

**THE IMPACT OF MODERN INFORMATION SYSTEMS
ON ORGANIZATION STRUCTURE**

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfilment of the requirements for the
award of the Degree of
MASTER OF PHILOSOPHY

60p + Ref.

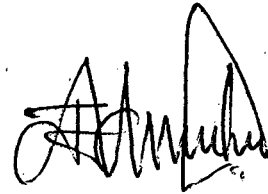
ADISESHU JUJUVARAPU

**SCHOOL OF COMPUTER AND SYSTEMS SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067, INDIA
1984**

CERTIFICATE

This dissertation entitled "The Impact of Modern Information Systems on Organization Structure" embodies the work carried out at the School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi - 110067.

This work is original and has not been submitted in part or full for any other degree or diploma of any other University.



ADISESHU JUJJUVARAPU
(Student)

R. Sadananda.

DR. R. SADANANDA
Acting Dean
School of Computer and
Systems Sciences
Jawaharlal Nehru University
New Delhi - 110067.

R. Sadananda

DR. R. SADANANDA
(Supervisor)

ACKNOWLEDGEMENTS

I wish to express my deep sense of gratitude to my supervisor, Dr. R. Sadenanda, for his excellence guidance with critical comments and valuable suggestions.

I would also like to acknowledge my cordial thanks to my friends and staff members for their kind help and cooperation.

I am also very thankful to Mr. S.K. Sapra for his excellence and skillful typing.

CONTENTS

			<u>Page No.</u>
CERTIFICATE			
ACKNOWLEDGEMENTS			
CHAPTER I	-	INTRODUCTION	1
CHAPTER II	-	INFORMATION	7
	2.1	Communication	7
	2.2	Computer	8
	2.3	Trends on hardware and software	12
CHAPTER III	-	ORGANIZATION-DIFFERENT KINDS AND THEIR STRUCTURE	17
	3.1	Line and staff authority Relationships	23
	3.2	Principles of Management	28
CHAPTER IV	-	IMPACT OF INFORMATION SYSTEMS	32
	4.1	Centralization	41
	4.2	Decentralization	42
	4.3	Factors determining the degree of decentralization of authority	42
	4.4	Computer's impact on planning and decision-making	44
CHAPTER V	-	CASE STUDIES	49
CHAPTER VI	-	CONCLUSION	57
REFERENCES			

CHAPTER - 1

Introduction

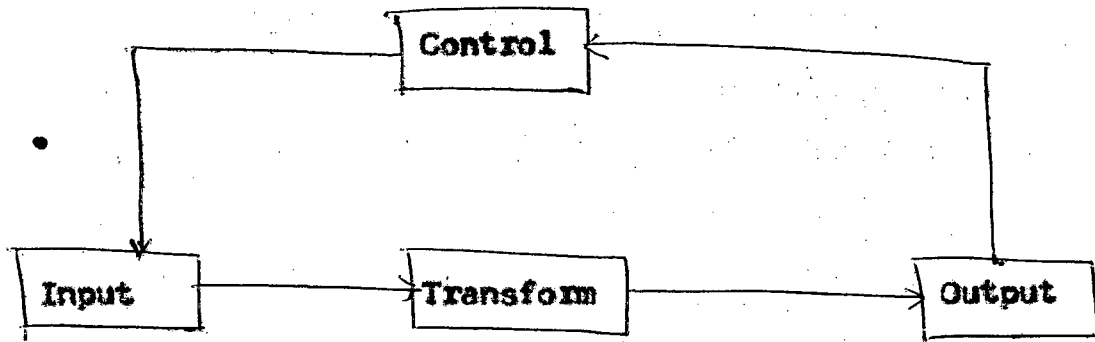
In this modern world every entrepreneur tries to optimise his goals by utilizing the available resources effectively and efficiently. Generally, the manager is top most authority in running the affairs of a company. Information is one of the basic resources available to the manager for the smooth running of the business. It is doubtless to say that the recent availability of effective information makes the business efficient. The computer is a relatively new tool for use in an organization. It became popular only about 20 years ago. When it was first applied to business tasks, the value of the computer as a producer of Management information has been recognised. The term management information system (MIS) is a popular one, and it can be assumed that all firms have some type of MIS. The information systems of some firms are better than those of others. And some firms have computer-based systems, while others use keydriven machines, punched card machines or manual methods. The better systems are not always the computer based ones. The quality of MIS is determined by the people who design it - the managers and computer professionals. It will not be determined by the type of equipment. This control that the MIS designers have over information is called information management.

The system of primary importance to business and the manager is a structure or arrangement of parts. A system can

be defined as a group of integrated elements with the common purpose of achieving some objective. This is only one of many definitions supplied by scholars and practitioners. All, however, tend to identify certain key characteristics of a system.

1. A group of elements :- A system must have more than one elemental part. For example, a rock or a steel ball, is not a system. The rock can be an elemental part of a wall that can be regarded as a system.
2. Integrated elements :- There must be some logical relationship among all parts of a system. Parts that do not fit the relationship can not be regarded as part of the system.
3. Common purpose to achieve an objective :- The system is designed to achieve one or more objectives. Perhaps one of the objectives is more important than the others, but that is not critical. What is critical is that all elements work toward the achievement of a system goal rather than toward a separate goal for each part.

The system transforms input in the output. A control mechanism is constantly monitors the system and regulates its operation so that the transformation process is executed properly. The elements of a system are integrated in a certain manner as illustrated in figure below :



Component parts of a system

When the model illustrates a business firm, the input consists of basic resources - machinery, materials, money, manpower and information. The transformation process converts these resources into the output of the firm - products or services. The control is performed by the management.

Systems often are comprised of smaller systems, or subsystems. A subsystem is simply a system contained within a larger one. Therefore a subsystem is also a system. This means that systems exist on several levels. There are large systems and small systems, and sometimes the smaller ones are part of the larger ones. In a business firm, the subsystems - such as marketing, finance and manufacturing - are the basic functional units. Each of these in turn consists of subsystems and parts. The marketing department, for example, is made up of advertising, sales, and marketing research subsystems.

The business firm is a physical system. A physical system is one that physically or actually exists. It is tangible. It can be seen, touched, or kicked. The business firm exists physically, the buildings, trucks, employees, machines, and materials all exist in a physical way. A conceptual system is one that represents a physical one. The conceptual system does not physically exist, but corresponds to one that does. The conceptual system commonly resides in some one's mind, or it exists as figures or lines as a sheet of paper, or as magnetized areas of a computer storage medium. Even though the conceptual system exists in these forms, it is not the form that is important, but what the system represents. The physical system is important for what it is, the conceptual system is important for its representation of the physical system. The management information system is a conceptual system representing the physical system of the firm. The knowledge and experience of the newsstand proprietor can be viewed as a conceptual system. The proprietor understands physical system and knows its operational details.

The conceptual system that the manager uses is an information system. It has been named the management information system, or MIS. Although this term has enjoyed increasing use in the past decade, there is no universal agreement on what MIS means. It can be define to include only systems that immediately provide the manager with any and all needed information. Obviously, such a narrow interpretation

would make it practically impossible for such an MIS ever to be realized. The term also can be defined very broadly to include any system that provides information to the manager - without specifying the nature of the information. Obviously, the MIS most frequently described in the literature lies somewhere between these narrow and broad descriptions.

A characteristic of the precomputer period in business was the emphasis on data, rather than information, processing. Data consists of facts and figures, and these usually exist in extremely large volume and in no particular order information, on the other hand, is meaningful data, or processed data. Data is converted into information by an information processing system. Data is converted into more data by a data processing system. The same computer system can be used as both a data and an information processor. To the manager, the computer is an information processing system when it produces output that is meaningful and useable.

A database is a collection of stored data organized in such a way that all user data requirements are satisfied by the database. In general there is only one copy of each item of data although there may be controlled repetition of some data. A database management system is a general purpose set of programs that aid and control each user's access to and use of the database for adding, modifying and retrieving data, and this includes facilities giving data independence, integrity and security. A Database Management System must therefore

provide facilities which allow these natural relationships between items of data to be represented. In other words, the DBMS should be capable of modelling the logical structure of the data in some way.

Understanding the impact of computer information systems on management and organization is an important area of investigation which attracts the attention of computer and social scientists, public policy makers and business managers. A study of computer information systems and Management is described and selected results relating to changes in organizational structure in different organizations are presented in the following chapters.

CHAPTER - 2

Information

1.1. Communication

The creation and expression of ideas which have to be imparted to other is an difficult and major task. Effective communication is not merely the passing on of information but its presentation in away that will be comprehensible to the recipients and likely to gain acceptance for proposals.

Channels of communications

1. Written Communication
2. Oral Communication

There are two kinds of written communication :

Reports :- Reports are normally written by a knowledgeable person for the benefit of some one less knowledgeable. And reports are written to persuade management to authorise proposals for change.

Reference manuals :- It will be used to provide users and computer operations staff with a description of new system, together with instructions to cover all likely events.

Most organizations prefer communication in writing, but oral presentation is also increasingly desirable as computer based systems become more complex and embrace more of a company affairs. Communicator should try to attract the audience by using several techniques applicable to that particular situation. Communicator should have perfect knowledge with the full details about the topic on which he is

speaking. He should show an interest in audience, so that each member feels individually involved.

There are two ways of oral communication
visual aids : visual aids should be carefully integrated with the spoken material as they have very important role in presentation. Communication experts emphasise that people learn more from looking than from listening. The following are some of the visual aids :

Films

Slides

Black or white boards

Flannel boards and magnetic boards

Flip charts

Overhead projectors

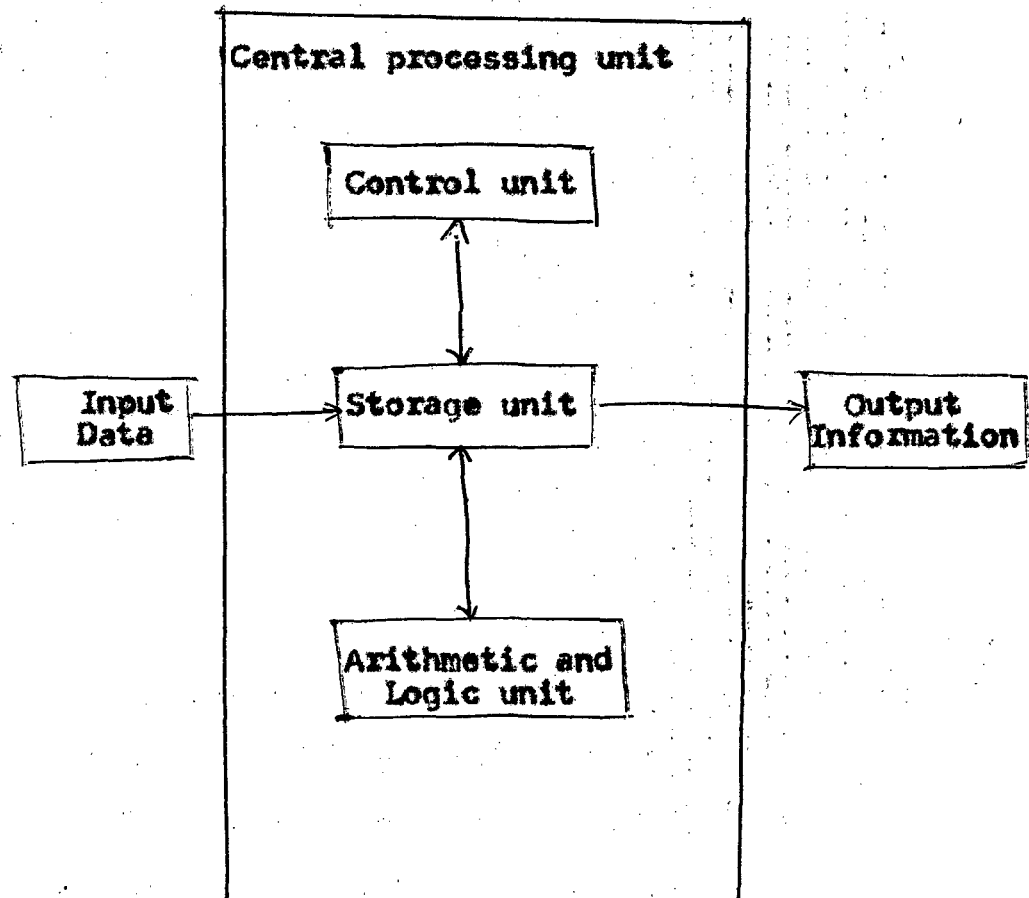
Meetings :- The purpose of the meeting is to exchange the views of different people. When calling a meeting the purpose should be cleared to all the members and the size of the meeting should be reasonable so that everybody will get a chance to clear his doubts or ideas related to that topic.

2.2. Computer

The computer is a powerful tool that enables a wide variety of jobs to be performed faster, and better, than any other method. A computer can be defined as a machine which can do arithmetic and solve arithmetical problems when properly instructed. The computer can do only numeric computations and so the data for any problem must be given only in numbers.

The origin of the computer can be traced back thousands of years, and many people made significant contributions. The first calculating device was probably the abacus, the wooden with numbers represented by beads originated in the middle East and China about 2000 years ago. It is still being used in many parts of Asia.

The computer is a physical system, which is a group of integrated elements with the common purpose of achieving some objective. The elements are the various electronic units connected with wires and cables. The objective is the satisfactory execution of the instructions contained in the storage. The computer can be represented as a physical system as shown below :



The computer has one or more input devices for entering data into the transformation and control part of the system. It is called the central processing unit or CPU. The CPU contains storage unit where the input data is stored. All calculations and logical decisions are made in the arithmetic and logic unit and the entire computer system is controlled by the control unit. Processed data and information are transmitted from the storage unit to one or more output devices.

Computer Configurations

Computers have a single CPU, but they differ in the number and types of devices attached. Input/Output and auxiliary storage are two classes of devices attached to the CPU.

Input/output units

Card readers
Card punch units
Line printers
Graph plotters
Optical character readers
Magnetic Ink readers
Type write like terminals

Auxiliary storage unit

magnetic tape units
magnetic drum units
magnetic disk units

most input/output units perform only one function either input or output. For example, Card readers are used only for input, and line printers only for output. Some of the units like typewriter like terminals can do both the things, transmit data to the CPU and receive information from it.

Hardware :- A modern computer system is a collection of hardware and software component designed to provide a productive and friendly environment for computing. Physical computing equipment itself is called the hardware. Computer hardware includes

Processor - For calculating, comparision and editing. The central processing unit or CPU is the computer. The other devices which will describe merely aid it to process data.

File store :- Although core storage is extremely past and very impact, it is relatively expensive for the large volumes of data. Therefore computers in the commercial environment normally provided with backing or external storage to complement and external their internal memory.

Example

magnetic tape

magnetic disk

magnetic drum

Input devices : Dr. Hollerith devised a method of storing and manipulating data with his punched card equipment. Other example of input devices are

magnetic encoder

mark sensing

Output devices : Line printers
 Microfilm
 Graph plotters

Software :- It is the collection of support programs written to provide various services to the users of the system. Many of the functions that once were performed by the users themselves are now handled by software known as the operating system. The operating system is responsible for the processing of programs by the computer system. It ensures that the appropriate hardware resources of the system are made available as required. The operating system creates an environment in which users can prepare programs and run them without being overly concerned with hardware details.

Software can be broadly divided into five categories -
Assemblers and compilers :- They will translate programs from high level language to machine level language.

Operating system :- A set of programs which permits the continuous operation of a computer with the minimum amount of operator intervention.

Utility software :- These are the programs or routines which carryout certain procedures and which are common to many applications.

Programming aids :- It will help the programmer in getting a program designed, coded, checked and tested.

Application packages :- Application packages is a software which is used for dedica-ted applications.

2.3. Trends in hardware and software

Computer is an dominating and powerful element in the world. Computers are in action every where - Schools, hospitals,

sweet shops, digital watches, making weather forecasts, directing space rockets, helping the disabled, guiding missiles and controlling a robot on a production line. Computers are from small size to large size. Today computers are deeply involved in information technology because of their information processing capabilities computers will perform a variety of functions. They can help people to book airline tickets, to type letters, to prepare business accounts and analyze statistics, to design cards, to manage traffic lights, to control air traffic and so many other things and developing to each and every aspect of human life.

Computers in the future

Charles Babbage is the person to develop a firm computing machine in 1930. The first electronic computer was invented in the 1940s. The pace of computing innovation has been progressing at an accelerating rate. The first generation computers were made with thermionic valves. The second generation computers introduced transistors. The third generation computers had integrated circuits. The fourth generation computer was never clearly defined. The use of VLSI technology was sometimes identified as the fourth generation computer type.

The fifth generation computer gives the highest priority to make easy systems that are natural to use. According to the fifth generation committee "Technological support needs to support 'problem solving systems'. Intelligence will be greatly improved to approach that of a human being. When compared to

conventional systems, the man/machine interface will be closer to that of human behaviour." The following are the requirements of the fifth generation computers :

1. Computers with high intelligence and natural human input and output mechanisms.
2. Efficient and reliable software development by languages and new computer architectures which can overcome the previous problems, software should be developed in such away.
3. Overall functions should be improved and the performance should be aimed at making more flexible and more reliable computers.

These are the objectives of the future of computing. By using their abilities and techniques they will try to develop the computer which will solve almost all problems with less efforts.

The fifth generation computers places stress on a number of developments which have arisen from Artificial Intelligence (AI) research⁽²³⁾ Artificial Intelligence is the study of how computing can be applied to perform tasks which involve a degree of intelligence or communications ability which resembles human behaviour. Artificial Intelligence also studies robotics research which aims to produce robots which can see, hear, walk, talk etc. The fifth generation identified three important areas of research -

1. Knowledge-based management systems
2. Logical problem solving and inference systems
3. Natural language processing

Knowledge based management systems :- Artificial Intelligence has developed expert system which knowledge refining techniques to distil the reasoned knowledge of experts into a computer program. Heuristic techniques, which are based on 'learning from experience' are used in Artificial Intelligence to solve problems rather than by applying predefined algorithms.

Logical problem solving and inference systems :- The traditional way of developing software will show mistakes in the program after the coding is produced. But the fifth generation will use a language called 'Programming in Logic' (PROLOG) Architecture of computer will be constructed by keeping this PROLOG language as a central point. PROLOG was developed by Prof. John Robinson of Syracuse University in the U.S. used in 1970. PROLOG can be used to define both the formal specifications and program code. Formal techniques can be applied to prove the correctness of a PROLOG specification. It will represent a knowledge or database. Through this language even children can be easily learnt the problems.

Natural language processing :- The fifth generation computer aims to searching for techniques which will enable computers to be used in translating from one language to another. System interaction is aided by the ability to communicate in natural human language.

Computing effects in human life

Computers could be applied in many ways that could have a positive or negative effect on individuals, organizations and

society as a whole. Fifth generation computers may exhibit many characteristics of intelligence but that does not make them equivalent to human beings. Computers could be used to enhance the quality of life, feed the hungry and cure the sick or to dehumanize society, to intrude on people's privacy and to kill. But there is a possibility of matching computer behaviour and assume that emotionless relationality is superior to the irrationality and emotionality of people.

CHAPTER - 3

Organization - different kinds and their structure

Management is an important factor for the effective utilization of available scarce resources. The task of management is to adopt to changing societal needs and technological advances in such away that its work will be accomplished most effectively.

Functions of the Management

1. Planning
2. Organizing
3. Staffing
4. Directing and
5. Controlling

Planning :- Planning is deciding in advance what to do, how to do, when to do and who is to do it. Planning bridges the gap from where we are to where we want to be in a desired future.

Organizing :- Organizing is a part of managing which involves establishing an internal structure. It involves determination of required activities to achieve goals and grouping of these activities into departments or sections.

Staffing :- Staffing function involves filling the positions provided by the organization structure. Recruitment is the process of searching for prospective employees and stimulating them to apply for the jobs in the organization.

Directing :- Directing involves motivating the people and leading them towards the attainment of the targets of the company. The manager should motivate the people and try to improve morale among the employees.

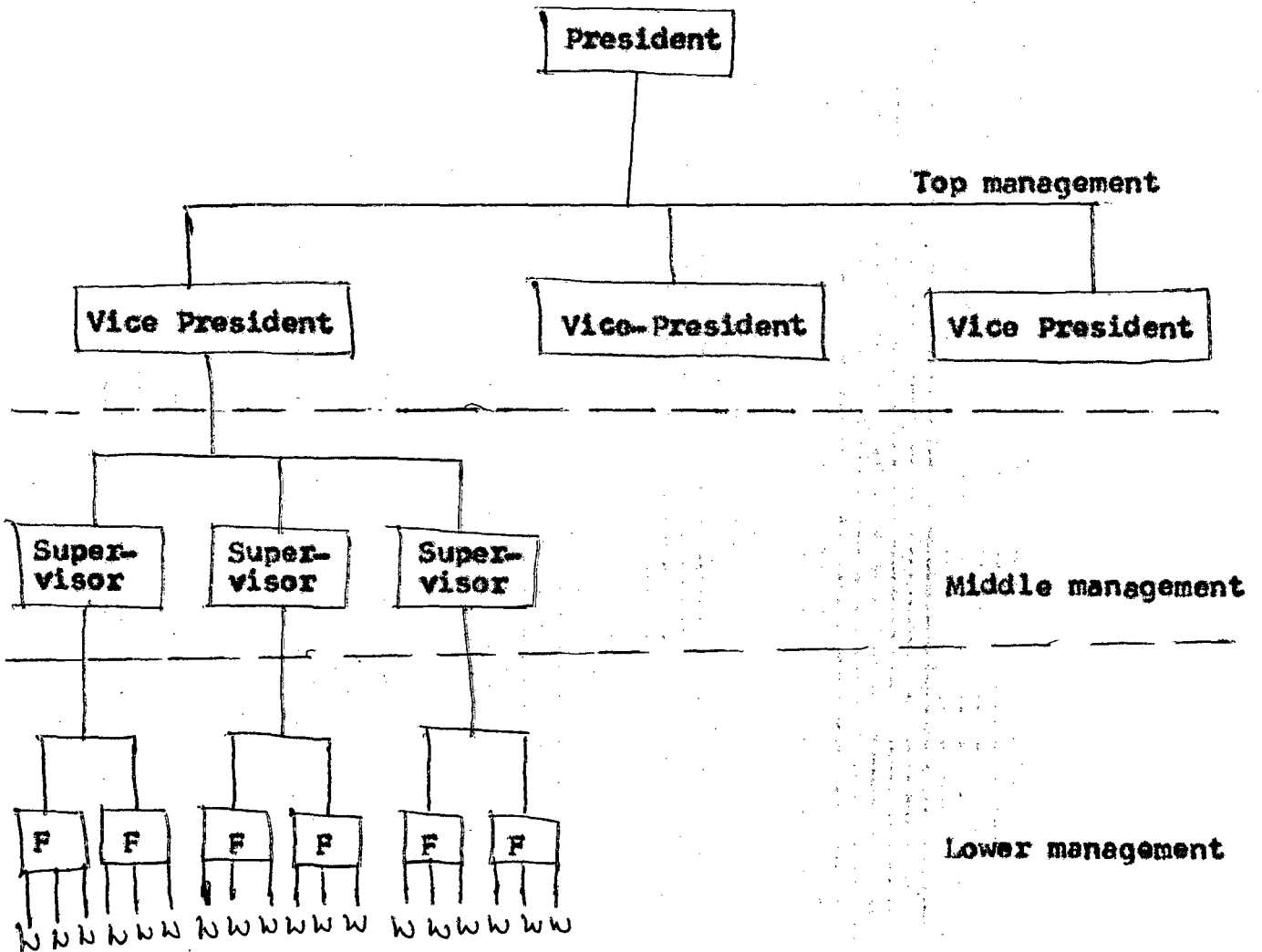
Controlling :- Controlling is the measuring and correcting deviations to assure that events conform to plans. Effective control will improve the efficiency of the organization and minimise the wastage.

The management structure of the typical organization can be broadly divided into three layers.

1. Lower management
2. Middle management and
3. Top management

Lower level management includes first line supervisors or foremen who represent the administrative group at the lowest possible level and who interface with the workers. Top management is the major policy making body and middle management will carryforward with the decisions of top management.

The managerial levels



What ever it may the complexity of the organization, we will find there three levels. The top management will decide the future course of action. Middle management will act as a link between

top management and lower management by implementing the decisions of the high level management. Generally, in the process some of the routine decisions will be taken by the middle management which is answerable to the high level management.

Kinds of the organization

Organization is the total system of social and cultural relationships. Some people call an enterprise as an organization. We can find two kinds of organizations :

Formal organization

Informal organization

Formal organization :- Formal organization is one in which the manager will furnish an environment in which individual performance contributes to group goals. There are the principles to guide the design of effective formal organization.

Principle of unity of objective : An organization structure is effective if it facilitates the contribution of individuals to the attainment of enterprise objective.

Principle of efficiency : An efficient organization structure is one in which the objectives will be accomplished by the people with the minimum risk and cost.

Informal organization :- Informal organization is joint personal activity without conscious joint purpose. It may contribute to joint results. There will not be a clearcut procedure and well defined rules and regulations. Even the

authority and responsibility is not clearly defined.

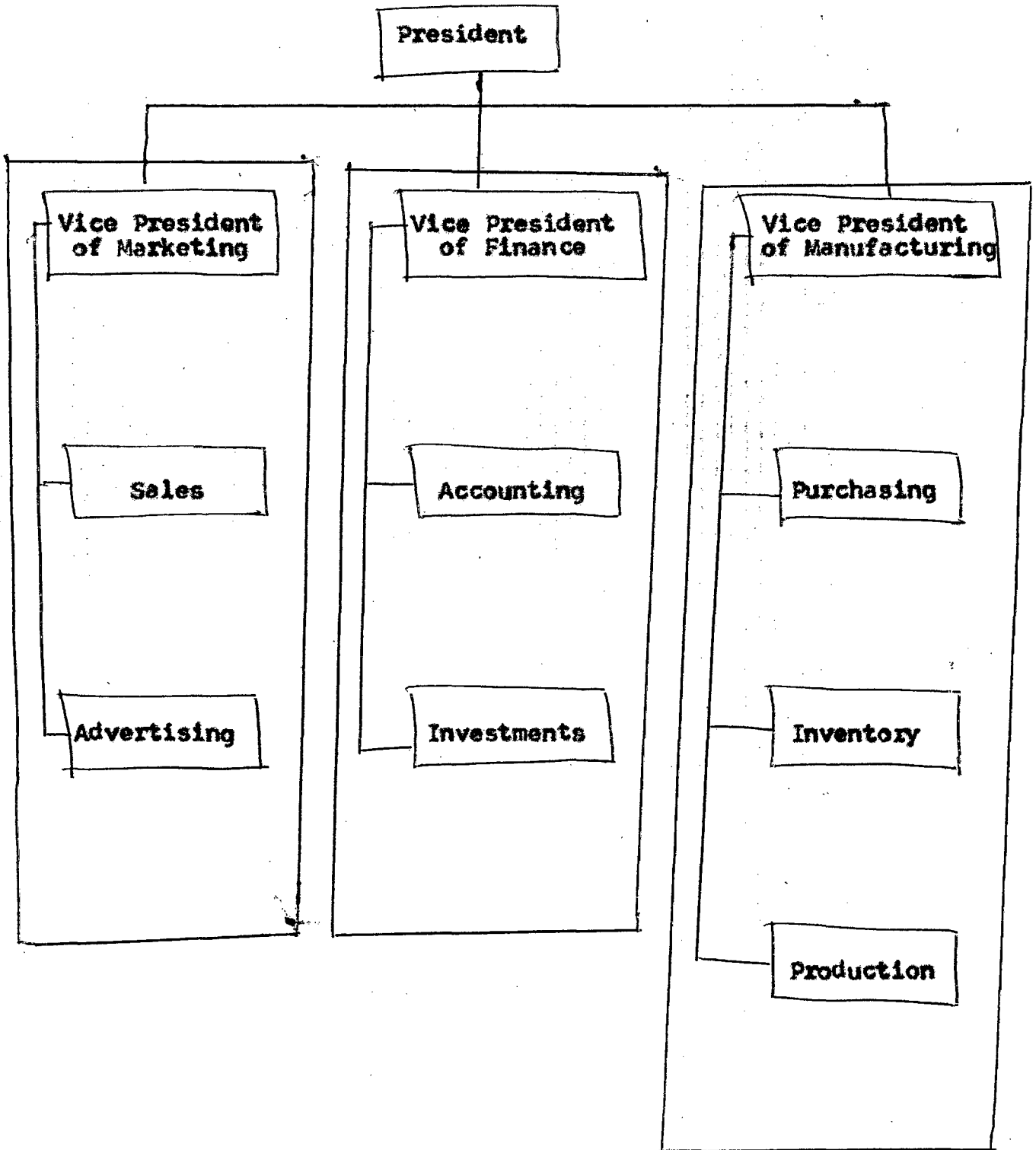
Structure of the organization :

Organization structure can be defined as the pattern of relationships existing between people within the context of an organization system. The organization structure illustrates the formal authority relationships, reporting flows, and communication problems.

Functional organization :- Generally different organizations will be segmented on the basis of its primary functions.

Primary functions of any organization are -

1. Production
2. Marketing
3. Personnel and
4. Finance

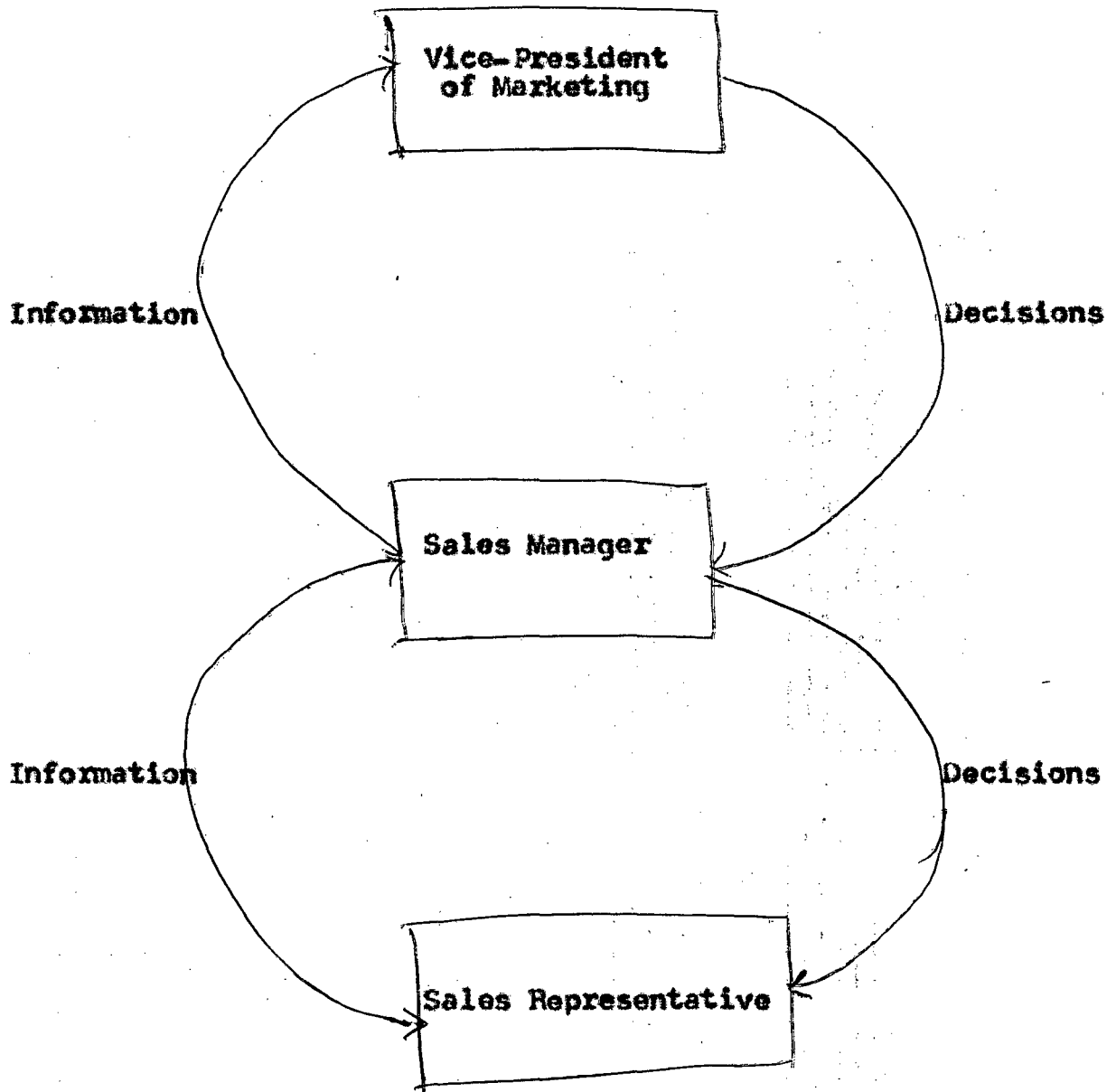


Specialization builds walls in an organization

The figure shows three main departments in the organization i.e. marketing, finance and manufacturing. Due to this specialization there is no interaction among the department which are striving for a common objective with various sub-goals. Undoubtedly the specialization builds walls in the organization. Its outcome was lack of performance. We understand that there is inefficiency in the organization due to this functional organization which will create barriers among various departments which are supposed to work towards the target of the organization. There is a need of close interaction and cooperation among various departments to avoid waste of time and money.

3.) Line and Staff authority relationships

To solve the problems arised due to this functional representation we should define clearly the nature of relationship in the organization. Authority is the power to exercise discretion in making decisions. Line functions are those which have direct responsibility for accomplishing the objectives of enterprise. Staff will help the line to work most effectively in accomplishing the primary objectives of an enterprise. The nature of Line authority is a superior exercises a direct supervision over a subordinate. It follows the scalar principle.

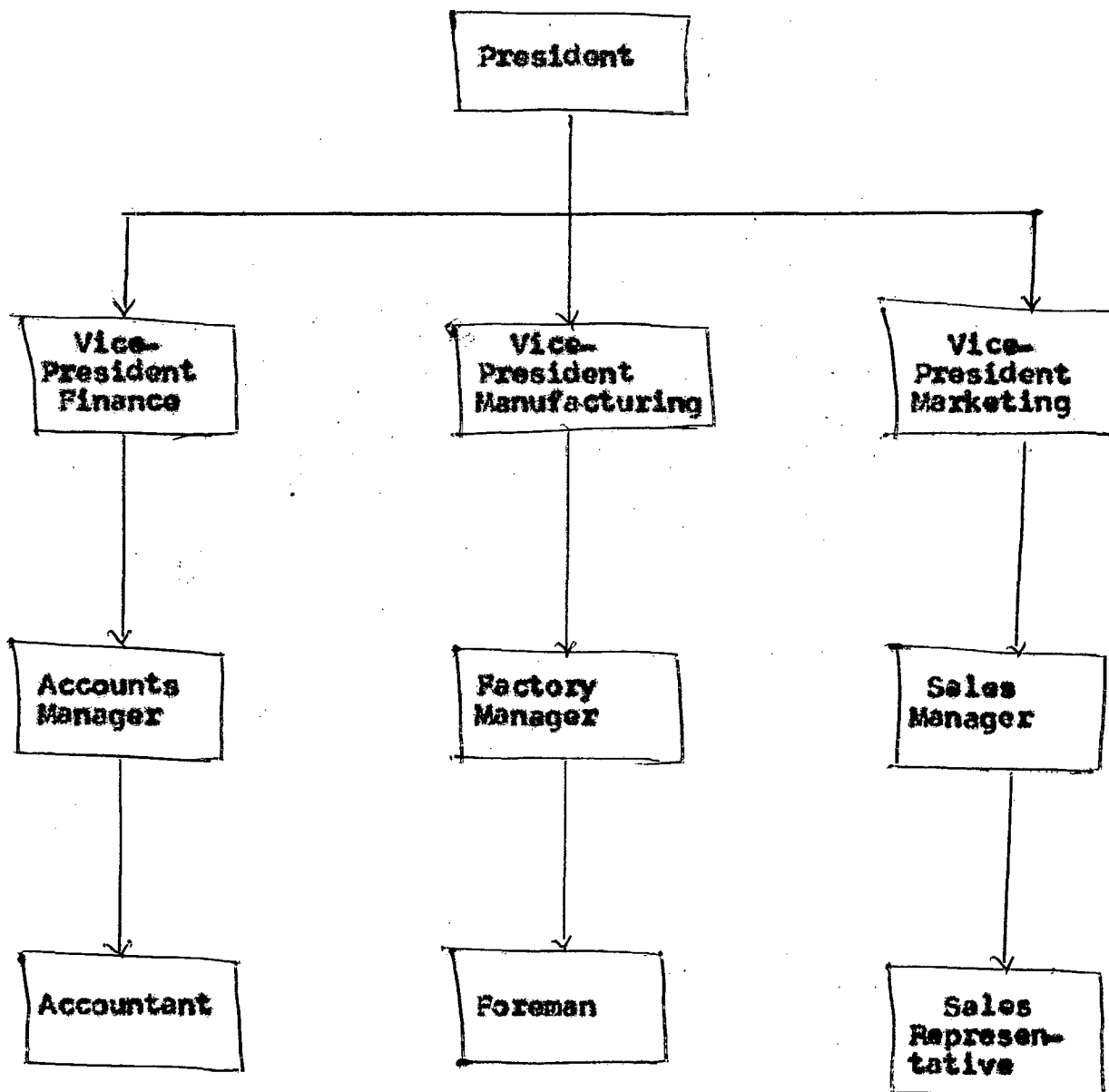


Information and decision flow through the chain of command

The chain of command stretches from the top of an organization to the bottom. Each level and sub system within the organization has well-defined areas of responsibility. The nature of staff relationship is advisory. The function of staff is to investigate, research and give advice to line managers to whom

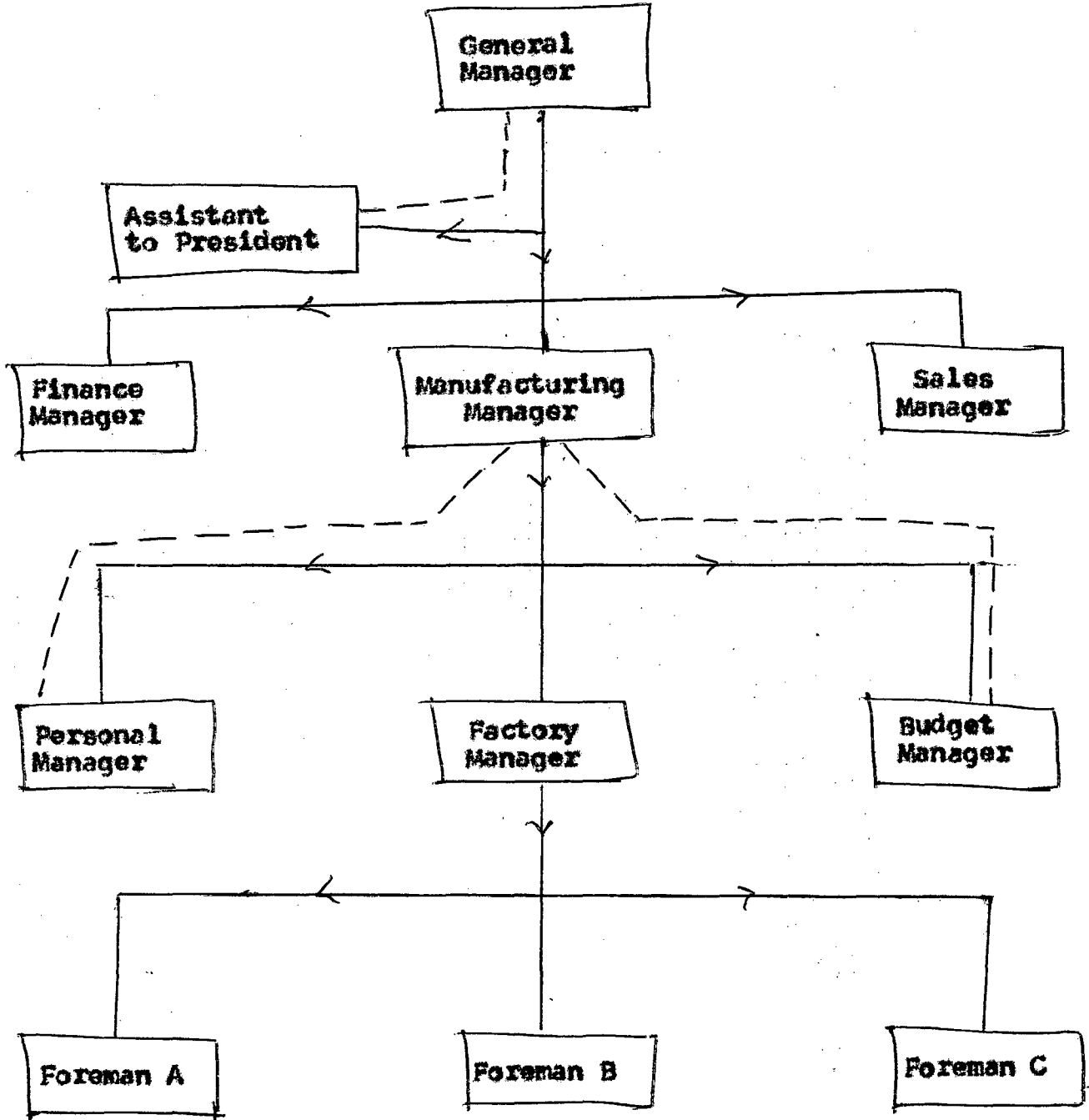
they report.

Organization with Line function



In this figure we will find only Line functions with different management levels, i.e. top, middle and lower. In practice it is very difficult to run the organization without the help of staff. Generally we will find almost all organizations with line and staff relationships. It may not correct to call some department as line and other as staff. Line and staff are characterised by relationships and not by departmental activities. When one looks at an organization structure as a whole the general character of line and staff for the organization emerges. In each and every organization supervisor and subordinate alike must know whether they are acting in a staff or a line capacity. If in a staff capacity, their job is to advice and not command. Line superiors must make the decisions and issue instructions. The distinction between Line and staff is very important.

Line and staff authority relationships



————— Flow of Line authority
- - - - - Staff relationships

Above diagram shows the flow of authority from superior to subordinate. It means, the General manager who is supreme authority in the organization delegates some authority to his subordinates like finance manager, manufacturing manager and sales manager. At the same time one should not forget that the manager who is enjoying with the delegated powers are accountable to their superior, who topped in the chart. Similarly, manufacturing manager will delegate some of his authority to the lower levels to get things done by different departments. Same is the case with factory manager and different levels of the managers in the different levels of the management.

3.2. Principles of Management

Fayol developed some of the management principles, which are attached great importance in the real life of the organization.

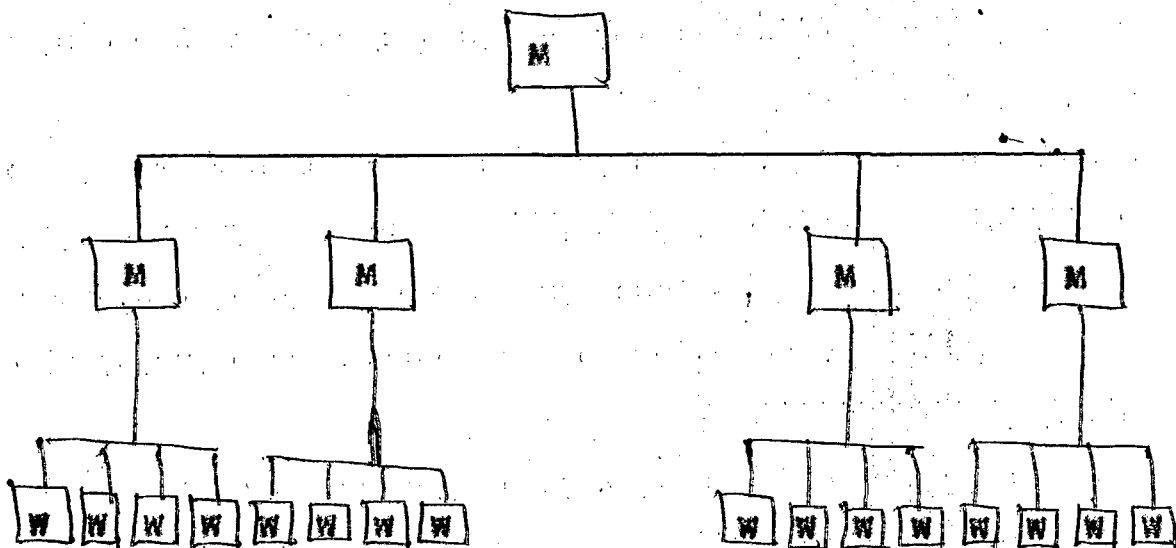
1. Subordination of Individual System :- The interests of the employee or an individual unit should not dominate the interest of the firm or total system.
2. Centralization of Control :- In each and every organization there should be some central control mechanism for the overall system. Centralization of control will minimise the wastage of time and cost by reducing the inefficiency of the organization.
3. Unity of direction :- All parts of the system should work together towards the attainment of the targets of the enterprise. All the sub-goals of the organization should be towards the main goal of the organization.
4. Division of Work :- The work to be done should be divided among all employees or subsystems. It should be divided on the basis of specialized skills.

5. Order :- The system should work in an orderly. The efficiency of the organization will depend upon the maintenance and utilization of available resources.

Some more principles which are useful in bringing efficiency in the organization are -

(1) Span of Control :- Span of control is the number of subordinates which one person can manage. The narrower the span, the greater the control. And, at the same time there will be a number of management layers when the span is less. If we have less number of levels with high number of employees it will result in inefficiency due to the under utilization or unutilization of available resources.

Span of control influences management levels

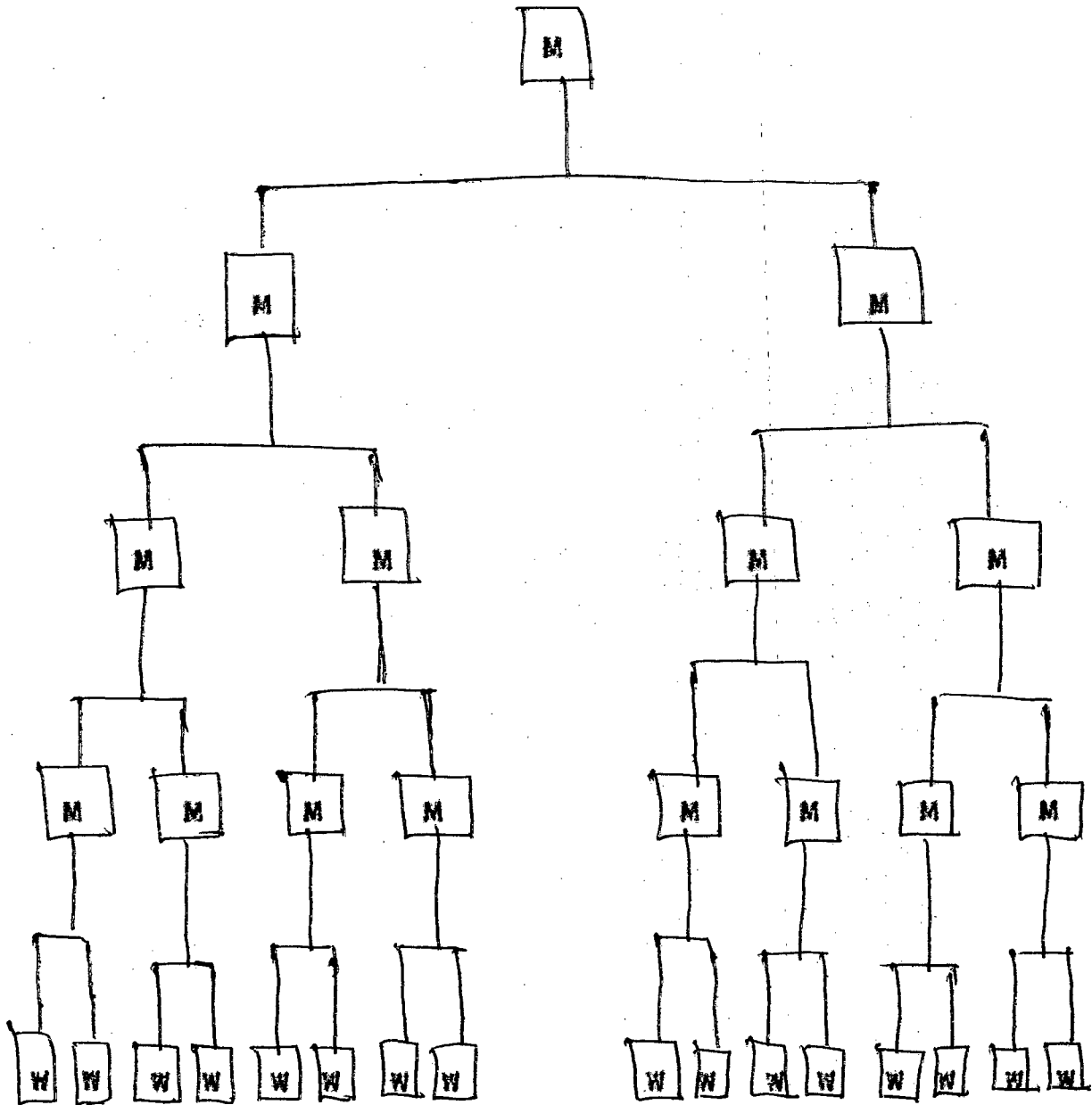


M = Manager
W = Worker

Span = 4

Layers of management = 2

If we try to reduce the span of control it will automatically result in large number of management levels or layers.



Unity of Command :- Each person should have only one immediate supervisor. There should not be contradictory commands or orders.

What ever it may be the kind of business it has to follow the principles of management^o for smooth running of the business.

CHAPTER - 4

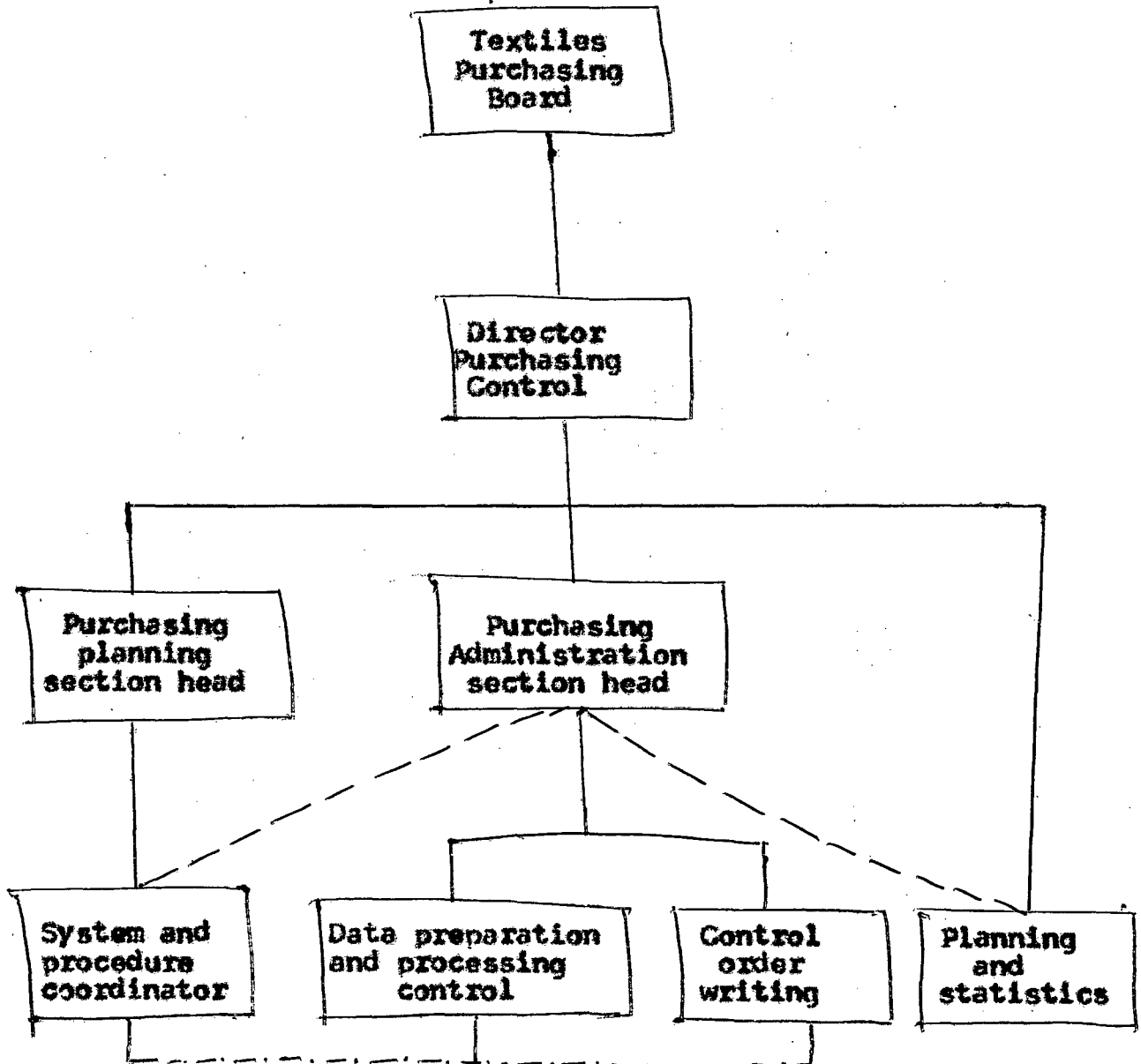
Impacts of information Systems

In this chapter we will see various impacts of information technology on organization structure. Some eminent persons in the field of management developed various principles and techniques which will be useful to utilize the available resources at the optimum level. Recent availability of computer information brought great changes in the organization and utilization of available resources increased to some extent. There is a considerable change in production and efficiency. Due to the increased size of organizations in the past decade and increased complexity of technology organizations emerged with variety of challenges.

The Computer Information Systems and Management (CISM) project is broadly conceived international research study and was conducted by research teams in Austria, Denmark, England, West Germany and the United States (25). Speculative analysis differ on the question of whether greater centralization or decentralization results from computer systems. Some authors contend that computers cause centralization since accurate information becomes readily available to higher levels. However, other suggest that computer take over routine decision-making at lower and middle levels, thereby increasing the capacity of these levels to handle less routine decisions. The result is greater decentralization. Confronted with evidence that computers cause both centralization and decentralization, two ways to resolve the controversy have been proposed.

The most striking evidence of the use of the information system as a tool for bureaucratic control comes from the Mail Order firm in Germany. The system was primarily designed to handle routine order processing, with little flexibility to handle special users requests. This permits a physical decentralization of the customer service and order entry operations with remote terminals. The system increased speed of service, reduced costs and accomodated an expanding business, without losing control over its operations. It lowered the level of decision making without causing top management to lose power.

Fig.1 Mailorder - partial organization of Textiles purchasing



Legend

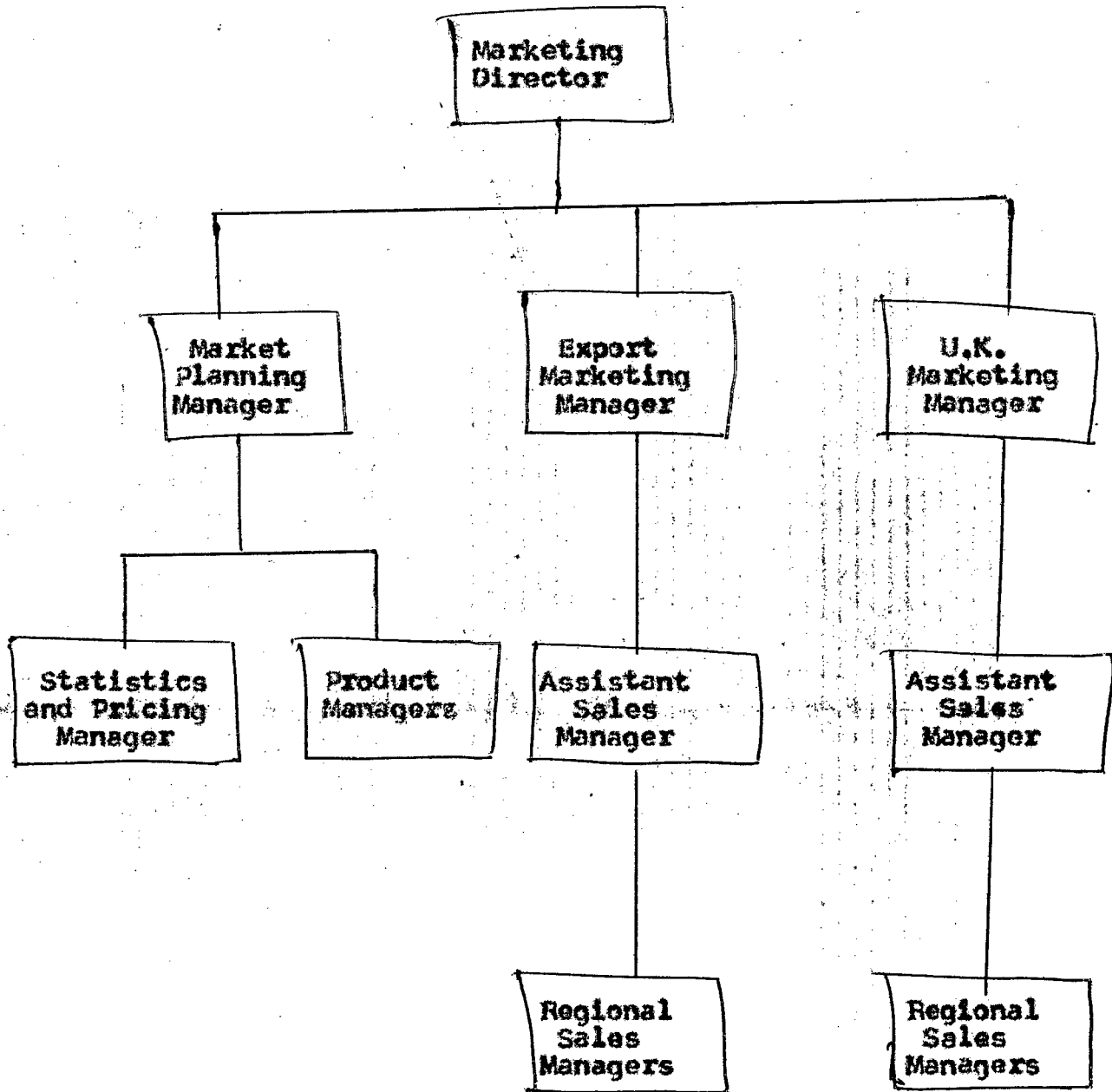
- . - . - . - Direct lateral instructions from system and procedures to other departments.
- - - - - informal staff reporting relationships

In contrast, the purchasing sections of the Mail Order Company used data from the order entry system mainly for centralized statistical analysis. Decentralization of purchasing decisions has not been attempted with or without the computer. Purchasing decisions are less routine and more difficult to automate than the handling of orders. Since business success depends more on favourable purchases and pricing decisions, it is understandable that these decisions are centralized. The Mail Order Case demonstrates that the impact of CIS can vary according to function. Both centralization and decentralization can be achieved in the same organization with the same data processing system.

The British Glass Manufacturer offers further evidence of bureaucratic controls and power centralization in both of the tasks studied there. The most direct evidence is in the design and use of the sales monitoring system to report sales variances to higher levels. While the system was not finely tuned enough to be used as a full exception reporting system, it did allow top managers to review sales performance through automated reports rather than by personnel supervision. The interviews suggest that this led to more active involvement of top managers in decision processes. Thus, the system led to slightly greater centralization and considerably stronger control over lower level decisions. The Glass Factory's budget preparation task experience also shows more centralization. Given the

company's new policy to base sales budgets on profitability instead of sales volume, it became necessary to develop a more sophisticated reporting system and analysis. Use of the system required greater standardization of input data for the budget preparation process. Consequently, the task of budget preparation became more bureaucratic and fell under the control of the Statistics section (see figure 2). While many lower managers welcomed the increased clarity of the budgeting process and valued their opportunities to contribute to planning with their expert opinion, it was also clear that budgeting decisions were more centralized after CIS introduction.

Fig 2. Glass Factory - Partial Organization Chart

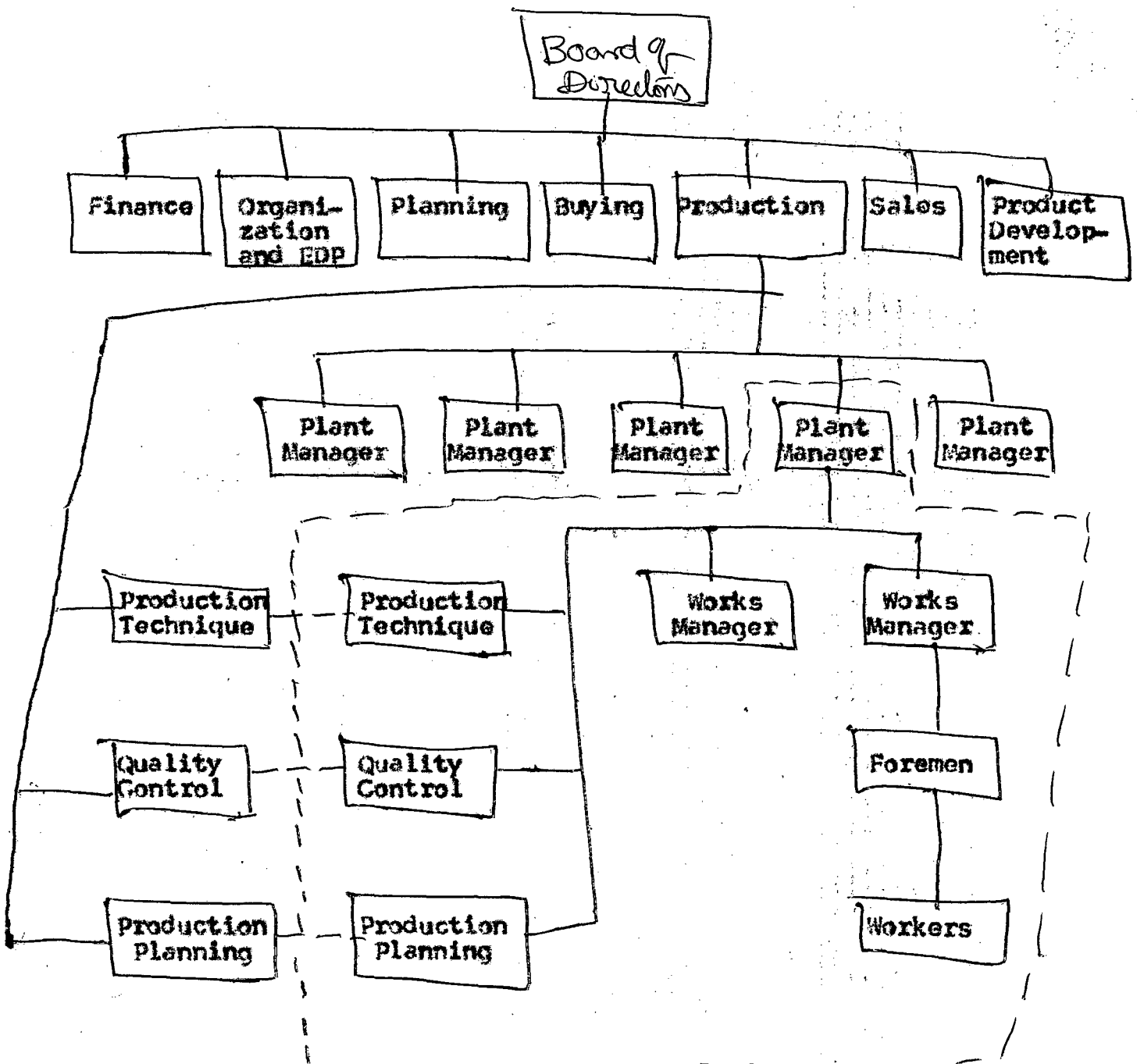


The U.S. Airline again provides evidence of greater centralization associated with computer information systems. Figure 3 shows the configuration of the departments affected by the system. The major change was in the crew utilization function, which gained greater control over the handling of schedule interruptions for the entire airline. Local crew bases were still responsible for providing specific personnel for changed flights, but they were given little leeway in whether they should provide a crew or not. Since the crew utilization departments received daily and on-demand reports of crew status across all local bases, they could determine the more effective adjustments in schedule from a total manpower perspective. Local bases merely accepted centrally suggested shifts in personnel or flying allocations. Most tangible local data became readily available to the central office on a real-time basis.

The Airline example is not a case of extreme centralization. Pilot and flight attendant crews were managed separately even though merging the databases was technically feasible. The two crew types are different on enough contractual, professional, and personal characteristics to warrant separate management. Further more, the level of decision authority for crew matters is still relatively low in the organization. Decisions on schedule adjustment must be made frequently and the level of detail is great. First or second line supervisors are often responsible for deciding to change crews on an aircraft or to request a particular base to call up reserves. The CIS supported these decisions

Since many administrative problems arise over the control and coordination of different departments, the relationship of the computer to the horizontal differentiation or the lateral complexity of organizations is considerable interest. Relationships

Fig.4 Electronics Company - Partial Organization Chart



among departments were affected in a variety of ways by the introduction of the information system. Previously, many informal conferences were used to coordinate the activities of Purchasing, Materials Management, Sales and Accounting. The system with its formal requirements for data entry, had the effect of reducing informal contacts.

The most ambitious attempt to incorporate information system within a lateral relations framework was the Danish Electronics Company. Within each plant (see figure 4) the various planning group exercised lateral influences over the foreman while the Works Managers maintained hierarchial control. The objective of this matrix arrangement was to bring an overall planning perspective to management of the plants while maintaining the local perspective of the Works Managers. Actual production decisions were most strongly influenced by a single group in each plant.

4.1. Centralization

The main problem in the organization is whether authority should be concentrated or dispersed throughout the organization. If the organization is centralised there won't be any delegation of authority to the lower levels. All powers are concentrated at only one point. Absolute centralization implies no subordinate managers and therefore no structured organization. Some decentralization characterises all organisations.

4.2 Decentralization :- Decentralisation is a fundamental aspect of delegation. Decentralization means some of the powers of the top authority will be delegated to the lower levels of the management. Centralization and decentralization are qualities like "hot" and "cold". Decentralization results in

1. There will be a number decisions which will lower down the management hierarchy.
2. There won't be any control it will result in desintegration of the system.
3. There will be disorder in the management.

Absolute decentralization will leave the manager without powers. Top authority will be left with no powers. So, in each organization you will find some sort of decentralization.

4.3 Factors determining the degree of decentralization of authority :

Even if the managers are interested they can not make all decisions and they were forced to delegate some of authority to the lower levels. There are some external factors which will influence the delegation of authority (14). Manager may resist their influence, but no successful manager can ignore them.

1. Costliness of the decision :- The more costly the action to be decided, the more probable it is that decision will made at the upper levels of management.
2. Uniformity of policy :- Another factor favouring centralization of authority is the desire to obtain uniform policy. Since the centralization is the easiest road to such a goal they will be infavour of centralization.

3. Size :- If the organization is large more decisions will be made at different places i.e. decentralization. One should not forget that it is very difficult to coordinate them.
4. History of the business :- Whether authority will be decentralized frequently depends upon the way the business has been built. The ford motor company was an extra-ordinary case of centralized authority.
5. Management philosophy :- The charter of top executives and their philosophy have an important influence on the extent to which authority is decentralized.
6. Desire for independence :- Desire for independence is a characteristic of individuals and groups. Individuals may become frustrated by delay in getting decisions which can lead to dangerous loss of good people.
7. Availability of managers :- The degree of decentralization of authority will depends upon the availability of trained managers. If the trained managers are not available it is impossible to delegate authority to the lower levels.
8. Control techniques :- The controlling authority should have some techniques while delegating authority to one manager whether he can use it properly or not.
9. Decentralized performance :- Division of labour will influences decentralization of authority to some extent. This kind of decentralization may be geographic or physical but it influences the centralization of authority.

10. The pace of change :- The fast moving character of an enterprise also affects the degree to which authority may be decentralized. If a business is growing fast and facing complex problems of expansion, its managers, may be forced to make a large share of the decisions.

11. Environmental influences :- There are definite external forces affecting the extent of decentralization. Example, governmental controls, national unionism and top policies. Government regulation of business policy makes it difficult and sometimes impossible to decentralize authority.

4.4 Computer's impact on Planning and Decision-making

The use of computers in organization has grown to the point where a great many social, business and government functions are heavily dependent on it. Most organizational computer usage falls into one of three categories.

1. Information handling : Using the computers to transmit and process information in a variety of ways.

2. Transaction processing : The computer is used much like a machine on the factory floor, together, transmit, store and retrieve the detailed transaction data of the organization.

3. Database applications : Computers are used to maintain and access various data files. All of these applications are basically aimed at clerical replacement. The computer is used because it is a very fast arithmetic device and extremely efficient file cabinet. These all applications are referred to as Management Information Systems. These days computing

departments are more and more concerned with the effectiveness and efficiency of the services they provide. Computers will assist managers in their decision-making activity but they can not replace managers. The computer techniques and analytical methods may be of significant value, but managerial judgement is also essential. Neither the manager nor the computer can do as effective a job as the two together. We call these types of application as Decision Support Systems (DSS). [18]

Planning is an information intensive activity, if normal planning is to be undertaken, some mechanism is necessary to support the information requirements. The three classes of mechanism, for information gathering, storage, analysis and display, are as follows :-

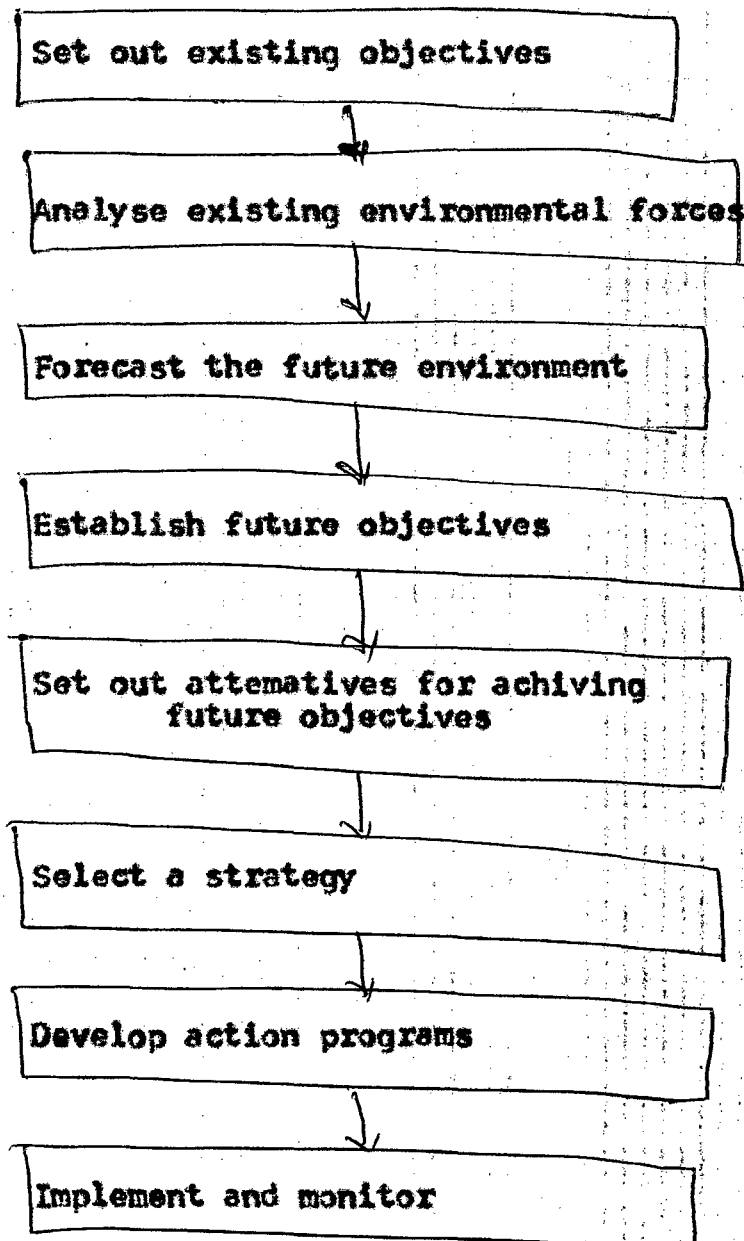
Manual

**Management Information Systems (MIS) and
Decision Support Systems (DSS)**

Manual includes all non-computer methods of formal information handling, such things as clerical assistance, libraries and other informal information handling activities. MIS and DSS are both types of computer-based support. DSS assists managers in making decisions, MIS is more independent of particular managers and decision processes. MIS is less closely connected with specific decisions, but tend to deal with functions.

Much effort has been diverted towards using computer techniques in the planning process [18]. The first important efforts aimed at developing computer-based planning support

systems took place in the mid-1960's. These earlier systems were huge and very expensive. The last few years have witnessed an unmistakable trend away from the large scale, total systems approach to planning models, towards smaller, more specialized models. In order to provide a frame work for an analysis of the computer's role in planning, we present an eight step model of the planning process in the figure given below :



An eight step model of the organizational planning process.

Let us now describe in more detail each of the planning steps identified in the figure :

1. Set out existing objectives :- The first step is to determine and set out the existing objectives of the firm in an explicit form. Each objective should be accompanied with a statement of how it is to be measured and what target level the firm would like to achieve. Computer-based support may play a minor role in certain situations, but generally computers have not been used to much advantage here.
2. Analyse Existing Environmental Forces :- The assessment of environmental forces requires two distinct phases. One phase involves identifying the types of forces that exist and that have an impact on the organization. Second phase involves trying to understand how those forces impact the organization. Management and experience and judgement are crucial in this stage, as are a sound grasp of general economic, political and social trends. MIS will play a minor role during this step.
3. Forecast the future environment :- This forecasting task has two phases. First, changes in the existing environmental forces must be considered. For instance, what the gross national product is likely to be five years from now. In the second phase, extensive research in the area of computer - aided techniques, some MIS oriented and other DSS-like.
4. Establish future objectives :- It follows the forecasting of the future environment and establishing future objectives. Forecasting is a complement of planning.

5. Set out alternatives for achieving future objectives :-

This stage of planning process is to set out alternatives by which these objectives could be accomplished.

6. Select a strategy :- This next stage of planning is that of selecting a strategy and a set of action plans that seem to be best for the organization. It involves cost/benefit analysis.

7. Develop action programs :- It is to set out on a year by year basis specific action programs that are needed to implement the strategy.

8. Implement and monitor :- It involves executing the detailed programs and controlling deviations from the plan.

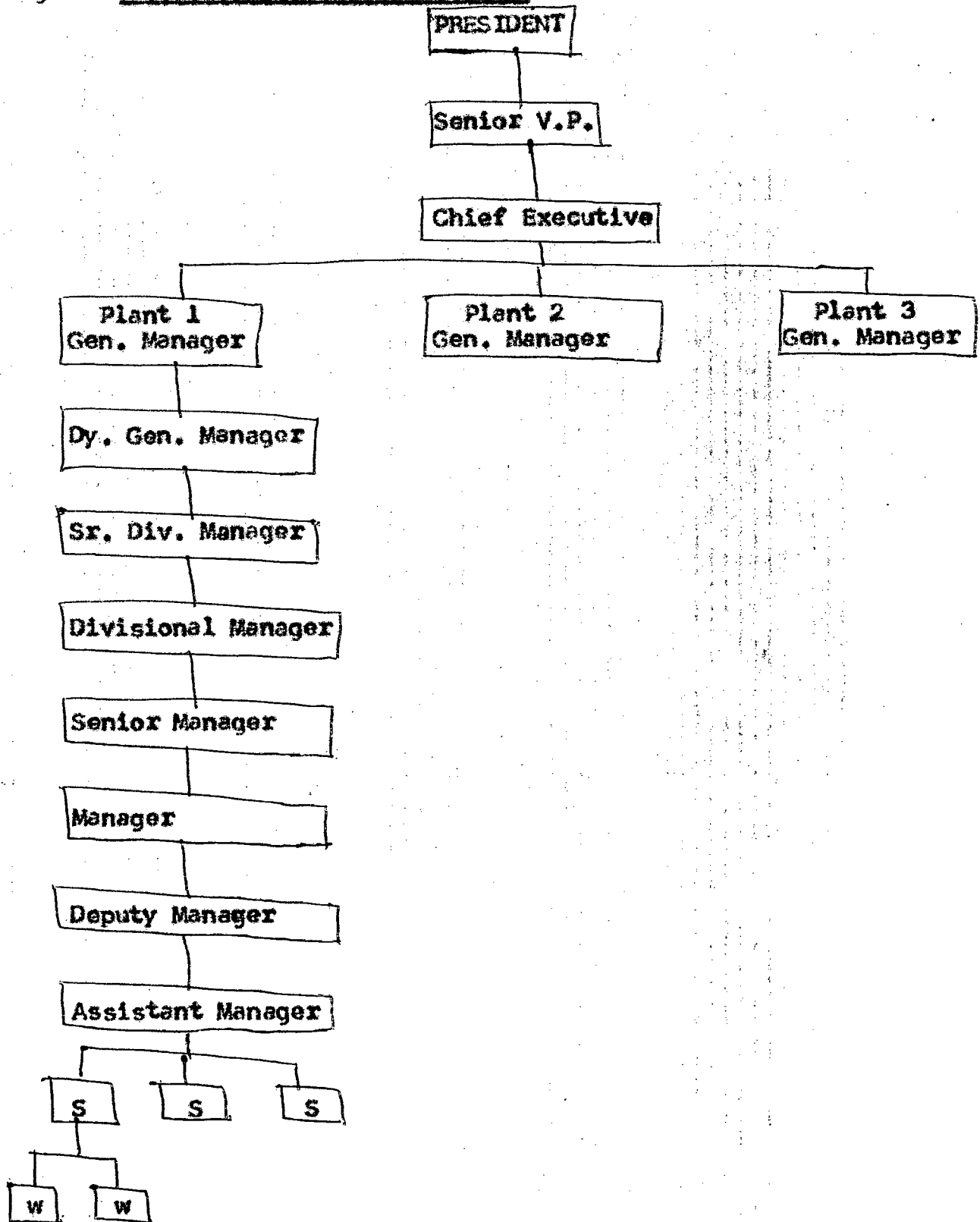
CHAPTER - 5

Case Studies

The Escorts is one of the important leading organizations, which has three major plants, with clearly defined targets. Plant 1 is an engineering department which produces railway equipments, heating elements, fabrication of tractor parts etc., Plant 2 is the motor cycle and scooter division, which is an independent division. It produces, for example, Rajdoot motor cycle, Yamana etc. Plant 3 is the tractor division, plant 1 and plant 3 have common functions. But plant 2 has independent functions. Plant 1 has finance, personnel and medical unit which are common to the plant 3, but plant 3 has its own finance, personnel and medical departments. Each and every plant has to show its own profit and loss account at the end of each financial year. Materials transfer from one plant to another plant will be treated as purchases, which will be useful to measure the efficiency of each plant.

President is the top most authority to decide about major policies of organization. Under him there will be senior Vice-President to perform some of the functions of President. Each plant will be headed by the General Manager, who will be boss of entire plant. General Manager, will have direct contacts with the chief executive to discuss some important matters. Escorts has some more units under the similar pattern. For example, Escorts Tractors Limited in collaboration with the

Fig.1 - Escorts-Partial Organization



Ford Motor Company USA, and Escorts employees ancillaries. Plant 2 has its own personnel department, Finance department. Each department will be headed by a manager. Plant 1 and plant 3 have common departments but accounts are maintained independently. Each plant's performance will be measured at the end of each financial year and will take stern measures to improve the efficiency.

Escorts introduced second generation computer IBM-1401, in the year 1969-70, mainly for commercial use which aims at providing services to the following functions -

- Materials management
- Production
- Inventory management
- Financial Accounts including general accounting and sales accounting

Now the Escorts has two large systems -

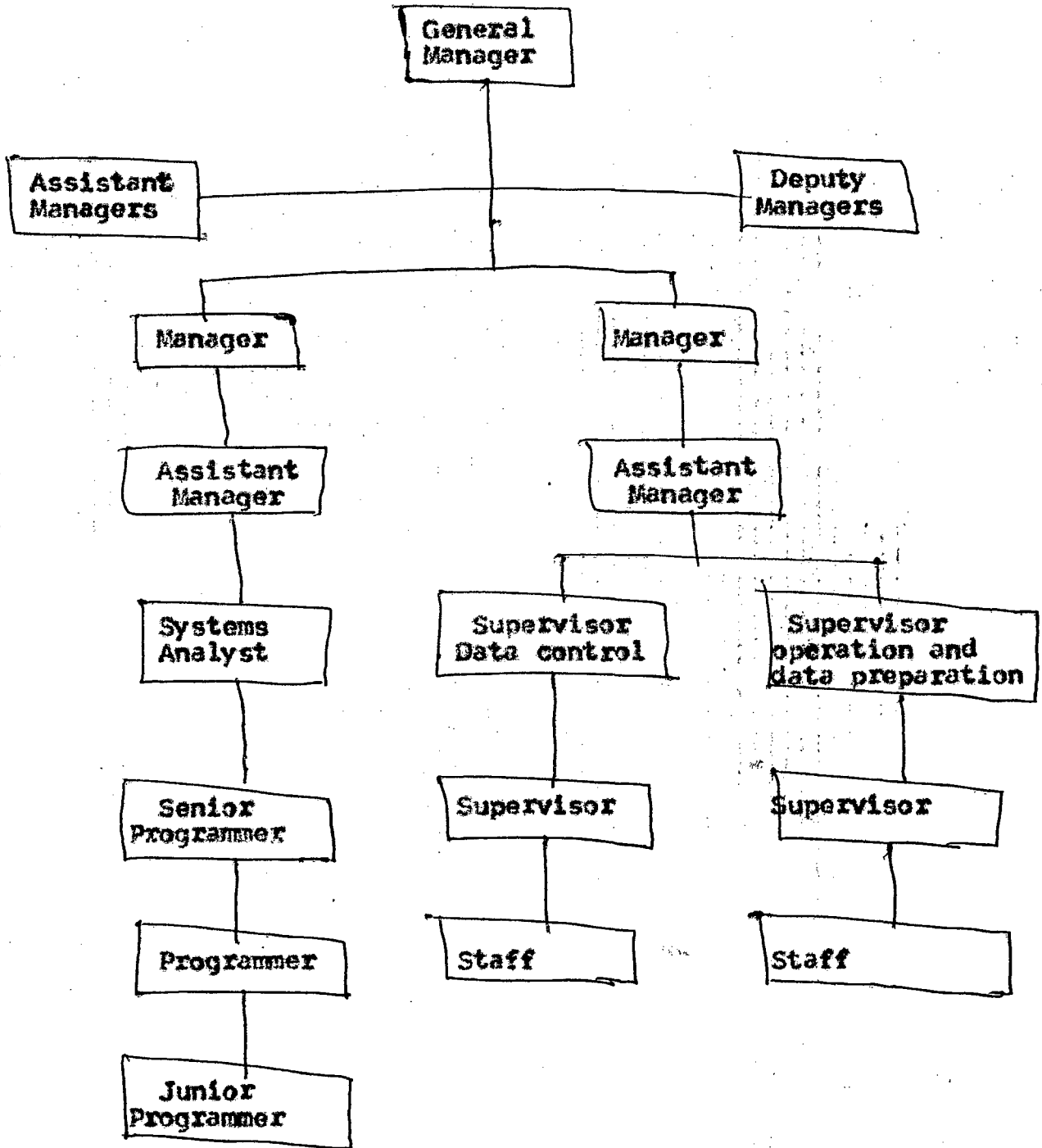
1. IBM - 36040, a Third generation computer
2. IBM - 1401 - Second generation computer

Impacts of computer on organization structure

Computer was introduced in the Escorts to improve the efficiency of organization by reducing the duplication of data. They have attained the expected goals, for which they have computerised the organization. There was considerable improvement in the efficiency of the people. Clerical people are feeling better. There were no adverse affects on the organization. Organization was able to provide work to almost

all employees without retrenchments which is the policy of the organization. At the same time workers have abundant work with changes in functions. Morale has been improved a lot among the workers. But the computerization of organization undoubtedly effected further recruitments.

As per as the organization structure is concerned there was no structural changes due to this computerization. Let us see the structure of plant 3.



The above figure shows different functions of the staff in plant 3. Functions of the workers have changed, but there was no change in the managerial layers. There are three levels of management top management, middle management and lower level management. The lower level management includes supervisors who will have direct contacts with the workers who are at the bottom in the hierarchy. Management policies will be decided at the top level management. Middle level management will take routine decisions in consultation with the top level management. In the Escorts organization structure General Managers who are heading different plants will come under middle level management. Some of the important decisions will be taken by the General Manager in consultation with the top level management which will decide the policies of management. The General Manager will have full control on the plants to mould the administration whatsoever way he likes by using his management strategies and tactics to improve the ability and efficiency of the organization.

Centralization of authority and control

According to the experience of Escorts, computer information system does not lead to either centralization or decentralization of authority. Basically, it depends upon the philosophy of the organization. Since the philosophy of Escorts is decentralization, most of the decisions will be made at middle level management only. But the major decision will be taken in consultation with the top level management.

For example, purchase of materials will be done only after discussing with the top level management. When the majority of decisions are taken by middle level management, the top level management will coordinate things of different management levels.

There is considerable impact of computers on the planning and decision-making process in the Escorts organization. The computers will assist managers in their decision-making activity. Computers techniques and analytical methods may be of significant value but managerial Judgement is also essential. The manager is in a position to do effective job with the help of computers.

The computer will be useful in almost all the stages of the planning and decision-making process given below :

1. Determine and set out the existing objectives of the organization.
2. Analysing existing environmental forces faced by the organization.
3. Forecasting the environment of future that matters for the organization.
4. Establishing what the future objectives ought to be
5. Set out alternatives for achieving future objectives.
6. Selecting a strategy and a set of action plans that seem to be best for the organization.
7. Set out on a period basis specific action programs that are headed to implement the strategy.

- B. Executing the detailed programs and correcting the deviations from the plan.

As a whole the Escorts organization is very successful with the computerization. Employees are happy and performing duties well with the improved efficiency. For them, timely decisions will be useful without waiting in frustration. They have minimised the time of keeping resources idle due to the lack of input materials. The managers are also very effective and efficient who can motivate the workers towards the attainment of targets of the organization. Computerization has not resulted in under utilization of manpower resources. In fact, there is optimum utilization of manpower resources. There is Job-satisfaction among the employees, and can able to perform their functions without much labour. Top level management is in a position to take prompt decisions which can minimize wastage and cost with the help of available information. If this trend continues there would be all round development in the organization with the product diversification and product development.

CHAPTER - 6

Conclusion

Computers will bring tremendous changes in the efficiency and effectiveness of the organization. The managers are always ready with the required information to take effective and prompt decisions as the situation demands. There is need of continuous touch with day to day events and future forecasting. Planning is forecasting future. There may be unexpected and unwanted interruptions in the process which will demand effective control to make sure the success of the organization. Manager should be capable of tackling untoward incidents with managerial skills and strategies. Information plays a key role in the organization. The information will be processed from one place to another place through the channels of communication. The effectiveness of communication will depend upon the channels of communication.

There are different levels of the management with defined objectives or shared responsibilities. Computerization will help the manager in planning and decision-making process. Different management levels in the Escorts are feeling happy with the readily available information to take prompt decisions. Managers can easily assess and forecast the future with the help of computers. While the electronics case would be interpreted as a misapplication of the matrix concept, other cases demonstrate the capability of computer systems within lateral relations arrangements. In the British Glass Company, the budget preparation task was accomplished via the cooperative efforts of numerous functional

areas. Before the computer system became operational, the product manager provided an organizational focus upon products. As the company increased its marketing emphasis, the product manager grew in stature vis-a-vis, the other functional areas. Developing a computer information system to analyze product profitability called for the more technical abilities of a statistical section. The primary job of this group became gathering data from product managers, sales persons, production staff, transport staff and others. Because the analysis was computer-based, data requirements were standard across all products. During and after this process, individual manager users worked with the statistics personnel in developing plans consistent with the budget.

The Mail Order Company's textile purchasing function provides another example of the relation between computers and lateral decision process. Here the computer information system worked across existing lines of authority to introduce a more flexible set of reporting relationships. The system thus encouraged lateral contact and did not require full authorization of instructions through the formal section head. In addition, planning and statistics operated by collecting and compiling data from all other sections conveying it to data processing. It worked across departmental lines in a staff capacity, and its activities were essential for effective purchasing control and administration. The more flexible relationships in textile purchasing were clearly the result of introducing the computer

system. The Escorts Company clearly shows that there were no structural changes in the organization due to the information systems. Functions of the people have changed but the organizations structure was remained unchanged. By assessing all these organizational forms, it can be concluded that the information system do not cause structural changes in organizations. Structural change may or may not accompany system implementation. Structural changes may be due to either rational management objectives, political strategies, or both. Structural arrangements depend more on the task to be accomplished and the objectives of the enterprise.

As far as the computer impact on centralization of authority is concerned, Computers do not lead to centralization or decentralization of authority. It depends on the philosophy of organization. Escorts Company believes in decentralization of authority. But the Ford Motor Company believed in centralization of authority. Even though the Escorts Company's philosophy is decentralization major decisions and policies of the organization will be taken at the top level of management. Due to the computer information system some of the important matters like purchase of materials and pricing decisions are taken only at the top level of management which shows the centralization of authority. There is divided opinion even among the authors. Some authors say that computers cause centralization since accurate information becomes readily available to higher levels. Others argue that computers take

over routine decision-making at lower and middle levels, thereby increasing the capacity of these levels to handle less routine decisions. The result is greater decentralization. Confronted with evidence that computers cause both centralization and decentralization, two ways to resolve the controversy have been proposed. It means impact of computer information system on organization will be indifferent.

It is very difficult to separate computer with any system. Computers are used every where. Computers will assist the managers in their decision-making activity but it can not replace him, as the managerial judgement is also essential in the planning and decision-making activity. Neither the manager, nor the computer can do as effective a job as the two together. Progress in the area of planning and decision-making activity is occurring partly because pressure is on organization today to perform well in increasingly complex and difficult situation. Continued progress is made possible in two factors. One is improvement in our understanding of the nature of the planning process, and second is improvements in our ability to cope up with recent technological changes. Much of this progress has occurred in the past few years and we expect to see atleast as much progress in the next few years.

REFERENCES

1. ABRAMS, M.D. and STEIN, P.G., COMPUTER HARDWARE AND SOFTWARE, An interdisciplinary introduction ADDISON-WESLEY PUBLISHING COMPANY, LONDON, 1973.
2. AWAD, E.M., INTRODUCTION TO COMPUTERS IN BUSINESS, PRENTICE-HALL INC. Englewood Cliffs, N.J., 1977.
3. CHAPIN, N., COMPUTERS A SYSTEMS APPROACH, VAN NOSTRAND REINHOLD COMPANY, NEW YORK, 1971.
4. COINS IV INFORMATION SYSTEMS, PLENUM PRESS, NEW YORK, 1974.
5. COLLIN, W.G., INTRODUCING COMPUTER PROGRAMMING, Published by NCC Publications, Oxford Road, Manchester, 1978.
6. COTTERMAN, W.W., COUGER, J.D., ENGER, N.L. and HAROLD, F., SYSTEMS ANALYSIS AND DESIGN, A foundation for the 1980's, North-Holland, New York, 1981.
7. COUGER, J.D., McFADDEN, F. R., INTRODUCTION TO COMPUTER BASED INFORMATION SYSTEMS, John Wiley & Sons Inc., New York, 1975.
8. DICKSON, G.W., MANAGEMENT INFORMATION SYSTEMS, Evolution and Status, Advances in Computers, Volume 20, Academic Press, New York, 1981.
9. DONOVAN, J.J., SYSTEMS PROGRAMMING, McGRAW-HILL International Book Company, Tokyo, 1975.
10. FLORES, I., COMPUTER SOFTWARE, Programming Systems for Digital Computers, PRENTICE-HALL, INC., Englewood, Cliffs, N.J., 1965.
11. FOY, N., COMPUTERS AND COMMON SENSE, Auerbach Publishers Inc., London, 1972.
12. HARTENSTEIN, R.W., FUNDAMENTALS OF STRUCTURED HARDWARE DESIGN, North-Holland Publishing Company, AMSTERDAM, 1977.
13. KERNGHAN, PLAUGER, P.J., SOFTWARE TOOLS, ADDISON-WESLEY PUBLISHING COMPANY, California, 1976.
14. KOONTZ, H. and DONNELL, C.O., ESSENTIALS OF MANAGEMENT, TATA McGRAW-HILL PUBLISHING COMPANY LTD., NEW DELHI, 1978.
15. MALHOTRA, A., COMPUTERS IN MANAGEMENT, TATA McGRAW-HILL Publishing Co. Ltd., Bombay, 1972.

16. MAYNE, A., DATABASE MANAGEMENT SYSTEMS, A technical review, The National Computing Centre Limited, Oxford Road, Manchester, 1981.
17. McLeod, R. Jr., Management Information Systems, Science Research Associates Inc., Chicago, 1979.
18. MORTON, M.S. and HUFF, S., "The impact of computers on planning and decision-making", in Human Interaction with Computers, Edited by SMITH, H.T. and Green T.R.G., academic Press, LONDON, 1980.
19. MOTO-OKA, T., FIFTH GENERATION COMPUTER SYSTEMS, NORTH-HOLLAND Publishing Company, Amsterdam, 1982.
20. MURDICK, R.G. and ROSS, J.E., Introducing Management Information Systems, Prentice Hall, Inc., Englewood Cliffs, N.J., 1977.
21. NCC. INTRODUCING SYSTEMS ANALYSIS AND DESIGN, VOLUME 1, Reprinted in India by Galgotia Book source in arrangement with National Computing Centre, U.K., 1982.
22. NCC. INTRODUCING SYSTEMS ANALYSIS AND DESIGN, VOLUME 2, Published in India by Neeraj Galgotia for Galgotia Book source in arrangement and Printed at Pearl Offset Press, New Delhi, 1982.
23. PELTU, M., INTRODUCING COMPUTERS, The National Computing Centre Ltd., Oxford Road, Manchester, 1983.
24. POPPLBAUM, W.J., COMPUTER HARDWARE THEORY, The Macmillan Company, New York, 1972.
25. ROBEY, D., "COMPUTER INFORMATION SYSTEMS AND ORGANIZATION STRUCTURE", ACM COMMUNICATIONS, Volume 24, Number 10, October 1981, pp. 679 to 687.
26. SANDERS, H.D., COMPUTERS IN BUSINESS, An Introduction McGRAW-HILL BOOK COMPANY, New York, 1968.
27. SIEGEL, P., STRATEGIC PLANNING OF MANAGEMENT INFORMATION SYSTEMS, Mason & Lipscomb Publishers Inc., New York, 1975.
28. SZWEDA, R.A., INFORMATION PROCESSING MANAGEMENT, AUERBACH Publishers, Princeton, New York, 1972.
29. TREMBLAY, J.P. and BUNT, R.B., AN INTRODUCTION TO COMPUTER SCIENCE AN ALGORITHMIC APPROACH, McGRAW-HILL INC. KOGAKUSHA Ltd., TOKYO, 1979.
30. VICKERY, B.G., INFORMATION SYSTEMS, Butterworth & Co. Publ. Ltd., LONDON, 1973.

31. WALSH, M., INFORMATION MANAGEMENT SYSTEMS, VIRTUAL STORAGE,
A practical guide for Managers, Reston Publishing Company
Inc. Reston, 1979.
32. WATSON, H.J. and CARROLL, A.B., COMPUTERS FOR BUSINESS,
A Managerial Emphasis Business Publications, INC.
Dallas, 1976.