



## **Maintenance Management Audits**

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## Maintenance Management Audits

### Introduction

Management audits provide a framework for organizations to systematically review, analyze, and recommend improvements in performance. The results of a management audit are a work plan that specifies the areas that need improvement, the appropriate corrective actions, and procedures for monitoring the outcome of these corrective actions. The functions to be reviewed include the more difficult areas of service that require standards of measurement different from those of traditional manufacturing operations. Using a logical format that systematically structures the process enables senior management to select and analyze a variety of different functional areas for analysis and improvement.

The management audit described in this article is developed from *Maintenance Management Audit: A Step By Step Workbook To Better Your Facility's Bottom Line* (published by R.S. Means, Boston, 1991). The workbook approach is a review activity to assist an organization both in appraising the effectiveness of its facilities operations and improving them in a systematic manner. The audit should be applied as a constructive process, one that encourages managers to engage in self-evaluations of their organizations as the review is conducted.

The first step in the maintenance management audit is a systematic review and evaluation of existing procedures, practices, and supporting documentation through the Preliminary Program review. This process familiarizes the person or persons conducting the audit and review with the maintenance management organization and operation in preparation for compiling the Effectiveness Rating. It also provides early insights into possible problem areas.

The second step in the Audit, the Effectiveness Rating, provides a measure for comparing the organization's maintenance management productivity to accepted standards. With this stage completed, recommendations for a formal improvement Action Plan can be developed, including specific actions, goals, and timetables.

The process can be repeated periodically and comparison made against the baseline of the initial study to measure the effectiveness of improvement actions taken.

### Improving Productivity

Improving productivity in maintenance management is becoming an important challenge to facilities managers. Although this might be considered a routine goal, changing financial conditions and demands to restrain expenditures are forcing facilities managers to examine maintenance management even more closely for opportunities to increase productivity.

Typical operations and maintenance activities can account for 5 to 15 percent of the total expenditures of an organization. Management has the responsibility to ensure that the resources made available to maintenance management functions are being employed in the most effective manner possible. A thorough audit of maintenance management functions can provide opportunities for improved program effectiveness, including:

- increased levels of service quality and performance
- guidelines for organizational restructuring
- introduction of management information systems to assist in meeting productivity and effectiveness goals
- better use of resources due to program improvements

This audit approach provides techniques for reviewing the key elements in a maintenance management program to improve overall effectiveness. There are two stages in the process. The first involves assembling and evaluating background material in a Preliminary Program Review. With this preparation phase completed, the second stage is to develop an Effectiveness Rating to determine a maintenance organization's relative overall effectiveness. This rating can also correlate with the actual productivity level of the organization and provides a benchmark that can be compared to generally accepted productivity targets. The Effectiveness Rating process also lets management know where to focus its efforts for the most significant improvements. Future evaluations can then measure the effectiveness of any changes in management practices, as compared to the status shown in the baseline survey.

### **Purpose**

The purpose of a maintenance management audit is to ensure that management is carrying out its mission, meeting its goals and objectives, following proper procedures, and managing resources effectively and efficiently.

Preliminary suggestions for conducting a management audit are:

- the audit should assess the right things. It must appraise performance in light of sound management principles. Objectives and scope must be clearly defined to ensure a constructive appraisal of an operation's effectiveness.
- the audit should include the participation of the department being reviewed.
- the audit should be objective and constructive. Every effort should be made to ensure that all review participants maintain independent, constructive perspectives.
- the evaluation should be understandable and acceptable. Any management technique or program that people do not understand and accept is likely to be ineffective.

An audit of a specific functional service area, such as maintenance management, focuses on efficiency of operations. In contrast to the more traditional measurement of manufacturing productivity, where units of labor and material can be compared to costs and rates of production, factors must be identified that can lead to improvements in both cost efficiencies and levels and quality of service.

The format is designed to answer the critical question: How well are we protecting our investment in facilities? The maintenance management audit and review process answers that question by providing an appraisal of the organization's maintenance management system. The results offer management the opportunity to seek improvements for increased efficiency and more effective utilization of available resources. The audit is designed to meet the ends of all organizations that have a maintenance component by utilizing common factors to evaluate performance.

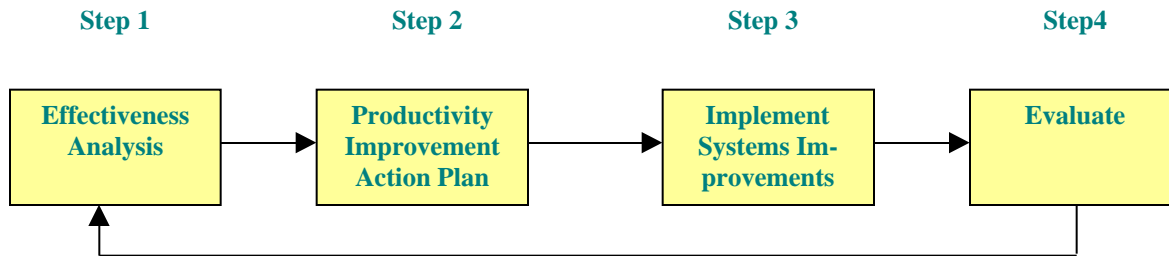
## The Maintenance Management Review Process

The review process is designed to evaluate the effectiveness of an existing maintenance management program. By assessing each of the key elements, one can obtain an overview of program effectiveness. This overview provides:

- a program effectiveness rating
- identification of areas for potential improvement
- a broad indication of potential productivity gains

The overall review process, together with a complete action program, is illustrated in Figure 1. Note that some or all of the review process may require the assistance of consultants, depending on the size of the facility, the schedule, and the resources available for completing the process. Consultants may be preferred in cases where objectivity is a concern of senior management or where staff is unavailable to complete part or all of the audit process.

**Figure 1**  
**Maintenance Management Review Process**



If an outside consultant is to be used, the facility manager should seek a firm that specializes in facilities management consulting. A design-oriented architecture / engineering firm is clearly not appropriate for this type of study. In any event, the facility manager should require several recent references of similar studies. The manager should obtain direct feedback about the personnel, the quality of work, and the client's overall satisfaction with the firm.

The first step of the maintenance management review process is the maintenance management effectiveness analysis, which is designed to improve productivity. This analysis is a procedure to develop the following understanding of the maintenance organization:

- How is it organized?
- How does it function?
- How effective is its operation?

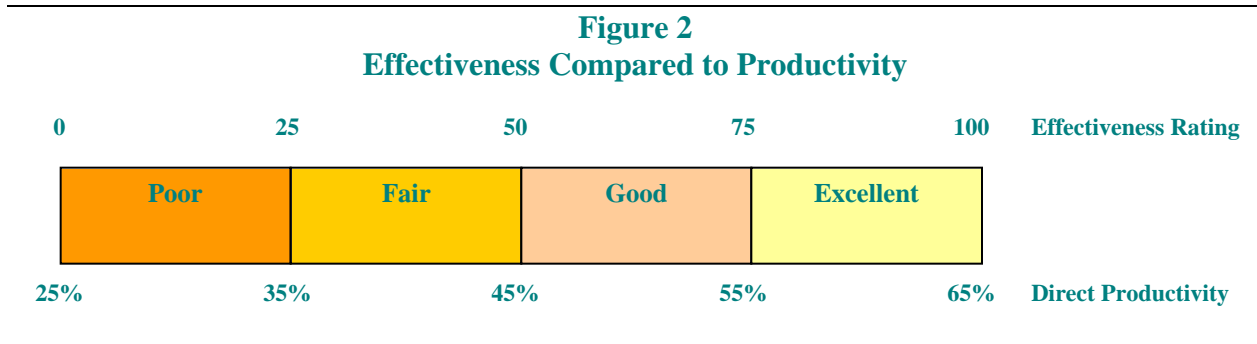
The effectiveness analysis procedure includes a numerical rating system to identify and measure each of the key elements. The subtotal of these key elements and the total of the Effectiveness Rating provide a subjective quantification of overall program effectiveness.

A maintenance management program that has all of these components fully implemented will achieve an excellent rating. Experience has shown that there is a close correlation between

overall program effectiveness and direct productivity as illustrated in Figure 2. Higher system effectiveness means higher productivity.

Industry sources (the Department of Defense, college and university publications) put maximum productivity at 65%. It follows that maximum Program effectiveness would be 100% (if maximum productivity obtainable is indeed 65%).

Conversely, even a poorly run program (i.e., one that is 0% effective) produces productivity figures at a minimum of 25% approximately. The illustration in Figure 2 uses 25% increments of the Effectiveness scale and assigns break points for the ratings of *poor*, *fair*, *good*, and *excellent*.



A review of productivity studies shows that a typical or average facility organization has productivity ratings of 38% to 48% (with an overall average of 43%) This range defines typical conditions. Above the range of 48% to 55% is set at *excellent*. At the lower end of the spectrum, most poorly run organizations have studies that record 30% to 40% as the most frequently occurring range observed. Therefore, 35% was set as the break point between *poor* and *fair*.

### Phase Descriptions

The basic phases, steps, and functional assignments in the management audit process are described below. There can be many variations on the central framework, depending on the organization's size, management style, and organizational structure. Formal, coordinated steps might be necessary for larger organizations.

#### Phase I Establish Priorities and Establish Schedule

1. Prepare a draft review schedule and nominate activities to be reviewed; suggest priorities and review time frames.
2. Set priorities among areas to be reviewed; issue schedule.
3. Senior managers of the organization should develop a steering committee and determine priorities for departmental reviews. Priorities should determine whether or not to review all functional components or to target selected components. A review of the effectiveness and efficiency of the targeted components can ultimately result in cost benefits or improved service by applying the management audit process.

#### Phase II Define and Organize the Audit

1. Review functional areas and procedures pertinent to the functional areas; identify potential audit team members.

2. Establish coordination with department manager(s); discuss the purpose of the audit and potential audit team members — the participants and the timing.
3. Prepare and send questionnaires to department manager(s).
4. Assemble data about the audit area.
5. Prepare preliminary statement of the scope of the audit:
  - Identify the limits of the audit
  - Prepare a statement of the objectives.
6. Establish a work plan for the audit:
  - Review possible methods of analysis and data collection
  - Identify criteria to be used in evaluating unit performance
  - Determine necessary coordinating procedures
  - Identify audit tasks
  - Estimate resources needed to conduct the audit
  - Estimate time requirements to perform the audit.

### **Phase III Form the Audit Team**

1. Select members of the audit team and arrange with department heads for members' participation.
2. Familiarize the audit team with functional areas and style of work.
3. Confirm and adopt statement of scope of audit.
4. Confirm work plan with department manager(s).
5. Discuss methods and procedures with the audit team.
6. Prepare detailed task plans using functional area outline and orientation materials previously assembled by staff.
7. Assign specific tasks to team members.

### **Phase IV Perform the Audit**

1. Collect data review policies and procedures, conduct interviews with unit staff, utilize opinion poll questionnaires, review budget documents. Use Guideline Checklists to identify the types of data to be collected.
2. Organize and analyze: this includes tabulating survey information, summarizing, and organizing interview data, and then reporting the data.
3. Identify organizational, process, and service problems.

### **Phase V Prepare the Report**

1. Formulate recommendations of alternative approaches to operations and organizations to assist management in solving identified problems.
2. Determine report format and content.
3. Assign drafting responsibilities; prepare draft of the report.
4. Discuss, evaluate, and revise the draft report.
5. Discuss the draft report with department manager(s).
6. Prepare a final report and present it to the steering committee.
7. Review, approve, and distribute the final report.

### Phase VI Management Action

1. Submit a plan of action responding to audit team recommendations.
2. Assess audit team report and action plan from department manager(s); discuss with department manager(s) and supervisor, if necessary.
3. Evaluate and approve recommendations to be carried out by department manager(s).
4. Obtain agreement and support from department manager(s) and supervisor on action plan items.

### Phase VIII Final Follow-up of Results

1. Monitor the implementation process.
2. Submit a progress report on implementation to the steering committee.
3. Critique review activity and results (include evaluation of project methodology, suggestions for changes in procedures, etc.).
4. Submit closing report to steering committee and chief executive officer.

### Key Components and Elements of Maintenance Management

To assess a maintenance management program, one should look at four factors that provide an overall indication of program effectiveness:

1. **Productivity** — the portion of a worker's time that is directly productive; how a worker's time is spent.
2. **Performance** — how well the individual is working, i.e., is work being completed as planned; how efficiently a worker's time is spent.
3. **Work Quality** — are they producing a satisfactory work product; how well the work is performed.
4. **Priority** — effective allocation of available time to the most important tasks; the most important tasks are being accomplished

As a general rule, the better the maintenance management system is designed and utilized, the more these four factors will be enhanced. The four factors indicating efficiency and effectiveness — *productivity*, *performance*, *work quality*, and *priority* — overlap in many areas of the maintenance organization. An analysis of how maintenance is managed and performed uses five basic components to evaluate the effectiveness of a maintenance management program. These components are further subdivided into *key elements*.

The five basic components and key elements are listed in Figure 3. Alternative groupings and factors can be developed for special applications. For example, a maintenance management organization may share some functions with other departments, such as purchasing, inventory control, or management information systems. Some organizations may operate under organizational structures that consolidate portions of workload identification and work planning into a single function. The audit manager should become familiar with the structure of the basic components and key elements and determine whether they are appropriate for use as presented or need to be adapted for their own unique conditions. However, variations on the forms, processes, and procedures should only be undertaken after becoming familiar with the audit process, after several iterations.

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**Figure 3**  
**Basic Components and Key Elements of the Maintenance Management Audit**

- A. ORGANIZATION**
1. Organization structure
  2. Policies, rules, services
  3. Work control functions
  4. Work control center (staffing)
  5. Shop organization
  6. Shop supervision & planning (functions)
- B. WORKLOAD IDENTIFICATION**
1. Facilities inventory
  2. Facility condition inspection
  3. Work request procedure
  4. Equipment inventory
  5. Preventive maintenance
  6. Service work
  7. Routine, recurring work
  8. Work requirements documentation
- C. WORK PLANNING**
1. Priority criteria
  2. Work classification
  3. Alterations & improvement work
  4. Work order preparation
  5. Budget requirements for M & R
  6. Backlog deferred maintenance
  7. Budget execution plan
  8. Backlog of funded work
- D. WORK ACCOMPLISHMENT**
1. Shop scheduling & planning
  2. Craft and material availability
  3. Training program
  4. Shop spaces, tools, equipment
  5. Storeroom operation
  6. Transportation
  7. Supervisory practices
  8. Use of contracts
- E. APPRAISAL**
1. Management information system
  2. Performance measurement
  3. Productivity measurement
  4. Variance reviews
  5. Facility history records
  6. Equipment history records
  7. Trend data
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## Conclusions

The maintenance management audit process described in this article is designed to identify the tasks of a facilities organization seeking to improve effectiveness and efficiency. The growth of these organizations in size, variety of services, and extent of operations has made it increasingly important to audit management methods and performance on a regular basis.

The process outlined in *Maintenance Management Audit: A Step By Step Workbook To Better Your Facility's Bottom Line* (published by R.S. Means, Boston, 1991) can serve in two capacities. First, it provides a documented, step-by-step method of conducting a large-scale audit of a facilities management organization. Second, the process can be started in Phase III, and be used as a preliminary phase of a detailed audit, providing direction by identifying areas that merit the most intensive investigation. Either way, the audit process defines checklists of facilities maintenance management performance and provides measures of effectiveness, setting up a baseline for future comparisons.