Maintenance-of-Way Project Management: Productivity Planning and Control

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ABSTRACT

Cost-effective track maintenance is closely related to and a direct result of a well thought-out plan with effective control procedures for ensuring the attainment of productivity goals and objectives. The application of basic management concepts, including planning, organizing, directing, and implementing, plays an important part in the success of a maintenance-of-way plan and its related management goals. Discussed in this paper are three essential elements of project planning (long-range or multiyear plan, financial evaluation, and line utility level) as well as establishment of production goals by using historical data. Attainment of these goals can only be accomplished through a well-informed project manager having the authority, responsibility, and accountability for crew performance. Specific management activities are discussed.

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MANAGEMENT CONCEPT

Maintenance-of-way project management includes a wide variety of track-work activity ranging from major track rehabilitation to daily maintenance and inspections. Planning, organizing, directing, and implementing these projects is the responsibility of the engineering line manager in order to ensure their timely completion in accordance with the prescribed quality standards, safe work procedures, and budgetary authorization. It is important to remember that the successful accomplishment of performance objectives and results as part of the planning and organizing functions necessitates the assignment of appropriate management authority, responsibility, and accountability.

As has been indicated, maintenance-of-way planning includes a wide spectrum of activity; however, the management concepts are essentially the same. For this purpose, the planning of projects for rail, tie, and ballast replacement will be used as examples of an effective approach for both planning and control procedures.

PROJECT PLANNING

Track-maintenance project planning involves three essential elements that are to be considered in the development of an annual program:

- Long-range or multiyear plan
- Financial evaluation
- Line utility level

Long-range or multiyear rail, tie, and ballast replacement programs are a function of the corporate goals and related strategic plan of the company. As is often the case, long-range programs must be continually revised and updated; however, they provide an important threshold for the development of annual programs, related priorities, project plans, and productivity goals. The corporate strategy and goal must be clearly stated to ensure that there is a consistent and compatible long-range plan.

The financial evaluation of the plan will determine whether the multiyear schedule can be sustained or whether modifications are needed to meet annual corporate financial goals. Projected revenues provide the initial benchmark in the financial analysis, with the following factors essential in developing the annual plan:

- Maintenance-of-way ratio
- Gross-ton-mileage maintenance ratio
- Capital funding
- Cost-benefit analysis

The maintenance-of-way ratio, that is, the ratio of maintenance-of-way expense to railway revenue, is a key factor in the attainment of corporate financial goals and therefore an important yardstick in the measurement of the Engineering Department's performance. Expenses must be adjusted in a manner consistent with revenue income to ensure having the prescribed proportionate relationship between transportation and maintenance-of-way activity.

The ratio of maintenance man-hours to operating gross ton mileage is also used as a management control in the definition of the annual plan. Unlike the maintenance-of-way ratio, which is keyed to expense and revenue dollars, the gross-ton-mile maintenance ratio incorporates constant units and a direct comparison of maintenance versus transportation activity.

The availability of cash to be allocated for the funding of capital projects such as rail, tie, and ballast replacement is perhaps the most important

factor in establishing the extent of each year's program. With the recent changes in railroad accounting procedures under the new depreciation accounting (DA), these projects are now driven almost entirely by the availability of cash rather than their effect on operating expense, as was the case under the historic retirement-replacement-betterment accounting (RRB).

Finally, each project must be analyzed as to its cost-benefit relationship in order to prioritize projects from the financial viewpoint, taking into account specific track-maintenance concerns such as subgrade instability, tie condition, rail defect rates, speed restrictions, and cycle maintenance requirements.

Track maintenance and rehabilitation must be planned on the basis of that work necessary to safely and efficiently meet the level of service to which the line is subjected. The related utility level of the line includes the following basic elements:

- Maximum authorized operating speed
- Allowable speed restrictions
- Traffic density (present and projected levels)
- Hazardous material density

PRODUCTION GOALS

The initial step in determining production goals is in the development of historical performance data. Production goals can then be realistically established to form the basis for the management budget plan, cost estimation, and productivity criteria. Obviously, production goals will vary from one system to another, depending principally on crew organization, equipment availability, track time, and so forth, to the extent that goals are somewhat unique to each individual railroad.

Typical productivity goals used to measure crew performance include man-hours per mile for rail and ballast projects, man-hours per tie for tie replacement crews, and miles per day for production tampers. Control parameters including variables such as available track time, weather delays, overtime, and machine downtime must be taken into account when establishing these goals to ensure that there is a consistent performance measure. Quality control requirements must be consistent throughout.

Overall performance goals, that is, departmental productivity, include the maintenance-of-way ratio and the ratio of maintenance man-hours to gross ton mileage. As previously noted, these ratios serve as a basis for the development of the annual project plan as well as performance indicators necessary to ensure adherence to that plan.

PROJECT CONTROL

The attainment of productivity goals can only be accomplished through a well-informed project manager having the authority, responsibility, and accountability for crew performance. The first line supervisor must have a clear understanding as to the crew organization, production goals, and control parameters in order to effectively manage the project.

Daily crew reporting, typically through call-in reports, is required and must include all pertinent production data. This information is furnished to the project manager, division engineer, and chief engineer. The daily crew production report should include the following data:

- Location and milepost working limits
- Units of work (e.g., number of ties installed, lineal feet of rail replaced)
- Number of men who worked, including foremen, assistant foremen, machine operators, helpers, and laborers
- Total man-hours, including straight time and overtime
- Total crew hours, including on-track time, travel time, train delays, weather delays, and equipment breakdowns
- Delays to trains

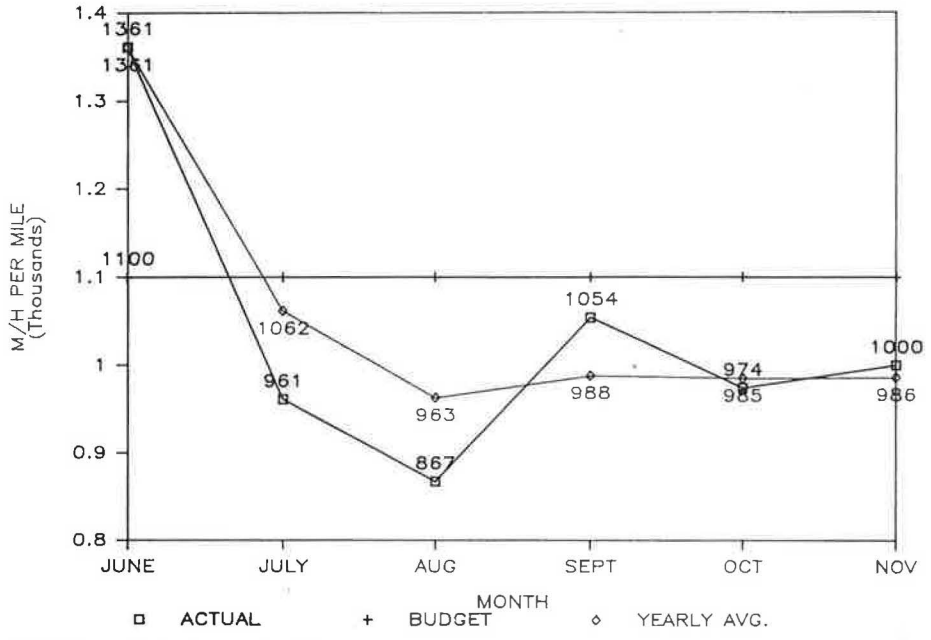

FIGURE 1 Rail relay productivity.

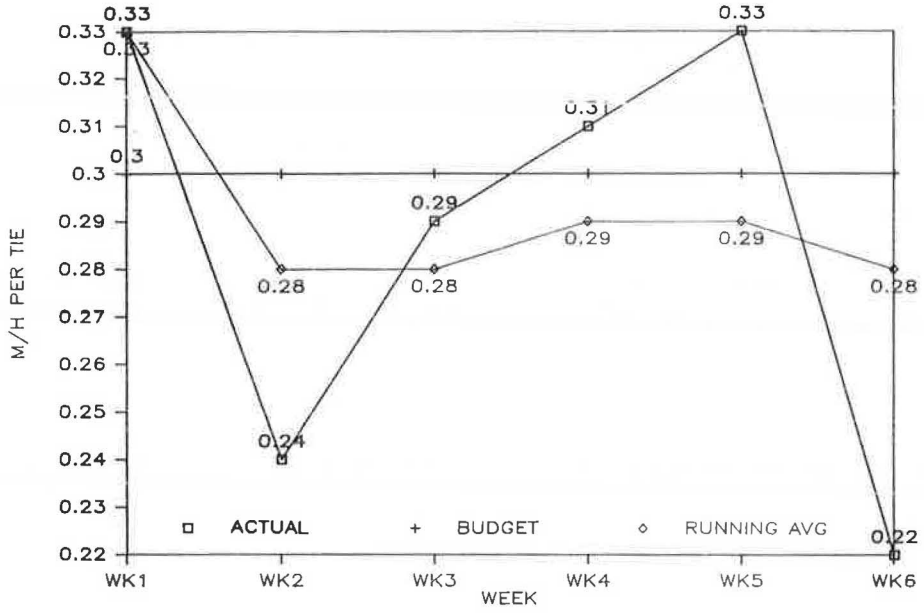

FIGURE 2 Tie gang productivity.

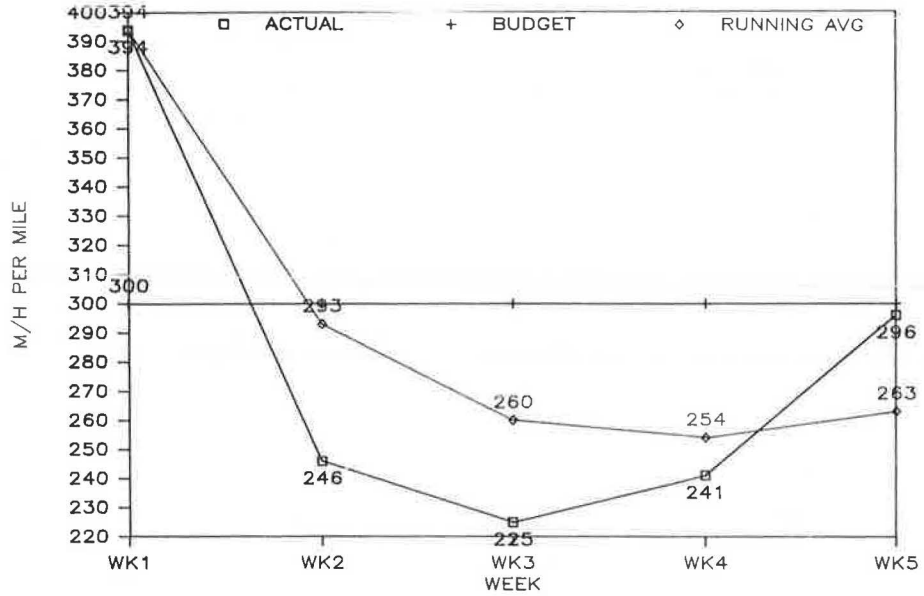

FIGURE 3 Ballast gang productivity.

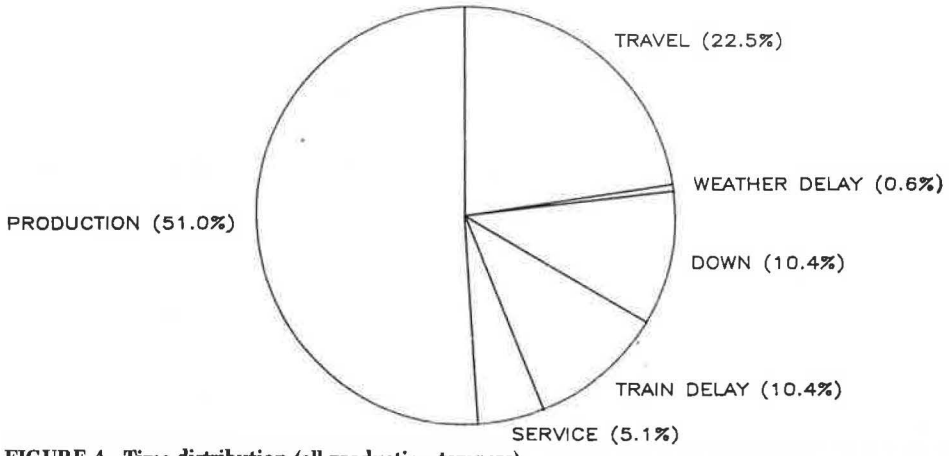

FIGURE 4 Time distribution (all production tampers).

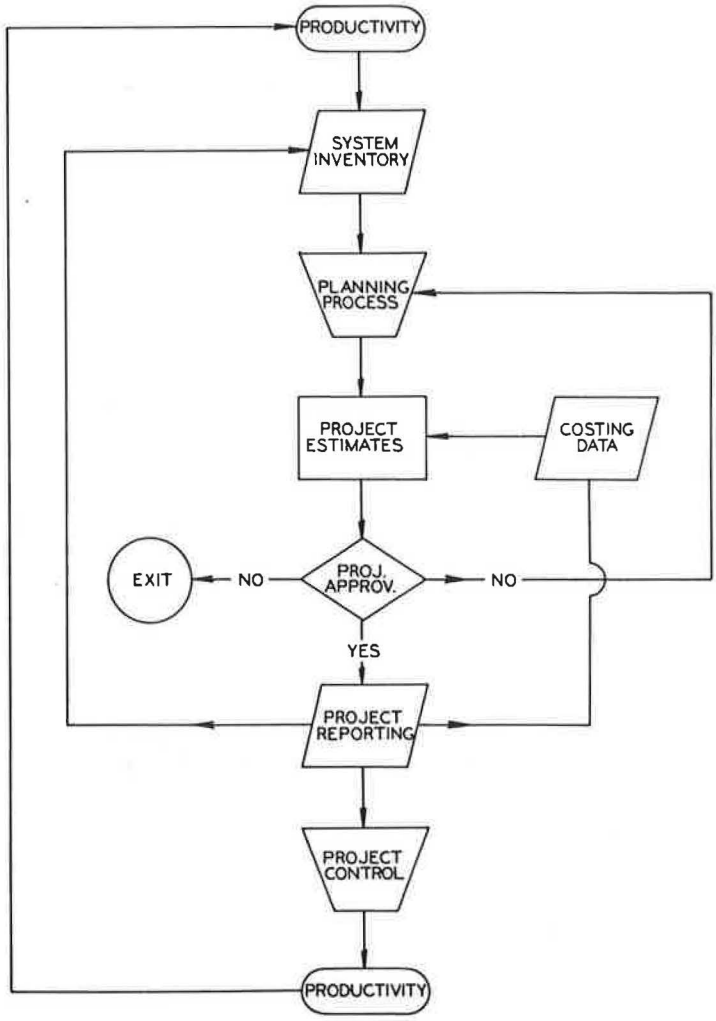

FIGURE 5 Project planning and productivity.

The project manager's action plan, that is, the procedures to be followed in taking daily corrective action following substandard crew performance, must be clearly understood by all concerned to ensure prompt, responsive results. Both intra- and interdepartmental contacts should be made directly with those individuals having both the authority and responsibility to take corrective action, thereby avoiding prolonged and costly delays. Specifically, the manager must know who, where, and when to call for help.

Computer processing of the crew production data and the preparation of weekly reports provide updated productivity and project status. Typical summary reports utilizing computer graphics include the following: rail relay productivity (Figure 1), tie gang productivity (Figure 2), ballast gang productivity (Figure 3), and time distribution summary of all production tampers (Figure 4).

SUMMARY

Establishing basic corporate goals and objectives provides the initial framework for both long- and short-term engineering project planning. Productivity and performance criteria become key factors in the subsequent project plan and related control mechanism. This logic sequence is shown in Figure 5, which indicates the flow through of productivity data used in the planning and control process. As with basic engineering design techniques, keeping the plan simple yet effective will avoid complex sophistication and potential analytic isolation.