

## The Organization and management of maintenance function and its effect Over Economies of an Industry

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### ABSTRACT

As with any discipline built upon the foundations of science and technology, the study of maintenance begins with a definition of maintenance. Maintenance is not merely preventive maintenance, although this aspect is an important ingredient. In a more positive vein, maintenance is a science since its execution relies, sooner or later, on most or all of the sciences. It is an art because seemingly identical problems regularly demand and receive varying approaches and actions and because some managers, supervisors, and maintenance technicians display greater aptitude for it than others show or even attain. The maintenance activity isn't a purpose in itself, it's a necessity of which the production suffers and the financial agent considers too expensive. It often exists a conflict between the production units and the maintenance department, not only for a short term, but, sometimes, for a long term, imposing a rigorous definition of each person's responsibilities [1].

### I. INTRODUCTION

The Organizing is the process of arranging resources (people, materials, technology *etc.*) together to achieve the organization's strategies and goals. The way in which the various parts of an organization are formally arranged is referred to as the organization structure. It is a system involving the interaction of inputs and outputs. It is characterized by task assignments, workflow, reporting relationships, and communication channels that link together the work of individuals and groups. Any structure must allocate tasks through a division of labour and facilitate the coordination of the performance results [2]. The purpose of this paper is to present a holistic framework for managing the maintenance function heretofore inundated by myriad tools, trappings, practices, and prescriptions. Nevertheless, we have to admit that there is no one best structure that meets the needs of all circumstances. Organization structures should be viewed as dynamic entities that continuously evolve to respond to changes in technology, processes and environment. The basis for modern organization management until the middle of the twentieth century maintenance has been carried out in an unplanned reactive way and

for a long time it has lagged behind other areas of industrial management in the application of formal techniques and/or information technology. With realization of the impact of poor maintenance on enterprises' profitability, many managers are revising the organization of maintenance and have developed new approaches that foster effective maintenance organization. Maintenance cost can be a significant factor in an organization's profitability. In manufacturing, maintenance cost could consume 2–10% of the company's revenue and may reach up to 24% in the transport industry [2]. So, contemporary management considers maintenance as an integral function in achieving productive operations and high-quality products, while maintaining satisfactory equipment and machines reliability as demanded by the era of automation, flexible manufacturing systems (FMS), "lean manufacturing", and "just-in-time" operations. However, there is no universally accepted methodology for designing maintenance systems, *i.e.*, no fully structured approach leading to an optimal maintenance system (*i.e.*, organizational structure with a defined hierarchy of authority and span of control; defined maintenance procedures and policies, *etc.*). Identical product organizations, but different in technology advancement and production size, may apply different maintenance systems and the different systems may run successfully. So, maintenance systems are designed using experience and judgment supported by a number of formal decision tools and techniques. Nevertheless, two vital considerations should be considered: strategy that decides on which level within the plant to perform maintenance, and hence outlining a structure that will support the maintenance; planning that handles day to-day decisions on what maintenance tasks to perform and providing the resources to undertake these tasks. The maintenance organizing function can be viewed as one of the basic and integral parts of the maintenance management function (MMF). The MMF consists of planning, organizing, implementing and controlling maintenance activities. The management organizes, provides resources (personnel, capital, assets, material and hardware, *etc.*) and leads to performing tasks and accomplishing targets. Figure 1. shows the role organizing plays in the management process.

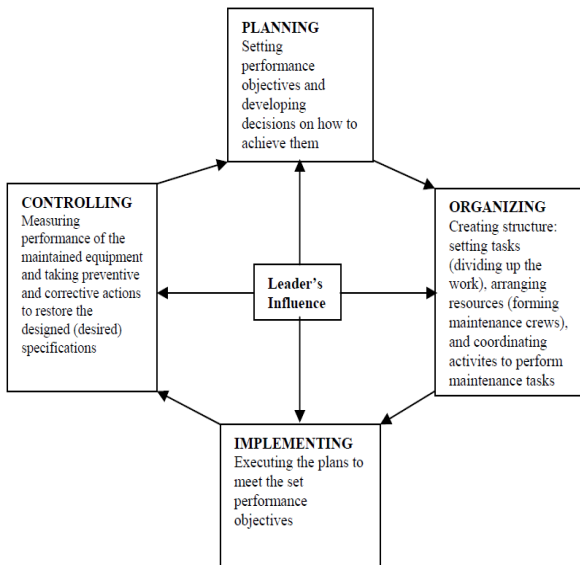


Fig. Maintenance management function and process

## II. MAINTENANCE ORGANIZATION OBJECTIVES AND RESPONSIBILITY

The A maintenance organization and its position in the plant/whole organization is heavily impacted by the following elements or factors:

- Type of business, *e.g.*, whether it is high tech, labour intensive, production or service;
- Objectives: may include profit maximization, increasing market share and other social objectives;
- Size and structure of the organization;
- Culture of the organization; and
- Range of responsibility assigned to maintenance.

Organizations seek one or several of the following objectives: profit maximization, specific quality level of service or products, minimizing costs, safe and clean environment, or human resource development. It is clear that all of these objectives are heavily impacted by maintenance and therefore the objectives of maintenance must be aligned with the objectives of the organization. The principal responsibility of maintenance is to provide a service to enable an organization to achieve its objectives. The specific responsibilities vary from one organization to another; however they generally include the following: [3]

- i. Keeping assets and equipment in good condition, well configured and safe to perform their intended functions;
- ii. Perform all maintenance activities including preventive, predictive; corrective, overhauls, design modification and emergency maintenance in an efficient and effective manner;
- iii. Conserve and control the use of spare parts and material;
- iv. Commission new plants and plant expansions;
- v. Operate utilities and conserve energy.

## III. DETERMINANTS OF A MAINTENANCE ORGANIZATION

The maintenance organization's structure is determined after planning the maintenance capacity. The maintenance capacity is heavily influenced by the level of centralization or decentralization adopted. In this section the main issues that must be addressed when forming the maintenance organization's structure are presented. The issues are: capacity planning, centralization vs. decentralization and in-house vs. outsourcing.

### a. Maintenance Organizing and Planning

Maintenance capacity planning determines the required resources for maintenance including the required crafts, administration, equipment, tools and space to execute the maintenance load efficiently and meet the objectives of the maintenance department. Critical aspects of maintenance capacity are the numbers and skills of craftsmen required to execute the maintenance load. It is difficult to determine the exact number of various types of craftsmen, since the maintenance load is uncertain. Therefore accurate forecasts for the future maintenance work demand are essential for determining the maintenance capacity. In order to have better utilization of manpower, organizations tend to reduce the number of available craftsmen below their expected need. This is likely to result in a backlog of uncompleted maintenance work. This backlog can also be cleared when the maintenance load is less than the capacity. Making long run estimations is one of the areas in maintenance capacity planning that is both critical and not well developed in practice.

### b. Centralization vs. Decentralization

The decision to organize maintenance in a centralized, decentralized or a hybrid form depends to a greater extent on the organization is philosophy, maintenance load, size of the plant and skills of craftsmen. The advantages of centralization are:

- i. Provides more flexibility and improves utilization of resources such highly skilled crafts and special equipment and therefore results in more efficiency;
- ii. Allows more efficient line supervision;
- iii. Allows more effective on the job training; and
- iv. Permits the purchasing of modern equipment.

However it has the following disadvantages:

- i. Less utilization of crafts since more time is required for getting to and from jobs;
- ii. Supervision of crafts becomes more difficult and as such less maintenance control is achieved;
- iii. Less specialization on complex hardware is achieved since different persons work on the same hardware; and
- iv. More costs of transportation are incurred due to remoteness of some of the maintenance work.



In a decentralized maintenance organization, departments are assigned to specific areas or units. This tends to reduce the flexibility of the maintenance system as a whole. The range of skills available becomes reduced and manpower utilization is usually less efficient than in a centralized maintenance. In some cases a compromise solution that combines centralization and decentralization is better. This type of hybrid is called a cascade system. The cascade system organizes maintenance in areas and whatever exceeds the capacity of each area is challenged to a centralized unit. In this fashion the advantages of both systems may be reaped [4].

#### **c. In-house vs. Outsourcing**

At this level management considers the sources for building the maintenance capacity. The main sources or options available are in-house by direct hiring, outsourcing, or a combination of in-house and outsourcing. The criteria for selecting sources for building and maintaining maintenance capacity include strategic considerations, technological and economic factors. The following are criteria that can be employed to select among sources for maintenance capacity:

- i. Availability and dependability of the source on a long term basis;
- ii. Capability of the source to achieve the objectives set for maintenance by the organization and its ability to carry out the maintenance tasks;
- iii. Short term and long term costs;
- iv. Organizational secrecy in some cases may be subjected to leakage;
- v. Long term impact on maintenance personnel expertise; and
- vi. Special agreement by manufacturer or regulatory bodies that set certain specifications for maintenance and environmental emissions.

Examples of maintenance tasks which could be outsourced are:

1. Work for which the skill of specialists is required on a routine basis and which is readily available in the market on a competitive basis, e.g.,:
  - Installation and periodic inspection and repair of automatic fire sprinkler systems;
  - Inspection and repair of air conditioning systems;
  - Inspection and repair of heating systems; and
  - Inspection and repair of main frame computers etc.
2. When it is cheaper than recruiting your own staff and accessible at a short notice of time. The issues and criteria presented in the above section may help organizations in designing or re-designing their maintenance organization.

#### **d. The maintenance cooperation's development**

Nowadays, diversifying the equipments and techniques at play and the necessity of costs minimizing doesn't allow a company to be endowed with all the maintenance means in order to face all the needs. In consequence, it must be appealed to cooperation in all the cases which are justified from the economic point of view. This cooperation's development needs [5]:

- defining everything that must be executed through cooperation and the means in which this cooperation is executed, meaning defining a cooperation policy;
- establishing some specifications or specification conditions, general and specific to each activity achieved through cooperation;
- achieving a central coordination and a cooperation control, the assistance in informatics proving itself very useful in this domain;
- creating a department capable to be given the task of maintenance cooperation or to assist the persons who are responsible with the maintenance in choosing and estimating their partners, in the commercial negotiations and in controlling the cooperation operations [6].

### **IV. DESIGN OF MAINTENANCE ORGANIZATION**

A maintenance organization is subjected to frequent changes due to uncertainty and desire for excellence in maintenance. Maintenance and plant managers are always swinging from supporters of centralized maintenance to decentralized ones, and back again. The result of this frequent change is the creation of responsibility channels and direction of the new organization's accomplishments vs. the accomplishments of the former structure. So, the craftsmen have to adjust to the new roles. To establish a maintenance organization an objective method that caters for factors that influence the effectiveness of the organization is needed. Competencies and continuous improvement should be the driving considerations behind an organization's design and re-design.

### **V. CONCLUSION**

Maintenance management has rapidly grown into a very complex undertaking as technologies, competition, and product characteristics evolve. The practical vision of the set of activities composing each management block, and the result of the paper is a classification of the different maintenance engineering tools. The discussion of the different tools can also classify them as qualitative or quantitative. At the same time, some tools will be very analytical tools while others will be highly empirical. The paper also discusses the proper use of each tool or technique

according to the volume of data/information available [7].

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