance to deposit the acceptable ones to the store. Quality control ^{dept.} / informs ^{the} workshop and production ^{control dept.} / about the quantity of defective item (which can not be recovered) so that necessary steps for re-work can be taken. Production control and store then intimates sales department to lift the material from store.

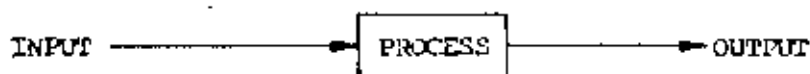
The purpose of tracing the product flow system is to see how it influences the information flow system. Fig. 3.2 depicts the product flow system which may be seen generally in similar plants.

3.3.2 Existing Information Flow System

The information network is depicted in fig. 3.3 where tracing of information flow is rather complex. The inherent difficulty which would probably emerge from such a system is either frequent loss of information or delayed communication of the information.

However, while the existing system is studied, it could be evident that unnecessary duplication and retrace of information flow are present. Any flow of information would demand some expense, ⁱⁿ a real sense ^{it} charge a cost. Before any comments are made on the existing system it would be wise to study the mechanism of information flow in the existing system.

The information flow for any system/sub-system could be described though a input-process-output system as given below:



The input part of the above diagram consists of the sources of information, types of information. The output part consists of the processed information for the relevant receiving units. In the figure ^{3.4} given ⁱⁿ ~~the~~ the following pages, the OUTPUT is omitted.

- 1) Sales department: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Customer	- Queries	- Record and Transfer information through prescribed form
Production	- Feasibility	
Quality Control	- Delivery date	- Offer placement to customer
Store	- Sample/drawing	- Job order placement to P&C
Accounts	- Specification	- Prepare delivery order
Purchase	- Technical clarification	- Maintain day to day delivery position
Administration	- Sample collection	- Sales forecasting
	- Sample approval	- Sales budget
	- Information of day to day material deposit to store	- Sales trends analysis
	- Cheque collection against delivery	- Advertisement
	- Inspection report before delivery	- Revised forecast
	- Customers suggestion	- Audit reply

Fig. 3.4(Contd.) Information sub-system of sales dept.

ii) Production department: The diagrammatical presentation of information flows are shown below:

source of information	Types of information	Process
Sales	- Job order/sample/drawing	- Product drawing
Customer	- Prices of the product	- Estimates of product
Store	- Queries and technical clarification	- Planning sheet
Purchase	- Time to time job position	- Operation sequence
Quality Control	- Inventory position of finished goods	- Material planning and procurement
Foundryshop	- Inventory of raw material	- Bill of material
Workshop	- Material supply report	- Pattern making
Accounts	- Material quality report	- Delivery commitment
Administration	- Report of defective items	- Foundry loading
Maintenance	- Job progress	- Workshop loading
	- Report of pattern, jig & fixtures	- Breakdown report
	- Casting programme	- Inspection report
	- Information of working hand	- Audit reply
	- Clarification of product during process	- Production report
	- Product cost/annual budget/work in process/monthly production report/overtime/wastage report	- Time study
	- Administrative information	- Sample approval
	- Machine breakdown report	- Drawing approval
	- Power failure report	- Administrative follow up

Fig.3.4: Information sub-system of production department

(Contd.)

11) Store: The diagrammatical representation of information flows are shown below:

Source of information	Types of information	Process
Customer	- Position of raw material	- Purchase order
Production	- Information of finished goods	- Invoice against delivery
Workshop	- Annual procurement list of raw material	- Inventory of finished goods
Foundry	- Procurement list of foundry tools & equipment	- Inventory of raw material
Purchase	- Procurement list of workshop tools & equipment	- Disposal of used up material
Quality Control	- List of stationaries procurement	- Procurement of maintenance spare parts
Accounts	- Information of samples	- Procurement of tools & equipments
Maintenance	- Delivery channel	- Procurement of stationaries & other things
Administration	- Day to day information regarding finished goods	- Administrative follow up
	- Administrative action	- Audit reply
		- List of delivered materials
		- Quality certificate of outgoing materials
		- Quality certificate of incoming materials

Fig. 3.4.2 Information sub-system of store
(Contd.)

iv) Purchase: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Production Workshop Foundry Maintenance Store Accounts Administration Supplier Quality Control	<ul style="list-style-type: none"> - List of raw material procurement - List of tools and equipment - Procurement of maintenance spare parts - Time to time material supply information - Availability of budget - Audit objection - Administrative follow up 	<ul style="list-style-type: none"> - Procedure of procurement - tender quotation comparative statement market study - Selection of vendor, supplier & carrying contractor - Preparation of purchase order - Terms and condition of supply - Clarification from indenting department - Necessary arrangement to supplier for payment - Penalties imposed to suppliers if they failed to maintain the contract - Audit reply - Enlistment of suppliers - Administrative action

Fig. 3.4 (Contd.): Information sub-system of purchase dept.

v) Manufacturing: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Production	- Route card with operation sequence	- Shop loading
Store	- Working drawing	- Tools & equipment planning & procurement
Quality Control	- Instruction of pattern making	- Different operation as per sequence of route card
Maintenance	- Instruction of -	- Inspection report
Administration	Jigs	- Manufacture of pattern, jigs & fixtures
Accounts	Fixtures	- Workers attendance
Purchase	Gauges	- Work distribution
	- Breakdown information	- Finished material deposited to store
	- Information of tools and equipments	- Collection of raw materials from store
	- Attendance report of workers	- Maintain delivery schedule
	- Information of urgent work	- Prepare casting schedule
	- Audit objection	- Daily production report
	- Administrative follow up	- Procurement list of various tools and equipments
	- Power failure information	- List of measuring instruments
		- Daily inspection report of production

Fig. 3.4 (Contd.): Information sub-system of manufacturing dept.

vi) Quality control: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Foundry	- Information of defective items against casting	- Inspection report
Workshop	- Information of defective items against route card	- Prepare scrap report
Store		- Line inspection report
Production	- Scrap note	- Casting report
Sales	- Quality certificate of purchase item	- Quality Certificate before delivery of material
Administration	- Inspection report of rejected material from customer	- Inspection report of purchase item
Purchase	- Administrative follow up	- Inspection report of material returned from customer
		- Procurement list of measuring instrument
		- Quality certificate
		- Scrap note after each operation
		- Administrative action

Fig.3.4(Contd.) Information sub-system of Quality control dept.

vii) Maintenance: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Foundry	- Breakdown information of machines and equipments	- Repair of breakdown machineries and equipments
Workshop	- Quality certificate of purchase maintenance items	- Preventive maintenance programme
Store	- Purchase requisition	- Purchase requisition for maintenance item to be procured
Purchase	- Audit objection	- Report of labour hour loss due to maintenance work
Accounts	- Procurement list of maintenance spare parts	- Statement of machines & equipments under maintenance
Administration	- Administrative follow up	- Overall maintenance of plant
Production	- Clarification of maintenance item	- Power failure report
	- Information of outside maintenance works other than manufacturing dept.	- Audit reply
		- Administrative action
		-

Fig. 3.4: (Contd.) Information sub-system of Maintenance dept.

viii) Accounts: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Production	- Information of budget preparation	- Budget preparation
Foundry	- Audit objection	- Payment of salaries & wages
Workshop	- Casting report	- Payment against purchased item
Maintenance	- Scrap note	- Preparation of final account and balance sheet
Store	- Estimate sheet	- Inventory of product
Purchase	- Statement of payment	- Overhead calculation
Sales	- Production information	- Sales report
Quality control	- Inventory list	- Cumulative scrap report
Customer	- Expansion proposal	- Cumulative working progress
Administration	- Incentive programme	- Audit reply
	- Administrative follow up	- Calculation of breakeven point
	- payment received from customer	- Fund allocation of research and development
	- Information of payment to the supplier	- Preparation of job costing summary
		- Statement of monthly production, overtime payment, idle labour hour, etc.
		- Administrative action

Fig. 3.4 (Contd.) Information sub-system of Accounts department

ix) Administration: The diagrammatical presentation of information flows are shown below:

Source of information	Types of information	Process
Production	- Requirements of personnel	- Personnel management report
Sales	- Administrative follow up of department personnel	- Manpower requirement report
Workshop	- Recommendation of administrative action, upgrading, leave, increment, A.C.R, etc.	- Information of salary payment
Foundry		- Distribution of workers
Quality control		- Recruitment of workers
Maintenance		- Training of personnel
Store		- History of personnel
Purchase		- Disciplinary action
Accounts		- Recruitment & release
		- Decision making and implementation
		- Welfare of personnel
		-

Fig.3.4 (Contd.): Information sub-system of Administrative Dept.

From the study of the information system and sub-system it is found that the total information system is very complex and cumbersome and that there is every possibility of missing of data. It is also observed that some departments collect information from other deptt. which is not at all required for that particular department. This is nothing but a duplication of work, wasting ^{of} companies time and stationaries. The existing system does not prepare high level information so that top management could ^{be} able to take any decision without consulting the departmental heads. "The information flow is sluggish and has a time aberration"⁽⁷⁾. The information flow is very irregular and incomplete in most situations. The existing information system does not filter, process and analyse the input information. What is done - is that all the data are put together and sent to the decision makers. No scientific method has been developed to communicate the right information to the right person at the right time. There is a little systematic data storage. Hence data retrieval is extremely difficult and poor.

The comprehensive list of the defects inherent in the present system is not exhaustive, yet these give a pointer towards a better system which may be schemed and implemented in the present context. Although a computerized on-line information system is the most advanced approach of information flow system, intermediate level of information systems non-computerized, namely, a management system of information centrally located may be appropriate. To suggest a system would require evaluative and comparative studies. But due to time restriction of the present work, without going into such studies, an established system, which found good places in many similar situations, has been proposed. This system has

its name derived in consequence of its ultimate use by the management, namely the management information system (MIS). The detailed study of this system in the context of its use in the present situation has been made in the following chapter. The primary and starting task of an MIS is to create a data bank containing necessary and relevant information from the sub-systems. The information retrieved from the data bank may be further processed and generate high level information for top management decision.

A MANAGEMENT INFORMATION SYSTEM REPOSITION AND DEVELOPMENT

In the chapter 3 the present information system has been studied and the inherent defects of the system have been identified. It has been emphasised that a scientific information system such as Management Information System (MIS) may take its right place in such a situation.

4.1 Management Information System

Managers are concerned with planning, controlling, and decision making. Fig. 4.1, shows an example of information system for purchase inspection department.

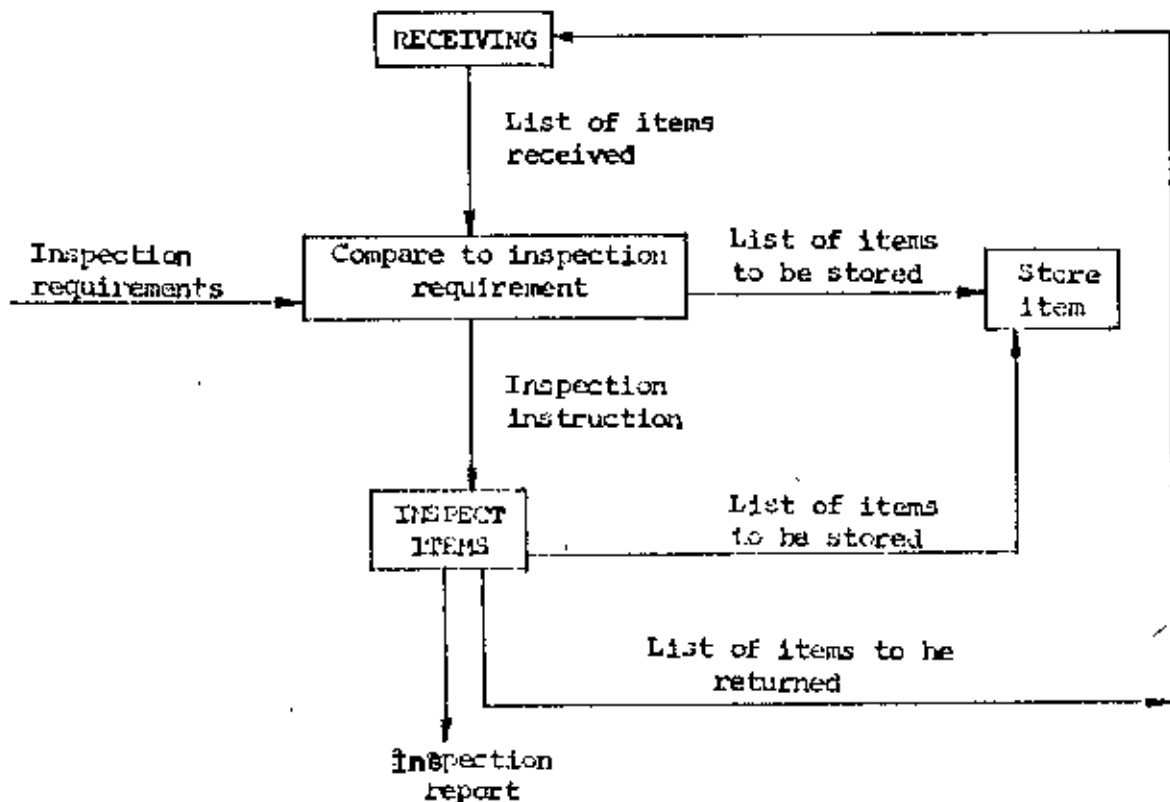


Fig. 4.1: Flow diagram of purchase inspection information system

Operations

Receiving
 Compare to inspection
 requirement
 Inspect items
 Store items

Information

Items received
 Inspection requirements
 List of items to be stored
 Inspection instructions
 List of items to be stored
 Inspection report

From the above information management can easily take proper decision for further procurement, as per their requirement.

In the past, managers sought information from miscellaneous - haphazard - sources and processed the information on a personal basis. Too often they failed to ask for information concerning the impact of a decision in one area on other areas of the company.

Three changes are now occurring in progressive companies:

- 1) Management has become system-oriented and more sophisticated in management technique
- 2) Information is planned for and made available to manager as needed.
- 3) A system of information ties planning and control by managers to operational systems of implementation.

The combined result of these concepts is the management information system (MIS). For the business to be a success, however, they must co-ordinate with each other. Each component must carry out its task in

relation to the others. How does this coordination take place? The business system needs an intelligence network that speeds information from part to part so that each is working toward the common objectives of making a successful business. This function is carried out by the Management Information System. MIS provides the communication links among all the parts of the system and which achieves the necessary co-ordination, planning, and control. The purpose of an MIS is to raise the process of managing from the level of piecemeal spoty information, intuitive guesswork, and isolated problem solving to the level of systems insights, systems information, sophisticated data processing, and systems problem solving. Manager have always had sources of information, the MIS provides a system of information. It thus is a powerful method for aiding managers in solving problems and making decisions.

The basic meaning of an MIS is shown below diagrammatically.

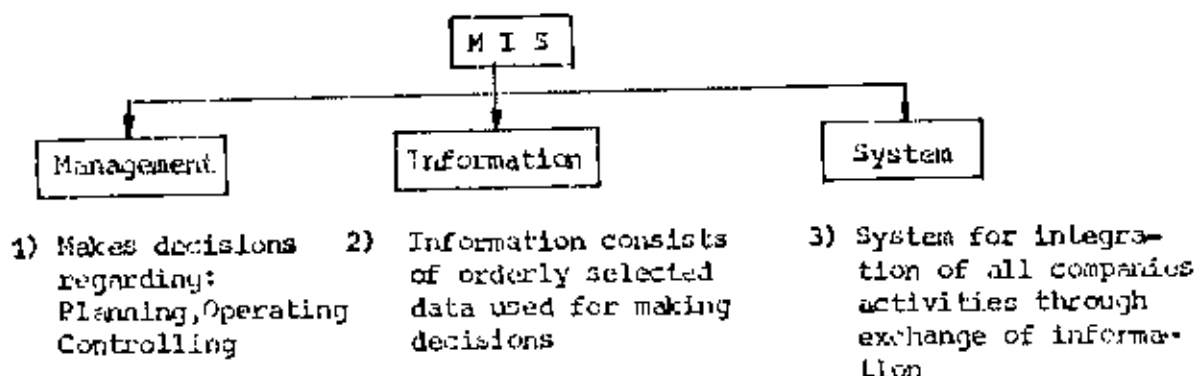


Fig. 4.2: Meaning of MIS shown in the diagram

MIS does specific things in response to specific requirements. It furnishes relevant data in useful form to the right person, at the right time, for use in management decision.

The objective ^{the} of present work is to develop such a management technique MIS for a manufacturing unit.

4.2 Developed System Model

The basic information flow diagram of a MIS is shown in Fig. 4.3. Information from all sub-system will come to MIS division which would build-up a data bank from where they retrieve the necessary data for appropriate use and processing to make higher level information for decision making.

For an engineering manufacturing plant, the information from all departments such as, sales, purchase, accounts, production planning and control, inventory, manufacturing, maintenance, quality control, administration, etc. will be recorded and stored in the MIS division. This in turn creating individual data file for respective sub-system. These undivided data files are integrated to the whole system. The necessary data processing and analysis are made centrally at the MIS division. In the MIS, there exists a built-in feed-back loop which operates in case there prevalls any deviation with respect to actual and planned actions in any sub-system and/or the total sub-system as a whole. Moreover, while a

Developed system model

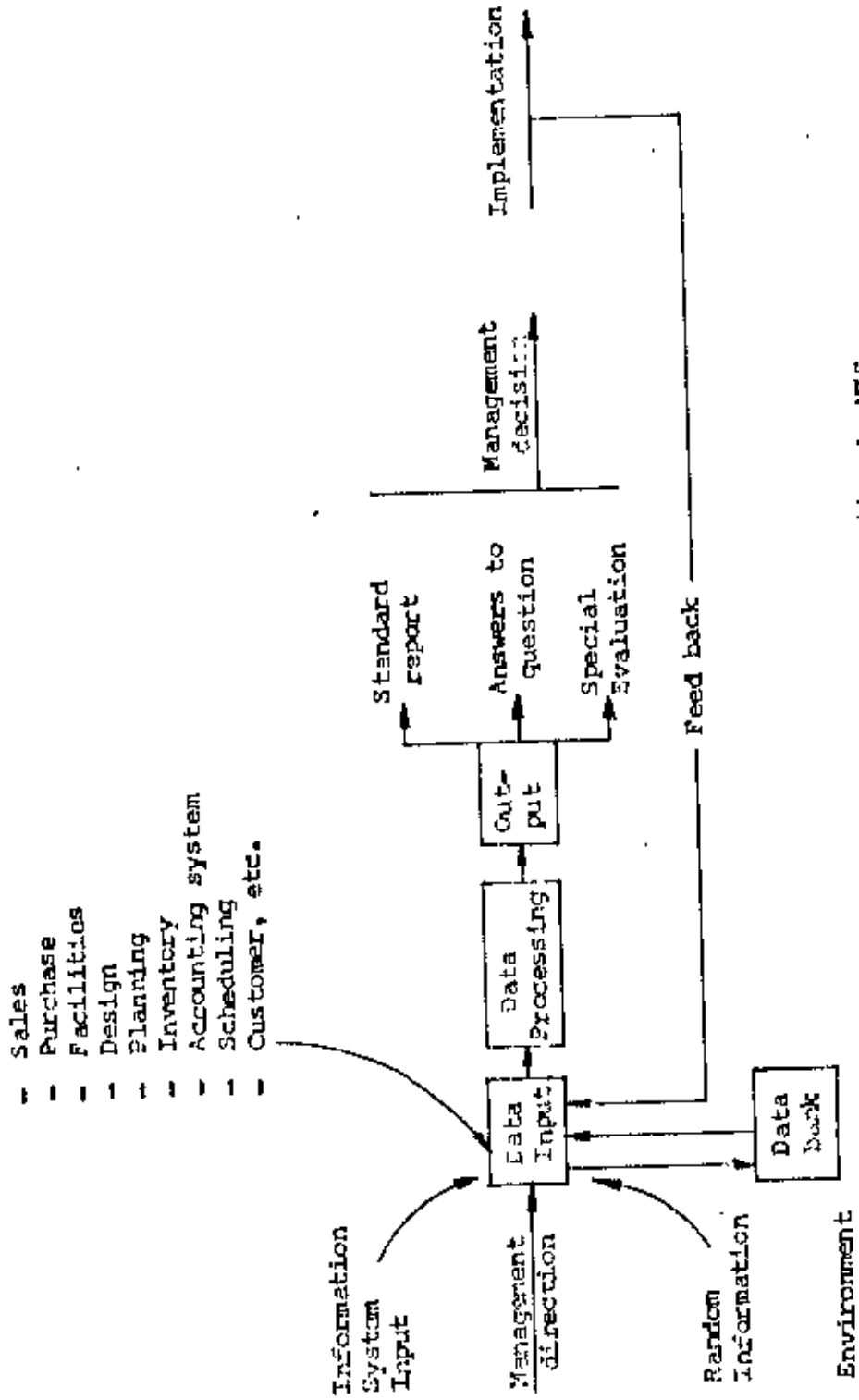


Fig. 4.3: Flow of Information in MIS

revision of earlier taken company decision is made at higher level. Management, it is communicated to relevant sub-systems to replan its activity accordingly. For example, a sudden shift in demand of the company product may dictate the production, stores, finance, etc. sub-system to react quickly and make necessary adjustments in their respective activities and programme. One could see the feed back loop operating in a different way, such as: MIS provides necessary information for example of any shortage of production. Production shortage may be due to shortage of material, manpower, equipment, design fault, wrong decision in floor level, fund, etc. MIS collects the information of the actual bottleneck of the production from respective department and again places it to the management for next corrective action/decision. Management then discusses the matter with respective department and take further decision. MIS communicates management decision to the respective department for implementation. In this way, feed-back system improves the management decision. Thus any deviation from the set programme would be informed to the MIS division which will communicate to the management for decision. In this way MIS plays an important role and provides a powerful information links to the management for decision making.

4.3 Central Management Information System

The central information system is the focal point of the total information system of the unit, thereby its very nature of activity reduces the volume of records and their duplicity at the same time makes information more rapidly available. Fig. 4.4 shows, a systematic integrated management information system composed of ten basic sub-systems. Each department such as, production planning & control, purchase, sales, manufacturing, store, accounts, etc. maintain their own link with the MIS. They collect, day to day activity and data, prepare a consolidated report, and place it to the central MIS division for ultimate build-up of an uptodate data bank.

As per requirement of the management MIS prepare higher level information file for management decisions. They also prepare the answer sheet of the various questions ^{for} top management. Decision also feed-back to MIS division for circulation to the respective department for implementation/necessary action. Any deviation of decision must be communicated to decision maker through MIS. Management may review the decision for the better interest of the business unit and again send it to respective department for implementation. Thus the central MIS division help management to take decision.

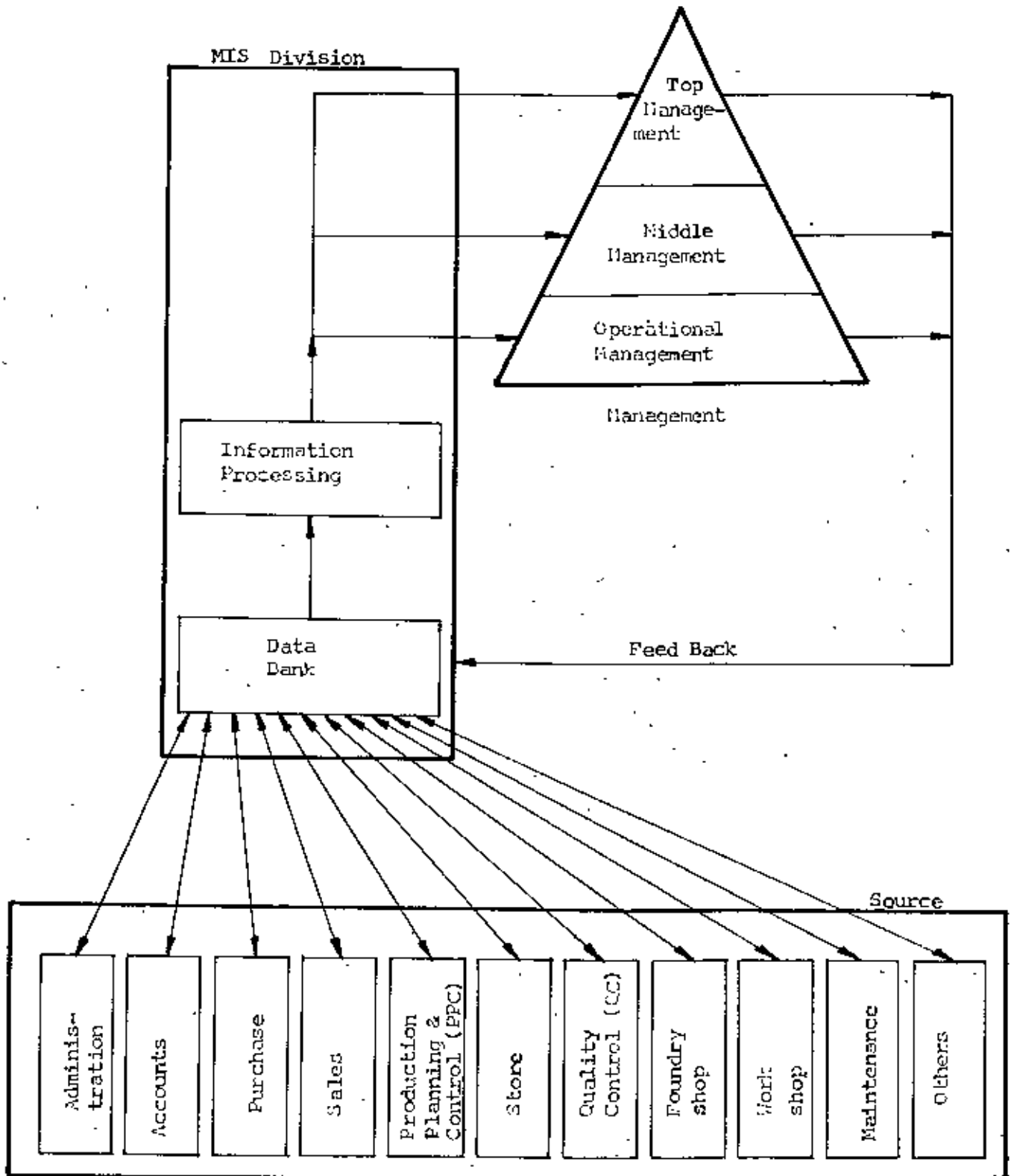


Fig. 4.4 : Centralized MIS division for the unit.

4.4 Suggestion for Design and Implementation of MIS

From the study of the existing system it has become clear that, MIS should take its right place strongly and forcefully. This would need some proposition for its gross design procedures and to find its relationship with the total system. The detail design of an MIS is closely related to the design of operating systems. Sometimes, it is true that the operating system must be accepted without change and a new MIS appended to it. However it is preferable to design both system together.

To implement MIS the following steps are to be taken:

- i) Organization chart of MIS division.
- ii) Definition of the responsibilities of MIS personnels.
- iii) Reorganization and revalidation of the existing data files in line with the MIS requirements.
- iv) Establish data collection and storage formats and devices.

4.4.1 Suggested MIS Division Organization Chart

A suggested organization chart for the present study may be framed and proposed for implementation. However, this must be flexible and dynamic with scope of any change in its structure in anticipation of future requirement. The chart is given below (Fig. 4.5):

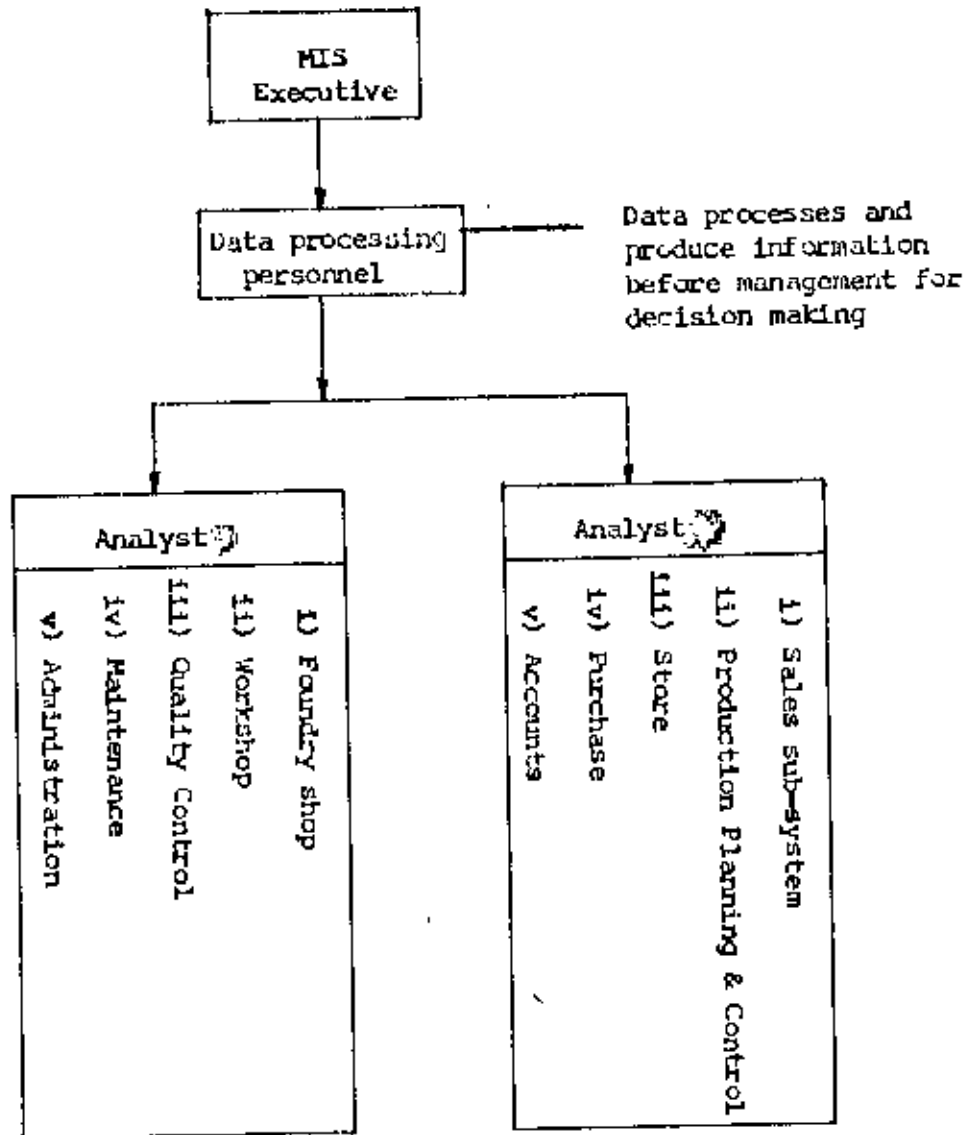


Fig. 4.5: Organization chart of proposed MIS division

To implement the MIS division planned manpower has to be developed. This would require proper training & knowledge of MIS fundamentals. Mention has been made in chapter 2 that MIS requires time and money for its implementation.

This has to be trade-off^{off} with the probable benefits from implementation of MIS is the organization. For the present study according to the suggested organization chart manpower requirements would be as follows:

MIS Executive	1
Data Processing Personnel	1 to 2
Analysts	2

The functions and responsibilities of the personnels are now given below:

Analysts: The analysts would receive data and would be responsible for their retrieval. They will also help data processing personnel to prepare effective information for management as and when required. Systematically they will exchange information from respective sub-system/department. They will maintain individual and master till for respective departments. They would build-up data bank.

Data Processing Personnel: The data processing personnel collect information from the data bank as per requirement of management time to time. After compilation of data from data bank, he place the information to MIS executive for management decision.

MIS Executive: He will be overall responsible for smooth functioning of MIS division. MIS Executive will have sufficient knowledge about organization, development and implementation of MIS, division. He will provide the top management high level information for decision making. He is the main co-ordinator of the top management for decision making.

MIS personnels will design ^{the} procedures, format for collection of data from different sub-system; and they would continually update the data bank. In the initial phase they would reconcile the existing information and data. After reconciliation they fill-up the data form and preserve it in the data bank. They open systematic data file for each and every department and keep all data in a way that, the retrieval becomes quick and easy.

All data and information are to be represented by some codes and sub-codes. For example, sales department may be represented by = 01 code and 001 sub-code. Similarly Production Planning & Control may be represented by 02 code and 001 sub-code and so on. Code and sub-codes of different department is shown in below:

<u>Sub-system departments</u>	<u>Code</u>	<u>Sub-code</u>
Sales department	01	01-XXX
P.P.C. department	02	02-XXX
Store department	03	03-XXX
Purchase department	04	04-XXX
Foundry department	05	05-XXX
Workshop department	06	06-XXX
Quality Control department	07	07-XXX
Maintenance department	08	08-XXX
Accounts department	09	09-XXX
Administration department	10	10-XXX

Galfra Habib Ltd.
Barabkund, Chittagong

From: PPC
To: MIS

Sub-code No.:
Sl.No. :
Date. :

State of clarification

Job order No.	Item No.	Quantity	Description	Types of clarification require	Delivery date	Unit price	Total price
1250	3	595	25T Helical gear	Sample/drawing with detail specification		XXX	XXXXX
	29	1125	Con. Arm sub-ly	Supplied earlier against Job No. 1221. Please confirm/supply new samples		XXX	XXXXX
	61	450	57T Sprocket	Material specification with sample		XXX	XXXXX
892	55	320	Faller screw	Material specification and drawing		XXX	XXXXX
1102	15	590	Came	Sample		XXX	XXXXX
	36	215	Scroll roller	Supplied earlier. Please confirm/sample required		XXX	XXXXX
XXX							

Data format

Head of Department

Gafra Habib Ltd.
Barabkund, Chittagong

From: PPC
To: MIS

Sub-code No.:
Sl.No. :
Date. :

Raw material statement

Sl. No.	Specification of material	Quantity required for production	Raw material stock quantity	Quantity to be procure	Material supply date	Date of completion of production	Remarks
1	Cold rolled, B.S. shaft 1" dia x 20' lg. (AISI-1020)	XXXX ft.	XX ft.	XX ft.			
2	Pig iron	XXXX Ton	XX Ton	XX Ton			
3	Tin Ingot 98% purity	XXXX lbs.	XX lbs.	XX lbs.			

Head of Department

Gafra Habib Ltd
Barabkund, Chittagong

Sub-code No.:
Sl.No. :
Date :

From: PFC
To: MIS

Statement of order in process

Job order No.	Item No.	Description	Total quantity	Unit price	Total price	For material	For casting	For machining	Special Tools or equipment	P.P.C.
1250	15	95T Spur Gear	16	XXXX	XXXX	6		10		
	25	Spacing wash	500	XXXX	XXXX					
	55	Upper bush	1000	XXXX	XXXX	500	300	200		
892	45	Bevel gear	100	XXXX	XXXX			45		
	40	Splineshaft	50	XXXX	XXXX					
1102	31	24T Helical gear	1200	XXXX	XXXX		700	500		
	6	52T Helical gear	1500	XXXX	XXXX					
1179	67	Bend pin	355	XXXX	XXXX					
	51	A-truck stud	2500	XXXX	XXXX	1500		1000		
	23	Filler screw	450	XXXX	XXXX					

Head of Department

Gaifra Habib Ltd.
Barabkand, Chittagong

Sub-code No.:
Sl.No. :
Date :

From: EPC
To: MIS

Statement of tools and equipments

Job order No.	Item No.	Description	Quantity	Total price of item	Specification of Tools and equipment	Remarks
892	40	Spline shaft	50	XXXXX	Special Milling Cutter sp.	New item
	45	Bevel gear	100	XXXXX	Special Bevel gear Cutter Sp.	"
925	3	Cop spindle	12000	XXXXXX	Slitting saw curter(Mill)	Used-up old one
	29	Spur gear 130T	500	XXXXXX	Sander Band gear planner Cutter	Old one
	41	Spiral roller	1500	XXXXXX	Portable angle grinding machine	Old one un- servicable

Galfra Habib Ltd
Barakkund, Chittagong

From: PIC
To: MIS

Code No.:
Sl.No. :
Date :

Monthly report

Order position

Total order in hand Tk.(in lac)	Total order in process Tk.(in lac)	Total order held-up for clarification	Finished material deposited to store Tk(in lac)

Raw Material Statement

Detail specification	Quantity	Detail as per attachment

Statement of man hr. machine hr. & work load

Available machine hour	Available man hour	Work load in hour	Breakdown loss (hr)	Remarks

Special Tools & Equipment Statement

Specification and description	Quantity	Remarks

Statement of Purchased item other than Raw Material

Specification and description	Quantity	When require	Remarks

Production Statement (weekly/monthly)

Cost Iron Ton	Steel Ton	Alluminium Ton	Gun Metal Ton	Wheet Metal Ton	Remarks

Head of Department

The code number of the MIS itself could be given 11 with sub-code structure as follows:

MIS Division	Code	Sub-code
	11	11-01-XXX for sales
		11-02-XXX for PPC
		11-03-XXX for Store
		etc.

Information data sheets for the various sources (Sub-systems) could be formatted for ultimate computerization. However, for the present work one such data format has been proposed, for example, for PPC department.

While implementation of MIS for the organization a benefit-cost analysis may have to be made to convince the company Board of Directors who is the ultimate decision making authority. In this respect it may be reiterated that establishment of Management Information System for the unit(s), time, cost, and availability of appropriate personnel are the three important decision variables would need utmost consideration. Before initiating such an idea a company management might carryout this important exercise to assess the impact of those factor variables.

CHAPTER - 5

CONCLUSION, RECOMMENDATION AND SCOPE OF FUTURE WORK

The objectives of the present work was to study the existing information system of a medium scale engineering units. The study revealed that in the existing system there exists several defects elimination of which would improve the situation. Amongst the drawback of the present system, it is observed that one of the major defects is management problem. Scientific methodology of management is rarely used in the existing system.

It is observed from the study of existing system that, top management taking most of the decision with the consultation of all other departmental heads in the meeting. Departmental heads do not maintain systematic data, as a result there exists inherent possibility of providing wrong information to the decision maker.

Emphasized of the technique of MIS as effective tools of management is recommended in the chapter - 4. A conceptual framework of MIS, its design and possible scope of application in a medium scale engineering unit has been endeavoured. The fundamental activities of MIS such as establishment of a MIS division with proper manpower development, creation of an information data bank, establishing information link with appropriate feed-back mechanism, reconciliation of existing data in the MIS format have been initiated.

For ultimate computerization of the MIS, a data format for example for the P&I department has been designed. It is suggested that similar formats may be designed for other sub-systems. It is further suggested that existing information are to be reconciled.

Implementation and development of MIS division can not be done overnight. It is a long-run program. There is a scope of future work on MIS which is stated below:

- i) For collection of information from different sources appropriate formats are to be developed. These will have to be designed in such a way that sub-system can provide necessary data which is required by management time to time.
- ii) There should be code No. on the form so that data processing, preserving, retrieval becomes easier. Codes are to be given in such a way that it can help the computer-base information system in future.
- iii) Data bank is most essential for effective MIS observation. A data bank will have to be built-up from different sources and preserve them systematically so, that process can be done easily both manual and computer-base.
- iv) Computer may be used for future MIS division. Computer application would be most effective to build-up data bank, retrieval and processing. A mini or micro computer may be used for the unit which will save the time and provide more effective information for decision. In this regard a benefit cost analysis may be made.

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