

高等学校工程管理专业规划教材

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工程管理专业英语

徐勇戈	马继伟	编
焦英博	贾广社	
王守清	卢有杰	审

中国建筑工业出版社

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英语是了解国外科技发展动向和进行国际学术交流的重要工具。本书旨在使读者掌握工程管理专业英语术语，培养和提高读者阅读和笔译专业英语文献资料的能力，并通过课堂英语交流，提高学生英语口语能力。

本书素材取自国外最近几年工程管理各个领域的经典教材、专著、论文和计算机网络信息，内容涉及工程管理各领域当前的状况和最新进展。本书主要内容包括：业主视角，项目管理组织，设计与施工过程，劳动力、材料与设备的利用，成本估算，投资项目的经济评价，建设工程项目融资，工程承包价格的确定与合同，施工计划，基本进度计划程序，高级进度计划技术，成本控制、监督与会计，质量控制与施工安全，以及工程项目信息的组织与应用。书后附参考译文。

本书内容新颖、覆盖面广、系统性强、可读性好，是学习工程管理专业英语的实用教材。本书既可供高等院校的工程管理专业和土木工程相关专业师生使用，也可用作工程管理专业人员及其他有兴趣人员的学习参考读物。

* * *

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前 言

编写《工程管理专业英语》的目的在于为土建类高等学校的工程管理专业及土木工程相关专业的本科生及研究生提供一本既能使读者掌握工程项目管理专业英语术语，又能培养和提高读者阅读与笔译专业英语文献的能力，并了解国外工程管理领域最新发展动态和前沿知识的融实用性和前瞻性于一体的教学用书。通过使用本教材不仅能提高读者以英语为工具进行外文文献阅读和翻译能力，还能够开拓其专业视野，并为日后从事相关的工程管理工作和理论研究打下坚实的基础。

本书的特色主要在于从业主的视角出发，对工程项目的整个管理流程予以系统整合地介绍，所选取的素材以被北美国家奉为“工程项目管理圣经”的由翰觉克森博士所著的《建设项目管理》一书为主，该书具有极强的系统性和完整的体系，再版了16次，且不断对内容进行补充与更新，同时又从能够反映本学科领域的最新动态和前沿知识的文献及论文选取一部分内容作为补充。这样一来，不仅保证了作为教材所需的系统性与完整性，也保证了知识的新颖性，从而有利于学生积累知识并开拓了他们的视野。

书中涵盖了包括项目管理组织、投资项目的经济评价、建设工程项目融资、工程承包价格的确定与合同、高级进度计划技术、成本控制、质量控制以及工程项目信息的组织与应用等诸多内容在内的工程项目管理领域的理论体系和方法论的精粹，并附有几乎所有的工程管理专业术语和专有表达，是对学生有关专业课知识的最好补充。此外还能够使读者对于工程管理的理论体系有一个系统而全面的认识。

本书中每一章的第一篇通常都是读者熟悉的内容。对于英语水平较好的读者，可以泛读或跳过该节；而对于初学者，建议精读这一篇。教师可以根据各章标题，在每一章中挑选若干篇文章进行教学。作为练习，可选择若干章节让学生笔译，并进行课堂讨论。

鉴于英语口语越来越重要，专业英语课程应提供一种英语环境来提高学生的英语口语能力。我们建议在教学过程中，教师可对每一章选择几个题目，让学生事先准备好用自己的语言来表达相关内容，然后分组进行讨论，再选派代表在课堂上交流。

全书分为14章，第7、8、9、11、12、13章由西安建筑科技大学徐勇戈编写，第3、4、5、6章由同济大学马继伟编写，第1、2章由西安唯赢人才培训中心总裁兼美国项目管理学院中国首席代表焦英博女士编写，第10、14章由同济大学贾广社编写，并由徐勇戈进行统稿。全书由清华大学王守清、卢有杰两位教授主审。

感谢翰觉克森博士允许我们使用其享誉工程管理界的著作《建设项目管理》中的部分内容作为本书的主要素材。在本书的编写过程中，焦英博女士的助手曾缓，西安建筑科技大学管理学院的硕士研究生韩雪、沈亚婷等为本书的编写给予了支持和帮助，在此我们一并表示感谢。

限于作者水平，书中难免存在不妥和错误之处，敬请读者批评指正。

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Chapter 1 The Owners' Perspective

1.1 The Project Life Cycle

The acquisition of a constructed facility usually represents a major capital investment, whether its owner happens to be an individual, a private corporation or a public agency. Since the commitment of resources for such an investment is motivated by market demands or perceived needs, the facility is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations^[1]. With the exception of the speculative housing market, where the residential units may be sold as built by the real estate developer, most constructed facilities are custom made in consultation with the owners^[2]. A real estate developer may be regarded as the sponsor of building projects, as much as a government agency may be the sponsor of a public project and turns it over to another government unit upon its completion. From the viewpoint of project management, the terms "owner" and "sponsor" are synonymous because both have the ultimate authority to make all important decisions^[3]. Since an owner is essentially acquiring a facility on a promise in some forms of agreement, it will be wise for any owner to have a clear understanding of the acquisition process in order to maintain firm control of the quality, timeliness and cost of the completed facility^[4].

From the perspective of an owner, the project life cycle for a constructed facility may be illustrated schematically in Figure 1-1. Essentially, a project is conceived to meet market demands or needs in a timely fashion. Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible project^[5]. The financing schemes for the proposed alternatives must also be examined, and the project will be programmed with respect to the timing for its completion and for available cash flows^[6]. After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control^[7]. In the procurement and construction stage, the delivery of materials and the erection of the project on site must be carefully planned and controlled. After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed facility when it is first occupied. Finally, the management of the facility is turned over to the owner for full occupancy until the facility lives out its useful life and is

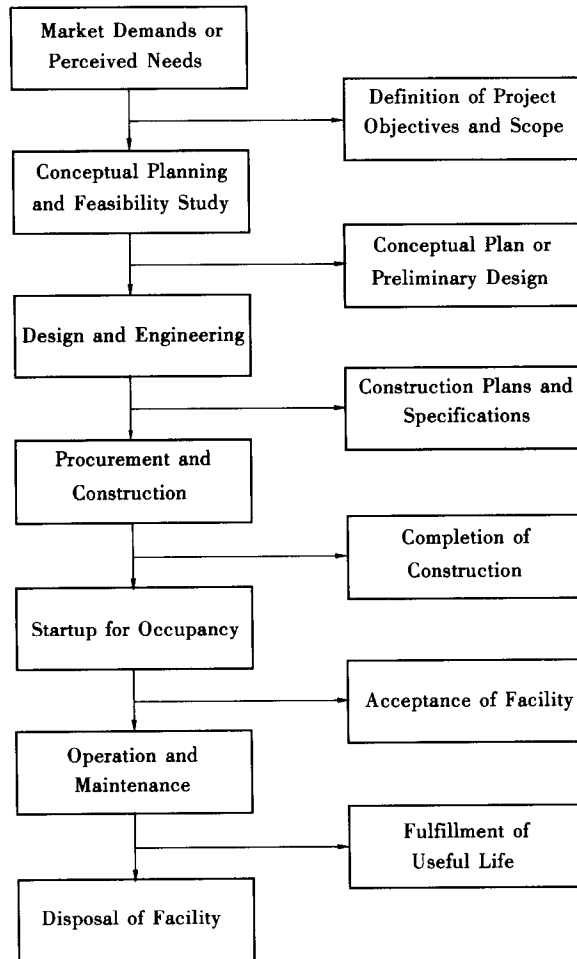


Figure 1-1 The Project Life Cycle of a Constructed Facility

designated for demolition or conversion^[8].

Of course, the stages of development in Figure 1-1 may not be strictly sequential. Some of the stages require iteration, and others may be carried out in parallel or with overlapping time frames, depending on the nature, size and urgency of the project^[9]. Furthermore, an owner may have in-house capacities to handle the work in every stage of the entire process, or it may seek professional advice and services for the work in all stages^[10]. Understandably, most owners choose to handle some of the work in-house and to contract outside professional services for other components of the work as needed. By examining the project life cycle from an owner's perspective, we can focus on the proper roles of various activities and participants in all stages regardless of the contractual arrangements for different types of work^[11].

In the United States, for example, the U. S. Army Corps of Engineers has in-house capabilities to deal with planning, budgeting, design, construction and operation of waterway and flood control structures. Other public agencies, such as state transportation departments, are also deeply involved in all phases of a construction project. In the private sector, many large firms such as DuPont, Exxon, and IBM are adequately staffed to carry out most activities for plant expansion. All these owners, both public and private, use outside agents to a greater or lesser degree when it becomes more advantageous to do so^[12].

The project life cycle may be viewed as a process through which a project is implemented from cradle to grave^[13]. This process is often very complex; however, it can be decomposed into several stages as indicated by the general outline in Figure 1-1. The solutions at various stages are then integrated to obtain the final outcome. Although each stage requires different expertise, it usually includes both technical and managerial activities in the knowledge domain of the specialist. The owner may choose to decompose the entire process into more or less stages based on the size and nature of the project, and thus obtain the most efficient result in implementation^[14]. Very often, the owner retains direct control of work in the planning and programming stages, but increasingly outside planners and financial experts are used as consultants because of the complexities of projects^[15]. Since operation and maintenance of a facility will go on long after the completion and acceptance of a project, it is usually treated as a separate problem except in the consideration of the life cycle cost of a facility. All stages from conceptual planning and feasibility studies to the acceptance of a facility for occupancy may be broadly lumped together and referred to as the design/construct process, while the procurement and construction alone are traditionally regarded as the province of the construction industry^[16].

Owners must recognize that there is no single best approach in organizing project management throughout a project's life cycle. All organizational approaches have advantages and disadvantages, depending on the knowledge of the owner in construction management as well as the type, size and location of the project^[17]. It is important for the owner to be aware of the approach which is most appropriate and beneficial for a particular project. In making choices, owners should be concerned with the life cycle costs of constructed facilities rather than simply the initial construction costs. Saving small amounts of money during construction may not be worthwhile if the result is much larger operating costs or not meeting the functional requirements for the new facility satisfactorily^[18]. Thus, owners must be very concerned with the quality of the finished product as well as the cost of construction itself. Since facility operation and maintenance is a part of the project life cycle, the owners' expectation to satisfy investment objectives during the project life cycle will require consideration of the cost of operation and maintenance^[19]. Therefore, the facility's

operating management should also be considered as early as possible, just as the construction process should be kept in mind at the early stages of planning and programming.

Words

represent 代表, 表示	design/construct process 设计/施工过程
commitment 承诺, 义务	corporation 企业 (尤指股份制企业)
regard 看作, 认为	residential 居住的
ultimate 最终的	viewpoint 观点
feasibility 可行性	fashion 方式
erection 树立, 建立	conceptual 概念的
iteration 重复	demolition 拆毁
facility 设施	overlap 搭接, 交叠
owner 业主	public agency 公共机构
the real estate developer 房地产开发商	speculative housing market 投机性住宅市场
perspective 视角, 角度	project management 项目管理
feasibility 可行性	the project cycle life 项目全寿命期
blueprint 蓝图	the scope of the project 项目范围
procurement 采购	baseline 基线
sequential 顺序的	construction 施工
transportation 运输	in-house 内部的
outline 轮廓	integrate 整合
contract 合约/合同, 订合约/订合同	professional services 专业服务
private sector 私营机构	from cradle to grave 从头到尾
decompose 分解, 拆分	the knowledge domain 知识领域
maintenance 维护	objective 目标

Notes

- [1] specified by... 是过去分词短语, 修饰前面的 constraints。全句可译为: 由于该投资的资源投入受市场需求的驱动, 所以建筑设施应在其业主和相关规范规定的约束条件内满足特定的目标。
- [2] in consultation with 意为“与……协商”。全句可译为: 除了投机性住宅市场, 在那里住宅单元由负责建造的房地产开发商销售之外, 大多数的建筑设施都是在与业主协商一致的基础上定制的。
- [3] synonymous 意为“同义的, 同义词的”。全句可译为: 从项目管理的角度而言, “业主”和“发起人”这两个术语是同义词, 这是因为他们都有做所有重大决策的最终权力。
- [4] 全句可译为: 由于业主实质上是以某种形式的合约为保证来获得一项建筑产品的, 那么为了保证对完工产品的质量、工期和成本的有效控制, 对于任何业主而言, 他

们应当对项目的全过程有一个清晰和完整的理解。

- [5] conceptual planning stage 意为：“概念规划阶段”。alternative 指“备选方案”。全句可译为：在项目的概念规划阶段，很多不同的可能方案都可能被考虑，同时每一个备选方案的技术和经济可行性都经过评估和比较，以选出最优方案。
- [6] 全句可译为：我们还需检验备选方案的财务计划，同时按照项目完工期限和现金流量来安排项目的进度计划。
- [7] the scope of project 意为“项目的范围”。detailed engineering design 是指“详细的工程设计”。全句可译为：一旦项目的范围被明确确定，详细的工程设计就能为施工提供蓝图，最终的成本预算作为成本控制的基准。
- [8] is turned over to ... 意为“被移交给……”。conversion 在这里指“转作他用”。全句可译为：最后，设施的管理将移交给业主全权使用和管理，直至其使用期结束，或者拆除，或者转作他用。
- [9] 全句可译为：某些阶段可以重复，同时也可以和其他阶段平行或搭接进行，这一切取决于项目的特点、规模和紧迫性。
- [10] in-house 指“内部的”。全句可译为：而且，业主可能自己有能力处理项目全过程中各阶段的工作，也可能就各阶段的所有工作寻求专业化的建议和服务。
- [11] 全句可译为：从业主的角度审视项目的全寿命期，我们得以把注意力集中在所有阶段中不同活动和参与方的适当角色上，而不用去考虑不同工作类型合约的安排。
- [12] outside agents 指“外部的代理机构”。to a greater or lesser degree 意为“或多或少地”。全句可译为：而所有的这些业主，无论是公是私，当其觉得合适时，他们也会或多或少地将项目的某些工作分包给公司以外的机构去做。
- [13] be viewed as 意为“被看作是”。Through which... 是定语从句，修饰 a process。from cradle to grave 意为“从头到尾”。
- [14] 全句可译为：业主可以根据项目的规模和特点有选择地把项目的全过程分解成或多或少的不同阶段，从而获得最高效的实施结果。
- [15] 全句可译为：业主通常保留规划和计划阶段的直接控制工作，而随着项目复杂程度的不断增加，会将其他工作委托给外部的咨询单位。
- [16] 全句可译为：尽管只有采购和施工阶段被认为是建筑业的传统领域，但是从项目概念规划和可行性研究直至设施的接受占用都被广义地认为属于设计和建造过程。
- [17] depending on... 是现在分词短语作状语，修饰前面的主句，可译为“取决于业主在项目管理上的知识以及项目的类型、规模和地点”。
- [18] 全句可译为：如果建筑设施的运营成本很高或者不能满足设施在功能上的需求，在施工阶段省一点钱就显得不那么值得。
- [19] facility operation and maintenance 意为“设施的运营与维护”。全句可译为：由于设施的运营和维护是项目全寿命期的一部分，业主为了满足其项目寿命期内投资目标的期望就需要考虑运营和维护成本。

1.2 Major Types of Construction

Since most owners are generally interested in acquiring only a specific type of constructed facility, they should be aware of the common industrial practices for the type of construction pertinent to them^[1]. Likewise, the *construction industry* is a conglomeration of quite diverse segments and products. Some owners may procure a constructed facility only once in a long while and tend to look for short term advantages. However, many owners require periodic acquisition of new facilities and/or rehabilitation of existing facilities. It is to their advantage to keep the construction industry healthy and productive. Collectively, the owners have more power to influence the construction industry than they realize because, by their individual actions, they can provide incentives or disincentives for innovation, efficiency and quality in construction^[2]. It is to the interest of all parties that the owners take an active interest in the construction and exercise beneficial influence on the performance of the industry.

In planning for various types of construction, the methods of procuring professional services, awarding construction contracts, and financing the constructed facility can be quite different. For the purpose of discussion, the broad spectrum of constructed facilities may be classified into four major categories, each with its own characteristics.

Residential Housing Construction

Residential housing construction includes single-family houses, multi-family dwellings, and high-rise apartments^[3]. During the development and construction of such projects, the developers or sponsors who are familiar with the construction industry usually serve as surrogate owners and take charge, making necessary contractual agreements for design and construction, and arranging the financing and sale of the completed structures^[4]. Residential housing designs are usually performed by architects and engineers, and the construction executed by builders who hire subcontractors for the structural, mechanical, electrical and other specialty work. An exception to this pattern is for single-family houses as is shown in Figure 1-2, which may be designed by the builders as well.

The residential housing market is heavily affected by general economic conditions, tax laws, and the monetary and fiscal policies of the government. Often, a slight increase in total demand will cause a substantial investment in construction, since many housing projects can be started at different locations by different individuals and developers at the same time^[5]. Because of the relative ease of entry, at least at the lower end of the market, many new builders are attracted to the residential housing construction. Hence, this market is highly