Rizkha Rida, ST, MT, Adinda Juwita Nasution, ST, MT,
Dr. Marina Marzuki, Dr. Nooraizedfiza binti Zainon,
Muhammad Fazri, ST, MT, Rahmad Rezeki, ST, MTM
Margie Subahagia Ningsih, ST, MT
Dr. Masdania Zurairah Sr, M.Si

GUIDE TO PROJECT MANAGEMENT

Rizkha Rida, ST, MT, Adinda Juwita Nasution, ST, MT,
Dr. Marina Marzuki, Dr. Nooraizedfiza binti Zainon,
Muhammad Fazri, ST, MT, Rahmad Rezeki, ST, MTM
Margie Subahagia Ningsih, ST, MT
Dr. Masdania Zurairah Sr, M.Si

GUIDE TO PROJECT MANAGEMENT

Penerbit Widina

GUIDE TO PROJECT MANAGEMENT

Authors:
Rizkha Rida, Adinda Juwita Nasution, Marina Marzuki,
Nooraizedfiza binti Zainon, Muhammad Fazri, Rahmad Rezeki,
Margie Subahagia Ningsih, Masdania Zurairah

Cover Design:
Andi Juliandi

Illustration Source:
www.freepik.com

Layout:
Handarini Rohana

Proofreader:
Aas Masruroh

ISBN:
978-634-246-851-7

First Edition:
Mei, 2026

PENERBIT:
WIDINA MEDIA UTAMA
Komplek Puri Melia Asri Blok C3 No. 17 Desa Bojong Emas
Kec. Solokan Jeruk Kabupaten Bandung, Provinsi Jawa Barat

Anggota IKAPI No. 519/JBA/2025
Website: www.penerbitwidina.com
Instagram: @penerbitwidina
Telepon (022) 87355370

PREFACE

In an increasingly dynamic and complex world, the ability to manage projects effectively has become an essential skill across industries and professions. This book, *Guide to Project Management*, is designed to provide a comprehensive yet practical introduction to the fundamental concepts, principles, and practices of project management. It aims to bridge the gap between theory and application, offering readers a structured pathway to understand and implement project management strategies in real-world contexts.

The content of this guide is carefully organized to cover key areas such as project initiation, planning, execution, monitoring, and closing. In addition, it highlights essential topics including risk management, stakeholder engagement, communication strategies, and the use of modern tools and methodologies. Each section is presented in a clear and systematic manner to support both beginners who are new to the field and practitioners seeking to strengthen their existing knowledge and skills.

This book is intended for students, professionals, educators, and anyone interested in developing a strong foundation in project management. It is our hope that this guide not only enhances technical competence but also fosters critical thinking, leadership, and decision-making abilities necessary for successful project delivery.

Mei, 2026

The Authors

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

Rizkha Rida, ST, MT
rizkharida26@gmail.com

A. DEFINITION OF MANAGEMENT

Management is the process of planning, organizing, directing, and controlling resources (human, financial, material, and information) to achieve goals effectively and efficiently. In the field of management, there are five interrelated functions: planning, organizing, staffing, directing, and monitoring. If any of these functions is missing, there is a high probability that management activities will not proceed according to plan or established goals. Planning is the first step a manager must take. With planning, managers are able to assess all actions, both those that have been implemented and those that have not. Without good planning, the goals of management activities will not be achieved.

Next, implement the organizing function. This aims to facilitate oversight by managers. In the placement function, managers are responsible for allocating existing resources according to needs. This way, goals can be achieved more efficiently and effectively. The directing function aims to ensure that the plans that have been prepared can be implemented properly. Therefore, direction is necessary to ensure that everything remains on track according to plan.

The final function is the monitoring function. Its purpose is to ensure that all management activities are carried out according to established plans. If something is not going well, an evaluation can be conducted.

REFERENCES

Batselier, J., & Vanhoucke, M. (2017). Improving project forecast accuracy by integrating earned value management with exponential smoothing and reference class forecasting. *International Journal of Project Management, 35* (1), 28–43.

Berg, H., Strand Alfredsen Larsen, A., Klakegg, O. J., & Welde, M. (2025). Cost estimation in major public projects' front-end phase: An empirical study on how to improve current practices. *Project Leadership and Society, 6* , 100171.

Engwall, M., & Miterev, M. (2025). What is the “project”? A typology of approaches to the core concept in project studies. Scandinavian Journal of Management. Article 101422. https://doi.org/10.1016/j.scaman.2025.101422

Fajsi, A., Moraˇ ca, S., Milosavljevi´ c, M., & Medi´ c, N. (2022). Project management maturity and business excellence in the context of industry 4.0. Processes, 10(6), 1155. https://doi.org/10.3390/pr10061155

Meredith, J.R., Shafer, S.M., & Mantel, S.J. (2020). Project management: A strategic managerial approach (10th ed.). Wiley.

Project Management Institute. (2020). The standard for earned value management. Project Management Institute.

Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® Guide) (7th ed.). Project Management Institute.

Sullivan, W.G., Wicks, E.M., & Koelling, C.P. (2018). Engineering economics (17th ed.). Pearson.

Shafiee, S., Sanrdin, E., Forza, C., Kristjansdottir, K., Haug, A., & Hvam, L. (2023). Framing business cases for the success of product configuration system projects. Computers in Industry, 146(2), Article 103839. https://doi.org/10.1016/j. compind.2022.103839

CHAPTER 2

NETWORK DIAGRAM ANALYSIS

Adinda Juwita Nasution, ST, MT

A. PROJECT NETWORK DEFINITION

A organize graph could be a visual representation of extend errors and their conditions, pivotal in extend administration for arranging and planning. It outlines the stream of work, grouping of assignments, and connections between them, supporting extend directors in understanding venture complexity and optimizing asset allotment. By providing a clear diagram of the venture structure, organize charts encourage successful communication, decision-making, and opportunity administration all through the venture lifecycle.

A organize graph in venture administration may be a visual representation of extending errands and their connections, outlining the sequence of exercises, conditions, and basic way to help arrange and oversee venture execution successfully. By mapping out these relationships, project supervisors can distinguish the grouping in which assignments have to be completed and decide the basic pattern of the longest grouping of subordinate errands that decides the project's length.

Network diagrams help project managers:

a. Sequence Assignments: They give a clear understanding of the arrangement in which errors should be executed, guaranteeing that work advances easily from one action to the following.
b. Identify Conditions: By appearing the connections between assignments, arrange charts highlight dependencies. where the completion of one assignment depends on the beginning or completion of another. This makes a difference in overseeing assignment conditions viably.

REFERENCES

Batselier, J., & Vanhoucke, M. (2017). Improving project forecast accuracy by integrating earned value management with exponential smoothing and reference class forecasting. *International Journal of Project Management, 35* (1), 28–43.

Berg, H., Strand Alfredsen Larsen, A., Klakegg, O. J., & Welde, M. (2025). Cost estimation in major public projects' front-end phase: An empirical study on how to improve current practices. *Project Leadership and Society, 6* , 100171.

Engwall, M., & Miterev, M. (2025). What is the “project”? A typology of approaches to the core concept in project studies. Scandinavian Journal of Management. , Article 101422. https://doi.org/10.1016/j.scaman.2025.101422

Fajsi, A., Moraˇ ca, S., Milosavljevi´ c, M., & Medi´ c, N. (2022). Project management maturity and business excellence in the context of industry 4.0. Processes, 10(6), 1155. https://doi.org/10.3390/pr10061155

Meredith, J.R., Shafer, S.M., & Mantel, S.J. (2020). Project management: A strategic managerial approach (10th ed.). Wiley.

Project Management Institute. (2020). The standard for earned value management. Project Management Institute.

Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® Guide) (7th ed.). Project Management Institute.

Sullivan, W.G., Wicks, E.M., & Koelling, C.P. (2018). Engineering economics (17th ed.). Pearson.

CHAPTER 3

CRITICAL PATH METHOD

Dr. Marina Marzuki

A. PROJECT SCHEDULING – CRITICAL PATH METHOD

Project scheduling is the cornerstone of effective project management. regardless of industry; construction, software development, manufacturing, or services, a project must be delivered on time and within agreed constraints. The inherent challenge in project delivery is coordinating multiple interdependent tasks while managing constraints on time, resources, and costs (Leach, 1999; Hui, et al., 2008). Scheduling offers a structured way of organizing tasks, defining their interdependencies, and allocating time in a logical sequence that allows the project to meet its objectives. A well-developed schedule transforms a project's conceptual plan into executable actions and serves as a reference baseline against which progress can be monitored and controlled.

Project managers often view a schedule as the heartbeat of a project; it governs activity sequencing, reveals task dependencies, and highlights potential bottlenecks that can delay delivery. Project schedule practices such as the Critical Path Method (CPM) transform scheduling from a manual planning tool into a quantifiable decision support mechanism. CPM is developed to help project planners identify the most time-critical activities affecting project duration (Aliyu, 2012; Antill, et al., 1991).

1. Project Schedule

A project schedule is a detailed plan that outlines how and when project activities will be performed. It presents a timetable of tasks with defined start and finish dates, relationships between tasks, allocated resources, and milestones that reflect key points of progress. While broader project planning defines what work must be done, scheduling determines

REFERENCES

Aliyu, A. M. (2012). Project management using critical path method (CPM): a pragmatic study. *Global Journal of Pure and Applied Sciences* , *18* (3-4), 197-206.

Antill, J. M., & Woodhead, R. W. (1991). *Critical path methods in construction practice* . John Wiley & Sons.

Atin, S., & Lubis, R. (2019, November). Implementation of critical path method in project planning and scheduling. In *IOP Conference Series: Materials Science and Engineering* (Vol. 662, No. 2, p. 022031). IOP Publishing.

Guerriero, F., & Talarico, L. (2010). A solution approach to find the critical path in a time-constrained activity network. *Computers & operations research* , *37* (9), 1557-1569.

Hammad, M., Abbasi, A., Chakrabortty , R.K., & Ryan, M.J. (2020). Predicting the critical path changes using sensitivity analysis: a delay analysis approach. *International Journal of Managing Projects in Business* , *13* (5), 1097-1119.

Herroelen , W. (2005). Project scheduling—Theory and practice. *Production and operations management*, *14* (4), 413-432.

Hui, P. P., Davis - Blake, A., & Broschak , J. P. (2008). Managing interdependence: The effects of outsourcing structure on the performance of complex projects. *Decision Sciences* , *39* (1), 5-31.

Leach, L. P. (1999). Critical chain project management improves project performance. *Project Management Journal* , *30* (2), 39-51.

Santiago, J., & Magallon, D. (2009). Critical path method. *CEE320, Winter 2013* .

CHAPTER 4

TECHNIQUE EVALUATION AND REVIEW PROGRAM

Dr. Nooraizedfiza binti Zainon

A. INTRODUCTION

Project scheduling is a core function of industrial engineering, particularly in environments involving new technology, process development, and system integration. Many real-world projects suffer from uncertain task durations due to human factors, supply variability, learning effects, and technological novelty. Deterministic scheduling tools often underestimate such uncertainty, leading to unrealistic timelines and poor decision-making.

To address this challenge, the Program Evaluation and Review Technique (PERT) was developed as a probabilistic scheduling approach. PERT allows project managers and engineers to estimate expected completion times and evaluate schedule risk using statistical methods. For industrial engineering students, PERT provides a bridge between operations research, probability theory, and project management practice.

B. HISTORICAL DEVELOPMENT OF PERT

PERT was developed in 1958 by the US Navy for the Polaris missile program, a large-scale aerospace project characterized by high uncertainty and technological complexity. At the time, little historical data was available, making deterministic scheduling unreliable. PERT introduced probabilistic reasoning into project planning, enabling managers to quantify uncertainty and evaluate schedule confidence (Kerzner, 2022) (Malcolm et al., 1959).

The success of PERT in defense and aerospace projects led to its adoption in engineering, construction, manufacturing, and R&D environments. Today, PERT concepts are embedded in many project

activity independence and distributions, it remains a valuable foundational tool in project management.

REFERENCES

Cox, M.A.A. (1995). Simple normal approximation to the completion time distribution for a PERT network. International Journal of Project Management, 13(4), 265–270. https://doi.org/10.1016/0263-7863(95)00026-M

Dawson, R. J., & Dawson, C. W. (1998). Practical proposals for managing uncertainty and risk in project planning. International Journal of Project Management, 16(5), 299–310. https://doi.org/10.1016/S0263-7863(97)00059-8

Fulkerson, D. R. (1962). Expected critical path lengths in PERT networks. Operations Research, 10(6), 808–817. https://doi.org/10.1287/opre.10.6.808

Grubbs, F.E. (1962). Letter to the Editor—Attempts to validate certain PERT statistics or "Picking on PERT." Operations Research, 10(6), 912–915. https://doi.org/10.1287/opre.10.6.912

Hajdu, M. (2013). Effects of the application of activity calendars on the distribution of project duration in PERT networks. Automation in Construction, 35, 397–404. https://doi.org/10.1016/j.autcon.2013.05.025

Healy, T. L. (1961). Activity subdivision and PERT probability statements. Operations Research, 9(3), 341–348. https://doi.org/10.1287/opre.9.3.341

Herrerías -Velasco, J.M., Herrerías-Pleguezuelo , R., & van Dorp, J.R. (2011). Revisiting the PERT mean and variance. European Journal of Operational Research, 210(2), 448–451. https://doi.org/10.1016/j.ejor.2010.08.014

Kerzner, H. (2022). Project management: A systems approach to planning, scheduling, and controlling (13th ed.). Wiley.

Kotiah, T. C. T., & Wallace, N. D. (1973). Another look at the PERT assumptions. Management Science, 20(1), 44–49. https://doi.org/10.1287/mnsc.20.1.44

Malcolm, D.G., Roseboom, J.H., Clark, C.E., & Fazar, W. (1959). Application of a technique for research and development program evaluation. Operations Research, 7(5), 646–669. https://doi.org/10.1287/opre.7.5.646

Meredith, J.R., Shafer, S.M., & Mantel, S.J. (2020). Project management: A strategic managerial approach (10th ed.). Wiley.

Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® Guide) (7th ed.). Project Management Institute.

Taha, H. A. (2017). Operations research: An introduction (10th ed.). Pearson.

Trietsch, D., & Baker, K. R. (2012). PERT 21: PERT/CPM fittings for use in the 21st century. International Journal of Project Management, 30(4), 490–502. https://doi.org/10.1016/j.ijproman.2011.09.004

CHAPTER 5

GERT METHOD (GRAPHICAL EVALUATION AND REVIEW TECHNIQUE)

Muhammad Fazri, ST, MT

A. INTRODUCTION

In an increasingly complex and dynamic project management landscape, the limitations of traditional network methods such as the Critical Path Method (CPM) and the Program Evaluation and Review Technique (PERT) in addressing structural uncertainty are becoming increasingly apparent (Kerzner, 2017). Both of these conventional methods operate on a deterministic-structural paradigm, assuming that the sequence and progression of all project activities are known and certain to occur. The reality of modern projects, particularly in the domains of research and development (R&D), systems engineering, and technological innovation, is characterized by inherent uncertainty, where the path to project completion is not linear, but rather filled with iterations, decision-making, and feedback loops (Turner, 2014).

The Graphical Evaluation and Review Technique (GERT) method emerged as a response to these modeling challenges. As a probabilistic-structural network technique, GERT accommodates not only uncertainty in activity durations but, more importantly, in the logic of the project flow itself (Pritsker & Happ, 1966). Its ability to model loops, probabilistic branching, and conditional activities makes it a powerful tool for analyzing projects characterized by stochastic networks. This chapter will comprehensively examine the theoretical foundations, constituent elements, mathematical formulations, and practical applications of the GERT method.

REFERENCES

Whitehouse, G. E. (1973). *Systems analysis and design using network techniques* . Prentice-Hall.

Moder, J. J., Phillips, C. R., & Davis, E. W. (1983). *Project management with CPM, PERT and precedence diagramming* (3rd ed.). Van Nostrand Reinhold.

Pritsker, A. B. (1966). *GERT: Graphical evaluation and review technique* (Memorandum No. RM-4973-NASA). RAND Corporation.

Helgerson, E. H. (1977). *Graphical evaluation and review technique (GERT): A stochastic networking scheme for systems acquisition management* (Study Project Report No. PMC 77-1). US Army Management Engineering Training Agency, Fort Belvoir, VA.

Kerzner, H. (2017). *Project management: A systems approach to planning, scheduling, and controlling* (12th ed.). John Wiley & Sons.

Turner, J.R. (2014). *Handbook of project-based management* (4th ed.). McGraw-Hill Education.

Kerzner, H. (2022). *Project management: A systems approach to planning, scheduling, and controlling* (13th ed.). John Wiley & Sons.

Moore, L. J., & Clayton, E. R. (1976). *GERT modeling and simulation: Fundamentals and applications* . Petrocelli/Charter.

CHAPTER 6

DISCRETE ELEMENT METHOD

Rahmad Rezeki ST, MT

A. DEFINITION AND CONCEPT OF DEM/DES

Discrete Event Modeling (DEM) or Event Model Discrete is a model that can describe the system with a group interconnected entities related to that only change the situation (and further condition system) at the point time discrete as consequence from behavior they yourself or behavior other entities. (Ullrich,O & Luckerath,D). The system components being investigated depicted with entity. Entity must modeled-in a way explicit to represent behavior relevant systems with studies simulation. Individual attributes owned entity its value describe current situation and influence his behavior. A series of activity from modeled entity is behavior potential from something entity. A series activity is order action during period time certain things that can result in change condition acting entity as well as other entities in the model. Events is point time simulation in which changes condition the happened. Next, the activity always framed by events. The right relationship between events and activities certain must defined by the modeler based on objective studies simulation (Ullrich,O & Luckerath,D).

1960s *Discrete Event Simulation* (DES) or Simulation Incident Discrete has developed in the field technique industry and research operations to help analyzing and improving industrial and business processes (Karnon, J, et.al). Discrete Event Simulation (DES) is a something method modeling with those who have ability to describe something complex behavior and interactions between individuals, populations and their environment. DES is used to model a system with a series incident discrete, where every incident influences the state of the system that occurs at a point time

REFERENCES

Karnon , J., Stahl, J. , Brennan,A . , Caro, J . , Mar, J . , & Moller, J . (2012). Modeling using Discrete Event Simulation: A Report of the ISPOR-SMDM Modeling Good Research Practices Task Force-4. Values In Health, Volume (15), 821-827.

Nguyen, PT . , Kim, PH . (2026). Application of discrete event simulation in construction projects: Annual Conference On Science And Technology Research, Volume (3337), Issue 1.

Zamani, V. , Yavari,E. , Taghaddos, H . (2024). A Science Mapping Lens On Discrete Event Simulation Applications In Construction Engineering And Management: Automation in Construction, Volume (166),

Fadjar, A. , Ali, A . (2024). The Utilization Of The Discrete Event Simulation Method In Scheduling Repetitive Construction: Earth and Environmental Science, Volume (1355).

Ullrich, O. , Luckerath,D . (2017). AnIntroduction to Discrete-Event Modeling and Simulation: Simulation Notes Europe, Volume (27), 9-16.

Sharma, P . (2015). Discrete-Event Simulation: International Journal Of Scientific & Technology Research, Volume (4), 136-140.

Shofiudin, M. , Nuraini, SA , Ihsan, MS , Wibowo, RA , Rolliawati, D. (2024). Discrete Event Simulation for Analysis Service Culinary Business (Case Study : Gacoan Merr): Journal of Informatic Technology and Communication, Volume (8),63-72.

Melly, S. , et al . (2024). Management Padang Project : CV Hei Publishing Indonesia.

Paharuddin ., Nadir , M., Anshari , AI .(2024). Management Solok Project : PT Mafy Media Literasi Indonesia.

Forcael, E. , Gonzalez,M. , Soto,J. , Ramis,F. , Rodriguez, C . (2018). Simplified Scheduling of a Building Construction Process using Discrete Event Simulation: 16th LACCEI International Multi-Conference for engineering, Education, and Technology: “Innovation in Education and Inclusion ”, Volume (1).

CHAPTER 7

PROJECT CRASHING IN PROJECT MANAGEMENT

Dr. Nooraizedfiza bint Zainon

A. INTRODUCTION TO PROJECT CRASHING

1. Definition of Project Crashing

Project crashing is a schedule acceleration technique in project management that aims to reduce the total project duration by deliberately shortening the durations of selected activities, typically through the allocation of additional resources, overtime work, premium procurement, or alternative construction or production methods. The fundamental principle underlying project crashing is that time can be reduced at the expense of increased costs, provided that the project scope and technical requirements remain unchanged (Kerzner, 2022). In engineering projects, crashing is therefore treated as a time–cost trade-off problem, where the objective is not merely to finish earlier, but to do so at the minimum possible additional cost while maintaining acceptable quality and safety standards.

Project crashing is most applied during the **execution phase** of the project life cycle, when actual performance data becomes available and deviations from the plan can be measured. However, the feasibility and effectiveness of crashing are strongly influenced by decisions made earlier, particularly during the planning phase. A well-developed project schedule with realistic activity durations, clearly defined dependencies, and identified resource constraints provides the analytical foundation necessary for effective crashing (Meredith et al., 2020). During execution, crashing decisions are typically initiated through monitoring and controlling processes, where schedule performance indicators reveal delays or opportunities for acceleration. Because crashing involves changes to costs,

REFERENCES

Ballesteros-Pérez, P., Elamrousy , K.M., & González-Cruz, M.C. (2018). Non-linear time–cost trade-off models of activity crashing: Application to construction scheduling and project compression with fast-tracking. Automation in Construction, 97, 229–240.

Chen, S.-P. (2011). Time–cost trade-off analysis of project networks in fuzzy environments. European Journal of Operational Research, 212(2), 386–397.

Diaby, M., Cruz, J.M., & Nsakanda , A.L. (2011). Project crashing in the presence of general non-linear activity time reduction costs. International Journal of Operational Research, 12(3), 318–332.

Kammouh , O., Nogal, M., Binnekamp , R., & Wolfert, A.R.M. (2022). Dynamic control for construction project scheduling on-the-run. Automation in Construction, 141, 104450.

Kerzner, H. (2022). Project management: A systems approach to planning, scheduling, and controlling (13th ed.). Wiley.

Khang, D. B., & Myint, Y. M. (1999). Time, cost and quality trade-off in project management: A case study. International Journal of Project Management, 17(4), 249–256.

Kim, J.-Y., Kang, C., & Hwang, I. (2012). A practical approach to project scheduling: Considering the potential quality loss cost in the time–cost trade-off problem. International Journal of Project Management, 30(2), 264–272.

Liu, J., & Rahbar, F. (2004). Project time–cost trade-off optimization by maximal flow theory. Journal of Construction Engineering and Management, 130(4), 607–609.

Meredith, J.R., Shafer, S.M., & Mantel, S.J. (2020). Project management: A strategic managerial approach (10th ed.). Wiley.

Phillips, S., & Dessouky, M. I. (1977). Solving the project time/cost tradeoff problem using the minimum cut concept. Management Science, 24(4), 393–400.

CHAPTER 8

RESOURCE ALLOCATION

Margie Subahagia Ningsih ST, MT

A. INTRODUCTION

In some parts big projects, networks work built with CPM, PERT, GERT, or DEM only provide a "framework" of the sequence activities. The framework Not yet automatic can executed before We assigning real people, equipment, materials, and budget. The process of assigning elements real That to activities — with still comply dependencies, calendars, and limitations capacity — called allocation source power. This chapter to explain principles, models, and techniques allocation source power, to describe difference between alignment load (resource leveling/smoothing) and scheduling limited capacity (resource-constrained scheduling), as well as show the implications to time, cost, and risk project.

In practice, managers project face to face with two interrelated problems related. First, when total capacity is considered adequate, challenges main is leveling fluctuations usage to the top burden No cause overtime, decrease quality, or violation safety. Second, when capacity limited, purpose mainly shift become look for a decent schedule below limitations said, often with consequence extension duration project or cost additional. Second situation This demand approach different conceptual and analytical, which will reviewed in a way systematic in chapter This.

B. CONCEPT AND SCOPE

Allocation source Power covers overall cycle — start from inventory availability source power, determination needs per activity, mapping to calendar work, until formation schedules that comply with capacity limits and regulations precedence. Source Power in project can classified as *renewable* (e.g. working hours) technician per day or availability tools per

- Resource-Feasible Schedule is schedule that is not beyond capacity periodic; RCPSP/MMRCPSP is a formal model for scheduling limited source power (single/multi-mode);
- Serial/Parallel Schedule Generation is scheme construction timetable-based priority; while Resource Critical Path marks series activity determinant consequence constraint capacity, not solely logic dependency.

REFERENCES

Project Management Institute (PMI). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Seventh Edition.* Newtown Square, PA: PMI, 2021.

Kerzner, H. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling.* Hoboken, NJ: Wiley, ed latest.

Demeulemeester, E., & Herroelen, W. *Project Scheduling: A Research Handbook.* Boston: Springer, 2002.

Gray, CF, & Larson, EW *Project Management: The Managerial Process.* New York: McGraw-Hill, ed latest.

Goldratt, E.M. *Critical Chain.* Great Barrington, MA: North River Press, 1997.

Soeharto, I. Project *Management: From Conceptual until Operational.* Jakarta: Erlangga.

CHAPTER 9

PROJECT SCHEDULING

Dr. Masdania Zurairah Sr., M.Si

A. PROJECT SCHEDULING

Project scheduling is the process of planning, organizing, and allocating tasks, time, and resources (labor, materials, equipment) to complete a project efficiently and on time, which serves as a structured roadmap to guide implementation, monitor progress, and control the project from start to finish. In the project planning stage, an estimate of the project's duration is required. The accuracy of the project completion time estimate is determined based on the accuracy of the estimated duration of each activity in the project (Hamdan Dimyati and Kadar Nurjaman, 2016). Project activities are temporary activities that take place over a limited period, with the allocation of certain resources and are intended to carry out tasks whose targets have been clearly outlined (Soeharto, 1999). According to Soeharto (1999), the stages of the project cycle can be seen in Table 10.1 below.

Table 9.1. Project Cycle

Conceptual Stage	PP/ Definition Stage	Implementation Stage	Termination Stage
a. Formulation of ideas b. Reference framework c. Feasibility study d. Indication of project scope dimensions e. Cost and schedule indications	a. Deepening various aspects of the problem b. Engineering design and development c. Creating master schedules and budgets, conducting follow-up investigations	a. Detailed engineering design b. Creation and specification of criteria c. Purchase of equipment and materials d. Manufacturing and construction e. Quality infection *f. Mechanical*	a. Start- up b. Demobilization of closing report c. Operation or utilization stage

REFERENCES

Abrar, H (2011), Project Management: Planning, Scheduling, and Project Control. Andi Offset , Yogyakarta

Andi, ARS and Chandra A (2005). Structural Equation Model of the Influence of Occupational Safety Culture on Worker Behavior in Construction Projects. Civil Engineering Journal. Vol. 12, No. 13.

Bhaskara, A., & Mubian , A. (2021). Analysis Project Time and Cost SchedulingWith using the Linear Scheduling Method. UBL Civil Engineering Journal , 12, 1269–1279

Faisol. (2010). Project Planning, Scheduling and Control Course. Islamic University of Indonesia

Halimi. (2018). Rescheduling Analysis Using the LSM (Linear Scheduling) Method Method). Islamic University of Indonesia.

Hinze . (nd .). Optimization with PDE Constraint . Hamburg University .

Husen, Abrar. (2011). Project Management : Planning , Scheduling , and Project Control . Yogyakarta: Andi Offset.

Mangkunegara , (2000), Human Resource Performance Evaluation, Refika Aditama, Jakarta

Satria H, Afifuddin M and Malahayati N (2012). The Influence of External Factors, Equipment, Labor and Work Implementation on the Cost Performance of Dam Construction Projects (Case Study in Aceh Province). Journal of Civil Engineering, Postgraduate Program of Syaih Kuala University, Vol.1. No.1.

Tjandra. (2022). Scheduling of Housing Project X in South Tangerang Using the Line of Sequence Method Balance and Learning Effects. Islamic University of Indonesia

CHAPTER 10

PROJECT BUDGET ANALYSIS

Dr. Nooraizedfiza bint Zainon

A. INTRODUCTION TO PROJECT BUDGET ANALYSIS

Project budget analysis is a core component of effective project management, providing a structured approach to planning, allocating, monitoring, and controlling financial resources throughout the project life cycle. While the terms project budget and project cost are often used interchangeably in practice, they represent distinct but closely related concepts. Project cost refers to the actual expenditure incurred in executing project activities, including labor, materials, equipment, subcontracting, and overheads. In contrast, the project budget represents the approved financial plan derived from cost estimates and authorized by stakeholders, serving as a baseline against which project performance is measured. The distinction is critical, as projects are not controlled against actual costs alone, but against how those costs compare with the planned and authorized budget at specific points in time (PMI, 2021; ISO, 2021; Kerzner, 2022).

The ability to establish and manage a realistic project budget is widely recognized as a key determinant of project success. Budget overruns frequently signal deeper issues such as inaccurate cost estimation, uncontrolled scope changes, ineffective resource utilization, or weak governance mechanisms. From a management perspective, the project budget functions not only as a financial constraint but also as a decision-making tool that supports prioritization, trade-off analysis, and accountability. In complex engineering and manufacturing projects, where capital investment levels are high and margins are often tight, effective budget analysis enables project managers to detect early warning signs,

REFERENCES

Baerenbold, R. (2023). Reducing risks in megaprojects: The potential of reference class forecasting. *Project Leadership and Society, 4* , 100103.

Batselier, J., & Vanhoucke, M. (2017). Improving project forecast accuracy by integrating earned value management with exponential smoothing and reference class forecasting. *International Journal of Project Management, 35* (1), 28–43.

Berg, H., Strand Alfredsen Larsen, A., Klakegg, O. J., & Welde, M. (2025). Cost estimation in major public projects' front-end phase: An empirical study on how to improve current practices. *Project Leadership and Society, 6* , 100171.

Cantarelli, C. C., & Flyvbjerg, B. (2025). Reference class forecasting: Promises, problems, and a research agenda moving forward. *International Journal of Production Research* .

Fleming, Q. W., & Koppelman, J. M. (2016). *Earned value project management* (4th ed.). Project Management Institute.

Gray, C.F., & Larson, E.W. (2020). *Project management: The managerial process* (8th ed.). McGraw Hill Education.

International Organization for Standardization. (2018). *ISO 21508:2018—Earned value management in project and program management* . ISO.

International Organization for Standardization. (2021). *ISO 21500:2021 Project, program and portfolio management—Context and concepts* . ISO.

Kerzner, H. (2022). *Project management: A systems approach to planning, scheduling, and controlling* (13th ed.). Wiley.

Kim, E. H., Wells, W. G., & Duffey, M. R. (2003). A model for effective implementation of earned value management methodology. *International Journal of Project Management, 21* (5), 375–382.

Kwak, YH, & Anbari, FT (2012). History, practices, and future of earned value management in government: Perspectives from NASA. *Project Management Journal, 43* (1), 77–90.

Lipke, W., Zwikael, O., Henderson, K., & Anbari, F. (2009). Prediction of project outcome: The application of statistical methods to earned value management and earned schedule performance indexes. *International Journal of Project Management, 27* (4), 400–407.

Mahamid, I. (2015). Factors affecting cost estimate accuracy: Evidence from Palestinian construction projects. *International Journal of Management Science and Engineering Management, 10* (1), 58–66.

Mayo-Alvarez, L., Alvarez-Risco, A., Del-Aguila-Arcentales, S., Sekar, M. C., & Yáñez, J. A. (2022). A systematic review of earned value management methods for monitoring and control of project schedule performance: An AHP approach. *Sustainability, 14* (22), 15259.

Meredith, J.R., Shafer, S.M., & Mantel, S.J. (2020). *Project management: A strategic managerial approach* (10th ed.). Wiley.

Project Management Institute. (2020). *The standard for earned value management* . Project Management Institute.

Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK® Guide)* (7th ed.). Project Management Institute.

Sullivan, W.G., Wicks, E.M., & Koelling, C.P. (2018). *Engineering economics* (17th ed.). Pearson.

US Government Accountability Office. (2020). *Cost estimating and assessment guide: Best practices for developing and managing program costs* (GAO-20-195G).

GUIDE TO
PROJECT MANAGEMENT

Guide to Project Management provides a comprehensive introduction to the principles, processes, and practices essential for successfully managing projects in various organizational contexts. This book is designed to equip students, professionals, and aspiring project managers with a clear understanding of how to plan, execute, monitor, and complete projects effectively. Beginning with an overview of project management concepts, the book explains the project life cycle, key roles and responsibilities, and the importance of aligning projects with organizational goals.

The discussion then moves to the core components of project management, including scope definition, scheduling, budgeting, risk management, and quality control. Readers are guided through practical tools and techniques such as work breakdown structures, Gantt charts, and performance measurement methods that help ensure projects are delivered on time, within scope, and within budget. The book also emphasizes the importance of communication, leadership, and teamwork in achieving project success, highlighting how interpersonal skills can influence outcomes as much as technical expertise.

In addition, Guide to Project Management explores contemporary challenges in project environments, including managing virtual teams, adapting to rapid technological changes, and responding to uncertainty in dynamic business settings. Real-world examples and case illustrations are included to bridge theory and practice, enabling readers to apply concepts in practical situations. By the end of the book, readers will gain not only theoretical knowledge but also actionable insights to manage projects efficiently and effectively in today's complex and competitive environment.

www.penerbitwidina.com
@penerbitwidina
penerbit widina
penerbitwidina@gmail.com
widina store
widina bookstore

Layanan Pembaca & Penerbitan Buku
0815-7000-699

SCANME

Manajemen & Marketing

ISBN 978-634-246-851-7

9 786342 468517