


Project Management: Enhancing Company Resource Efficiency and Effectiveness

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Article Info	ABSTRACT
<p>Keywords: Project Management, Efficiency Enhancement, Resource Allocation, Conceptual Analysis, Company Effectiveness</p>	<p>Project management represents a strategic endeavor aimed at enhancing the efficiency and effectiveness of a company. As technology evolves, it becomes imperative for companies to adapt to the significant changes occurring in the business landscape. This study seeks to provide a comprehensive conceptual explanation of project management. Conducted as a literature review, this paper analyzes various sources from journals, books, and websites that delve into the conceptual aspects of project management. Data collection for this paper is primarily based on documentation, including articles and books, and employs content analysis to analyze descriptive literature data or scientifically analyze premises conveyed. The data analysis methods employed are deductive, inductive, and comparative in nature. The key findings of this study indicate that project activities are temporary endeavors with defined resource allocations, aimed at accomplishing predetermined tasks within a specified timeframe. Project management entails planning, organizing, leading, and controlling company resources to achieve short-term objectives. While this paper shares similarities with others in discussing project management conceptually, it distinguishes itself by providing accompanying methodologies geared towards enhancing the efficiency and effectiveness of company resources in project management</p>
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INTRODUCTION

The modernization efforts undertaken by nearly all developing countries, including Indonesia in the Asian region, demand accelerated development in the twenty-first century with a paradigm shift towards sustainable and humane environmental development. Globalization experienced by the international community since the early 1990s, especially after the collapse of the Soviet Union, has had a tremendous impact on all aspects of global society, particularly in economics and information technology. This has led to international communication exchanges that influence economic, social, and political aspects among rapidly developing countries, which are difficult to contain. The global impact has prompted the Republic of Indonesia government, through Bank Indonesia, to swiftly implement a tight monetary policy to control inflation rates. Additionally, the government aims to ensure that the economic growth momentum is not excessively compromised.

The proliferation of multinational projects, including international humanitarian projects such as the Aceh tsunami disaster in 2004, underscores how information technology has globalized, leaving no information development unnoticed on the international stage. Similarly, a nation's economic growth and the interests of its public projects unavoidably bear the impact of information technology globalization, which affects decision-making and policies. Therefore, the existence and performance of projects involving public interests are also influenced by the globally interconnected external environment.

Hence, the role of project management in aligning internal needs and external conditions becomes paramount. Project management, with its various management functions and activities, represents a collaboration of management science and art in achieving effective and efficient project performance. Project management enables the positioning of project existence and procurement in line with specific added values expected by stakeholders, including central and local governments, private entities, and the public. Given the significance of understanding project management, this paper aims to elucidate project management conceptually and comprehensively.

METHODS

This paper is a literature review conducted with a descriptive qualitative approach, aiming to describe or explain project management conceptually and its application in enhancing the efficiency and effectiveness of company resources. The research utilizes documentation as the method of data collection, incorporating various articles and books. Subsequently, the collected data is analyzed using content analysis, which involves examining descriptive literature data or scientifically analyzing premises conveyed in the literature. The data analysis methods employed include deductive, inductive, and comparative approaches.

RESULTS AND DISCUSSION

Definition of Project

A project is a series of specialized activities aimed at achieving specific results. The specificity of these results dictates that once the desired outcome is achieved, the project activities are concluded, and such activities are not continued in the short term. This means that a project is not a routine activity carried out continuously, but rather is limited to a certain period of time. For example, a project to replace old machinery with new machinery in a textile company (Maulidizen et al., 2019). This project is a specific activity that is very different from routine activities such as textile production and marketing. The project also has specific goals, and once these specific goals (such as replacing machinery) are achieved, all related project activities are completed. Similarly, a road network expansion project will end once the entire road network has been widened, and so on. Because a project is a series of activities aimed at achieving a specific outcome, it is important to define and establish it before it is organized and implemented (Asiyanto, 2003).

A project can be defined as a temporary activity that takes place within a limited time frame, with specific resource allocations and intended to accomplish clearly defined objectives. According to the Project Management Institute (PMI), a project is defined as "A temporary endeavor undertaken to create a unique product or service." This means that it is a temporary activity that can be undertaken to produce a unique product or service. Based on the two definitions above, the characteristics of a project can be identified as follows: (1) it has specific goals; (2) work standards and quality have been established; (3) it is temporary; (4) it is one-time and not routine (Asiyanto, 2003).

In addition to the term "project," we also encounter several concepts in everyday life that are considered synonymous with a project. These terms include programs, tasks, and work packages. To avoid confusion in using these terms, it is important to differentiate between these three terms, which are essentially different. A program consists of several projects. Projects can be broken down into several tasks (Maulidizen, 2022a). The difference between a Program and a Project can be clearly seen. A Program is broader than a project and usually consists of more than one project. Programs operationalize public policies to address public problems. A Project is a set of operational activities to achieve specific program objectives. Tasks can be grouped and assigned to specific individuals with the term task package. Activities in an organization are divided into operational and administrative activities. Although they have different orientations, these two activities complement each other. Operational activities are oriented towards achieving direct profits, while administrative activities are limited to providing information for the smooth operation of operational activities. Project activities are part of the operational activities of an organization (Nurullita et al., 2022).

Table 1: Comparison between Project Activities and Operational Activities

Aspects	Project Activities	Operational Activities
Dynamic and non-routine	Dynamic and not routine	Repeated and routine
Activity cycle	Relatively short	Long term
Intensity of activities	Fluctuating	Relatively long
Budget and schedule constraints	Tight	Not as sharp as project activities
Interdisciplinary	Exist	Limited
Resource requirements	Tend to change	Relatively constant

The uniqueness of project management lies in two aspects. Firstly, projects always interact with cost, time, and performance. In terms of budget, it means that project activities must be completed within the allocated budget. In terms of schedule, it means that projects must be completed on time (Maulidizen, 2022b). Regarding quality, it means that the quality of work must meet the predetermined performance standards. These three components can interact to form unique combinations. For example, if a project is completed late from the agreed schedule, it may result in increased costs, but the quality of work may be better, and so on. Secondly, borrowing and integrating functional resources from departments within the organization have the potential to cause conflicts. These

conflicts arise because personnel within the organization sometimes prioritize project work over routine organizational tasks (Muchtar et al., 2022). This is especially true when projects utilize resources across different organizational units. Naturally, the primary tasks requiring their expertise may be disrupted. Moreover, if someone frequently receives projects, it may cause envy among staff. When this happens, conflicts can arise, subsequently affecting organizational productivity (Maulidizen, 2019).

Project Management

After understanding the definition and concept of management, as well as comprehending the definition of a project, it is essential to grasp the concept of project management. Project management refers to the management applied to a project to achieve a specific outcome. It involves the planning, organizing, directing, coordinating, and controlling of people and resources to achieve the objectives of a project (Salfadila et al., 2022).

With this understanding, it is evident that all management functions must be utilized to effectively manage a project to ensure the desired goals are achieved smoothly. This is because project management inherently involves all three management elements: (1) a specific goal to be achieved (the purpose of the project); (2) a process of activities to achieve that specific goal; (3) the involvement of people in the process of these activities. Therefore, effective project management requires proper project planning, organizing, directing, coordinating, and controlling to ensure project objectives are met (Maulidizen et al., 2022). Project management is the application of management principles in managing a project. In the concept of management, it is assumed that management resources are very limited. Generally, management resources consist of materials, human resources, financial capital, work methods, markets, and so on. Despite the constraints of these resources, they can be efficiently utilized through management principles. These management principles can be used to achieve project goals effectively and efficiently (Yolanda et al., 2022).

In project management, identifying various issues and addressing them carefully is essential to ensure that the project output aligns with the planned goals and objectives. Some key issues in project management that require careful handling include: (a) finances, (b) budgeting, (c) human resource management, (d) production management, (e) pricing, (f) effectiveness and efficiency, (g) marketing, (h) quality, and (i) time. Time-related issues can result in cost overruns if the project execution is slower than planned, and conversely, can be advantageous if accelerated.

According to Nicholas, there are three key elements in project management: (1) Project Manager: The project manager is responsible for planning, directing, and integrating the work efforts of team members to achieve project goals (Winanto et al., 2022). The project manager coordinates efforts across functional areas and integrates planning and control of costs, schedules, and task assignments in a project. (2) Project Team: The project team comprises individuals from different functional areas working together to accomplish project tasks, and (3) Project Management System: The project manager and project team should operate within a project management system. This system is built on organizational structure, information processes, and training and procedures that integrate elements of

the project organization vertically and horizontally. Vertical elements include task breakdowns in the project, while horizontal elements involve functional units and departments involved in the project (Dimiyati & Nutjaman, 2014).

Kerzner provides a definition of project management as planning, organizing, leading, and controlling company resources to achieve predetermined short-term goals. Furthermore, project management employs both vertical and horizontal systemic and hierarchical approaches. Based on the definition above, the concept of project management encompasses several aspects. Firstly, it involves utilizing management principles with the support of company resources. Secondly, it aims to achieve predetermined short-term goals. Thirdly, it adopts a systemic approach. Lastly, it involves both vertical and horizontal flow of activities (Kerzner, 2006).

Project management is an activity that has a concept from start to finish. Because project management is always viewed as having a finite end, its focus is on completing the scheduled activities. The goal of project management is to complete the project before or on time, within or below budget, and with specific performance exceptions. Project management activities can be referred to as program management, product management, and construction management within a broader relational context. Each factor fundamentally relates to the success of project management. Collectively, they represent the characteristics of project management: completeness of project resource allocation costs in project management and completeness of project schedules.

Project Life Cycle

The project life cycle is a method used to depict how a project is planned, controlled, and monitored from the time it is agreed upon to be executed until the final project objectives are achieved. There are several main stages of activities carried out in the project life cycle:

a. Initiation Phase

The project initiation phase is the initial stage of project activities from the time a project is agreed upon to be executed. During this phase, the issues to be addressed are identified. Several alternative solutions to address the issues are also defined. Feasibility studies may be conducted to select a solution with the highest likelihood of being recommended as the best solution to solve the problem. Once a solution is identified, a project manager is appointed, and the project team is formed.

b. Planning Phase

Once the project scope is defined, and the project team is formed, the project activities enter the planning phase. During this phase, detailed planning documents are prepared as guidelines for the project team throughout the project activities. Activities during this phase include creating project plan documentation, resource planning, financial planning, risk planning, acceptance planning, communication planning, procurement planning, supplier contract, and performing phase reviews.

c. Execution Phase (Project Implementation)

With a clear and detailed project definition, project activities are ready to enter the execution or project implementation phase. During this phase, project deliverables or objectives will be physically built. All activities documented in the project plan will be executed. While the development activities are ongoing, several management processes need to be performed to monitor and control the completion of deliverables as the project's final outcome.

d. Closing Phase

This phase marks the end of project activities. During this phase, the final project deliverables, along with their documentation, are handed over to the customer, contacts with suppliers are terminated, the project team is disbanded, and reports are provided to all stakeholders, stating that the project activities have been completed. The final step in this phase is to conduct a post-implementation review to assess the project's success level and document any lessons learned during the project activities as insights for future projects.

e. Project Organization

This stage is a project's stage before it is then closed (completed). However, not all projects will go through every stage, meaning that a project may be terminated before reaching completion. Some projects do not follow structured planning or monitoring processes. Some projects will go through steps 2, 3, and 4 multiple times.

Planning and Project Control.

Planning a project requires that the project objectives be clearly stated so that the manager and their team understand what is desired. Project planning is intended to bridge the gap between the goals to be achieved and the initial conditions (Widajanti, 2014). Project scheduling involves sequencing and allocating time for all project activities. In scheduling, people, money, and materials are linked to specific activities and each activity is linked to others (Herjanto, 2007).

Scheduling is a phase that translates planning into diagrams that fit the time scale. Scheduling determines when activities start, are delayed, and are completed. Project scheduling includes sequencing and allocating time for all project activities. During this phase, managers decide how long each activity will take to complete and calculate how many people are needed for each production stage (Heizer & Render, 2004). One method of scheduling work for a specific project is to use Gantt diagrams (Gantt Charts) named after its inventor, Henry Gantt. The Gantt Chart depicts estimated time for each task in the production process (Syafaat, 2019).

When used in resource loading, Gantt diagrams show loading time and idle time. Gantt Charts are planning diagrams used for resource scheduling and time allocation. Gantt Charts are an example of a non-mathematical technique widely used and popular among managers because they are simple and easy to read. The characteristics of a Gantt Chart are as follows: (1) Gantt charts are widely known as a fundamental tool and easily applied by project managers to allow one to easily see the start and end times of tasks and sub-tasks of the project; (2) The more tasks in the project and the more important the sequence between tasks, the greater the tendency and desire to modify the Gantt chart; and (3) Gantt

charts help answer questions when looking for opportunities to make changes early to meet needs.

Time Variables in PERT and CPM

One method used in project management is the PERT method (Program Evaluation and Review Technique), which is a project management technique that uses three time estimates for each activity. PERT was developed in 1958 by Booz, Allen, and Hamilton for the United States Navy. PERT aims to (as much as possible) reduce delays in activities (projects, production, and engineering) as well as obstacles and differences, coordinate and align various parts as a whole, and accelerate project completion (Nurhayati, 2010).

In PERT, the emphasis is on obtaining the best time frame (toward greater accuracy). PERT assumes that activity duration depends on many factors and variations, so it's better to provide range estimates using three estimated figures. PERT is used for planning, scheduling, and monitoring projects where completion time is not known exactly. The assumption used in PERT is that the duration of all activities is not dependent on each other. PERT is an analytical method designed to assist in scheduling and monitoring complex projects that require specific activities to be performed in a certain order.

PERT (Program Evaluation and Review Technique) was developed to address the uncertainty of activity durations. In PERT, three time estimates are used for each activity, and time determination can use time units such as hours, days, weeks, months, and years. The explanation of the three time estimates is (a) optimistic time, (b) pessimistic time, and (c) most likely time. PERT is a method for visually representing projects. PERT has two main components: arrows and nodes. Nodes, representing activities, are connected by arrows to previous and subsequent activities. After activities are plotted and connected, the project manager can then determine the critical path (Soeharto, 1999).

PERT is very useful for managing where several tasks simultaneously reduce redundancy. The technique used for project scheduling will vary depending on the project size, complexity, duration, personnel, and owner's needs. PERT analysis is used to obtain the lowest cost by accelerating activities as much as possible on the critical path. PERT is a model designed to analyze and characterize the tasks involved in completing a specific project. It is useful in analyzing the activities involved in completing a project, especially the time needed to complete each activity, and identifying the minimum time required to complete the entire project (Nurhayati, 2010).

PERT was primarily developed to simplify planning and scheduling for large and complex projects. PERT is used to combine uncertainty by making it possible to schedule projects temporarily without knowing the exact details and durations of all activities. Two key terms involved in PERT are PERT events and PERT activities. PERT events are points that mark the start or completion of one or more activities, where no time is consumed and no resources are used. When marking the completion of one or more tasks, it is not "achieved" until all activities leading to the event are completed. Meanwhile, PERT activities are the actual performance of time-consuming tasks that require resources, such as labor, materials, space, machines. PERT activities cannot be performed until their predecessor activities start. PERT has many advantages. For example, an engineering

construction project uses it to organize and measure project information and provides a graphical display of the project. This helps identify activities critical to project completion time and should be monitored without affecting project completion time.

The basis of the PERT approach includes: (a) conducting selections based on specifications and event identification, (b) event sequencing and establishing interdependencies between each event so that the project network can be developed, (c) estimating the time required to achieve an event, taking into account uncertainty, (d) planning for analysis and assessment to process data, and (e) establishing channels of information to obtain actual data and deviation data for assessment purposes (Nurhayati, 2010).

The Critical Path Method (CPM) is a critical path method developed in the 1950s to help managers schedule, monitor, and control large and complex projects. In CPM, there is also the term slack time, which is the time delay of an activity without changing the overall project duration (Arianie & Puspitasari, 2017)

The network created in CPM can be reflected as the basis for project scheduling. Project scheduling is commonly made in the form of a Gantt Chart. The similarities between PERT and CPM are that both measure project completion time and identify critical paths and slack. The differences between PERT and CPM are: (1) PERT is used for planning and controlling projects that have never been worked on before, while CPM is used to schedule and control activities that have been previously done, so data, time, and cost of each element of the activity are known by the evaluator, (2) PERT uses three types of time estimates: optimistic, most likely, and pessimistic. While CPM only has one type of time information, which is the most appropriate and feasible time to complete a project, (3) PERT emphasizes timeliness, while CPM emphasizes cost-effectiveness, and (4) PERT arrows indicate the sequence or relationship between activities. While CPM arrowheads indicate activities (Rani, 2016).

Determining Project Schedule

Planning is a process aimed at setting goals and providing the necessary resources to achieve them. It provides guidance for implementation in allocating resources to carry out activities. In the context of construction projects, there are several important steps in determining the project schedule:

a. Work Plan

Before commencing the construction project, the first step is to develop a work plan tailored to the construction method to be used. Some considerations to be taken into account in preparing the work plan include; (1) Identify potential obstacles that may arise during implementation; (2) Estimate the types and numbers of workers required; (3) Determine the type, quantity, and timing of material procurement needed; (4) Identify activities requiring equipment and ensure the type, capacity, and condition of equipment align with the activities; (5) Prepare the necessary working drawings for project implementation; and (6) Ensure the continuity of the project's activity plan (Erviyanto, 2002)

b. Project Scheduling

Scheduling serves two main functions: organization and control. In construction projects, project success is evaluated based on cost, quality, and time. Therefore, planning the implementation schedule is crucial. The scheduling process involves six stages; (1) Review and analyze contract documents to identify all activities to be performed; (2) Estimate the time required to complete each activity, considering the amount of work and productivity; (3) Determine the sequence of activities required for implementation; (4) Determine when each activity should start and finish; (5) Ensure the project schedule is reasonable and executable considering the available resources; and (6) Use the developed schedule to execute and monitor project implementation (Soeharto, 1999)

Cost-Time Trade-offs and Project Crashing

Project crashing, or expedited project completion, involves shortening the project duration. The total project duration is equal to the length of the critical path. Hence, crashing a project entails efforts to shorten the critical path in the project work plan network. The extent to which an activity can be shortened (the difference between normal time and crash time) depends on the activity; some activities may not be crashable at all (Kisworo et al., 2017).

Mahendra explains that there are two reasons for implementing a crashing program; (1) The project activity is expected to finish promptly because it has been decided and approved by management or project owners for specific reasons, and (2) Due to project implementation delays exceeding a certain tolerance limit, which is deemed by management or project owners to significantly affect the overall project completion time (Dimiyati & Nutjaman, 2014; Mahendra, 2004).

Key definitions necessary for further analysis of crashing include: (1) The time required to complete an activity or task with the available normal resources, without additional costs in a project; (2) The time required for a project in its efforts to shorten the duration, which is shorter than the normal duration; (3) The cost incurred by completing the project within the normal time frame; and (4) The cost incurred by completing the project within a shortened duration. The cost after crashing will be higher than the normal cost.

Expediting project completion involves an attempt to finish the project earlier than the normal completion time. This acceleration leads to a reduction in activity duration, which is achieved through crash programs. According to Soeharto, the maximum acceleration duration of an activity is the shortest duration to complete an activity that is technically feasible, assuming resources are not a constraint (Dimiyati & Nutjaman, 2014).

Gray & Larson outline several effective methods for expediting project completion (crashing): (Gray & Larson, 2007)

a. Adding Resources

The most common method is to assign additional staff and equipment to activities. However, the speed gained is still limited even with added staff. Doubling the workforce will not halve the project completion time unless tasks can be divided to minimize communication among workers.

b. Outsourcing Project Work

Subcontracting an activity is a common method to expedite project completion. Subcontractors may have access to superior skills or technology that can accelerate project completion.

c. Scheduling Overtime

The easiest way to add more labor to a project is not by adding more workers but by scheduling overtime. However, overtime has its drawbacks, including increased labor costs and decreased productivity due to human limitations.

d. Building Project Teams

Building specialized core teams is beneficial for completing a project faster than the established schedule. Assigning full-time professionals to a project avoids the hidden costs of multitasking, where individuals must fulfill requests from various projects.

e. Do It Twice-Fast and Right

If urgent, consider building short-term solutions and then returning to do it correctly. For example, the Rose Garden stadium in Portland, Oregon, was expected to be completed in time for the NBA season opener. Delays made this impossible, so the construction crew arranged a temporary venue to accommodate the opening night audience. The additional costs of doing so were often twice as high as compensating for missing the deadline.

CONCLUSION

Project activities can be defined as temporary endeavors that occur within a limited time frame, with allocated specific resources, and intended to accomplish clearly defined objectives. Kerzner (1982) provides a definition of project management as the planning, organizing, leading, and controlling of company resources to achieve predefined short-term goals. Furthermore, project management employs a system approach and hierarchical structure, both vertically and horizontally. The Philosophy of Project Managers includes: (1) Viewing projects as primary activities within the organization, with project specifications and tasks aimed at executing work. Resources and responsibilities can be shared between functional organizations and projects; (2) The matrix organizational structure supplements projects in terms of time, budget, and performance; (3) Planning and controlling are the main techniques to achieve project objectives by completing tasks separately through network diagrams; (4) Technology serves as the primary model for improvising projects; (5) Coordinating all project activities is crucial for successful resource utilization; (6) Authority, responsibility, and resources can be managed through organizational and project function mechanisms; and (7) Growth can occur through the project management process. Project Management Principles encompass; (1) A focused overview of project objectives; (2) Recognition of production activities; (3) Integration within organizational functions; (4) Adapting to technological changes; (5) Control and planning of all activities; (6) Inclusion of authority, resources, and responsibilities; (7) Interaction among time, budget, and work quality; (8) Organizational function processes; (9) Collaboration within a working team; (10) Consumer orientation.

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