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ZHUANYE YINGYU

工程管理专业英语

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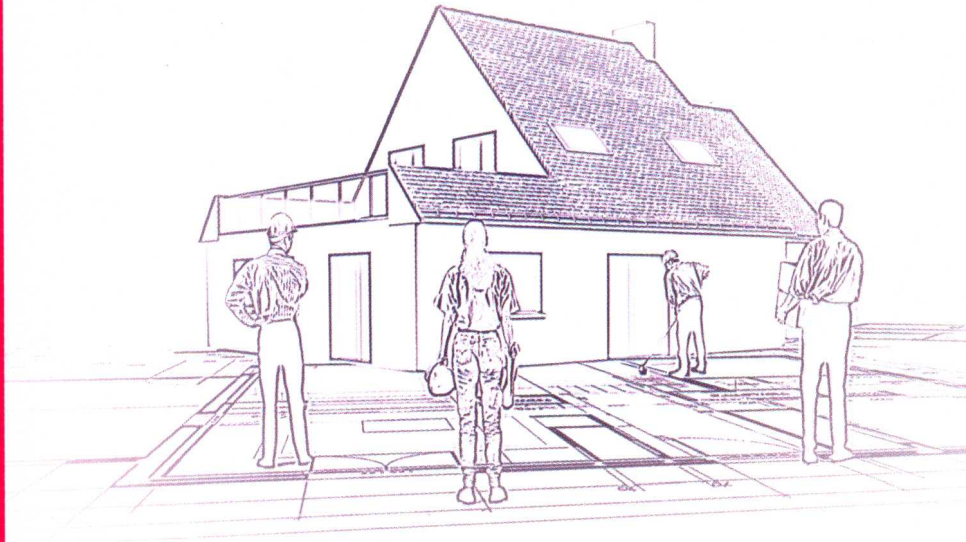

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内 容 提 要

本书是为满足应用型本科工程管理专业英语教学需要而编写的一本专业英语教材。本书选材以国外工程管理相关领域经典教材、专著为基础，并结合国内外相关论文以及网络信息，来源广泛，风格多样。内容涉及工程管理的应用现状及最新进展。本书主要由12个单元组成，内容涉及工程项目管理专业概念、工程项目组织、工程项目计划、工程项目成本管理、工程项目质量管理、工程项目时间管理、工程项目安全管理、项目融资、工程项目招标与投标、工程项目合同管理、项目谈判、合同索赔等领域。本书内容覆盖面广、系统性强、可读性好，是学习工程管理专业英语的实用教材。

本书既可作为高等院校工程管理、造价管理及相关专业的教材，也可作为成人教育、网络教育的相关专业教材，还可作为工程管理专业人士的学习参考读物。

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前　言

工程管理专业是教育部1998年颁布的《普通高等学校本科专业目录》中设置的一个新专业。该专业整合了原专业目录中的建筑管理工程、国际工程管理、房地产经营管理（部分）等专业，具有较强的综合性和较大的专业覆盖范围。工程管理专业培养适应社会主义现代化建设需要，德、智、体、美全面发展，具备土木工程技术及与工程管理相关的管理、经济和法律等基本知识，获得工程师基本训练，具有一定的实践能力、创新能力的高级工程管理人才。随着世界经济全球化的深入发展，工程项目管理也越来越国际化。中国工程项目管理的发展必须进一步加快管理方式的国际化，努力学习借鉴国际上先进的项目管理经验，在学习中借鉴、研究、提升乃至完善，不断地提高工程项目管理的水平。因此对工程管理专业本科生以及工程管理从业人员有效阅读理解国外相关工程资料、合同的能力，掌握国际上处理工程项目相关事务的法规、条例以及惯例等更多新的专业知识，能够与国际相关机构进行有效的沟通等方面的能力提出了更高的要求。

本书的编写目的在于为高校工程管理专业学生及工程管理从业人员提供一本既能够掌握工程管理专业英语术语，又能够培养和提高阅读翻译专业英语文献的能力，并了解国际工程管理领域最新发展动态和前沿知识的，具有较强应用性的教学用书。本书选材以国外工程管理相关领域经典教材、专著为基础，并结合国内外相关论文以及网络信息，内容上紧扣工程管理专业的基础理论、最新进展、前沿知识领域，并汲取了同类优秀教材的优点，主要涵盖了包括工程项目管理专业概念、工程项目组织、工程项目计划、工程项目成本管理、工程项目质量管理、工程项目时间管理、工程项目安全管理、项目融资、工程项目招标与投标、工程项目合同管理、项目谈判、合同索赔等领域在内的工程项目管理领域的理论体系和知识精粹。

本书包括12个单元，内容涉及工程项目管理专业概念到合同索赔等方面的问题。为配合课文内容的学习，每章都配有本章重点难点的注解及针对文章的问题设计，学生通过回答问题不仅能更进一步了解工程管理专业的知识，而且能进一步提高自己专业英语的听说能力；为加深学生对每单元专业术语的理解和使用，课后配有对重点词汇的讲解和习题及答案；为加强学生对该章内容专业内容的掌握，还配有支持性的课后阅读材料。

由于编者水平有限，时间仓促，书中内容涉及面较广，而我国高校开设相关专业的历史较短，可供学习、参考、借鉴的资料并不多，书中错误与不妥之处在所难免，诚请各位专家和读者批评指正，以便今后改正和提高。

编　者

Contents

Unit 1 Introduction to Core Construction Project Management Concepts

1.1 The Project Life Cycle

Project managers or the organization can divide projects into phases to provide better management control with appropriate links to the ongoing operations of the performing organization. Collectively, these phases are known as the project life cycle. Many organizations identify a specific set of life cycles for use controlling all of their projects. The project life cycle defines the phases that connect the beginning of a project to its end.

For example, from the perspective of an owner, the project life cycle for a constructed facility can 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. 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. After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for the construction, and the definitive cost estimate will serve as the baseline for cost control. On 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 designated for demolition or conversion.

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 overlapping time frames, depending on the nature, size and urgency of the project. 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. 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.

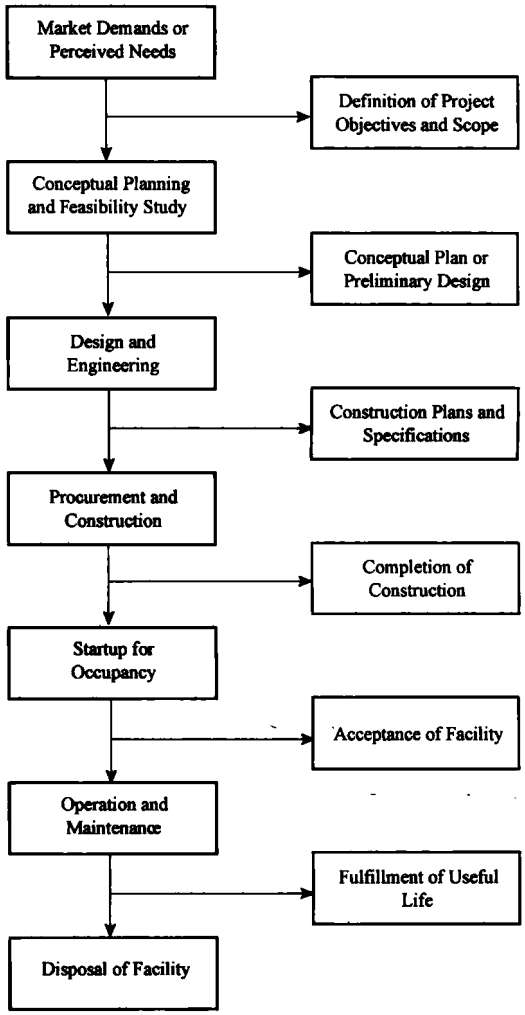

Figure 1-1 The project life cycle of a constructed facility

1.2 Major Types of Construction Project

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[1]

Residential housing construction includes singe-family houses, multi-family dwellings, high-rise apartments. 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, 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.

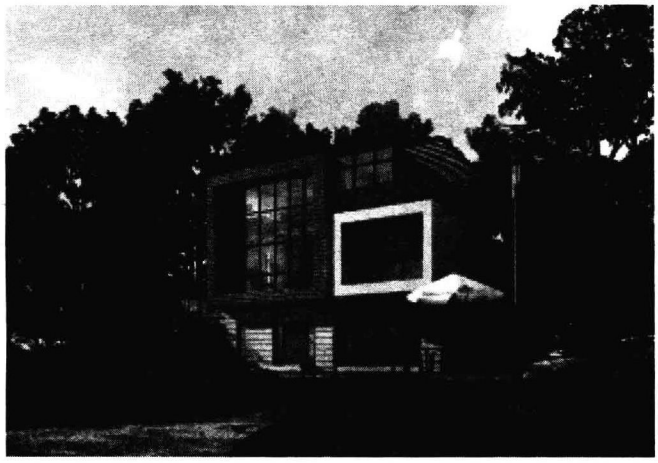

Figure 1-2 The single-family house

The residential housing market is heavily affected by general economic conditions, such as 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. 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 competitive, with potentially high risks as well as high rewards.

Office and Commercial Building Construction[2]

Office and commercial building construction encompass a great variety of project types and sizes, such as schools and universities, medical clinics and hospitals, retail chain stores and large shopping centers, warehouses and light manufacturing plants, and skyscrapers for offices and hotels, as is shown in Figure 1-3. This sector typically accounts for 35 to 40 percent of the construction market. The owners of such buildings may or may not be familiar with construction industry practices, but they usually are able to select competent

professional consultants and arrange the financing of the constructed facilities themselves. Specialty architects and engineers are often engaged in designing a specific type of building, while the builders or general contractors undertaking such projects may also be specialized in only that type of building.

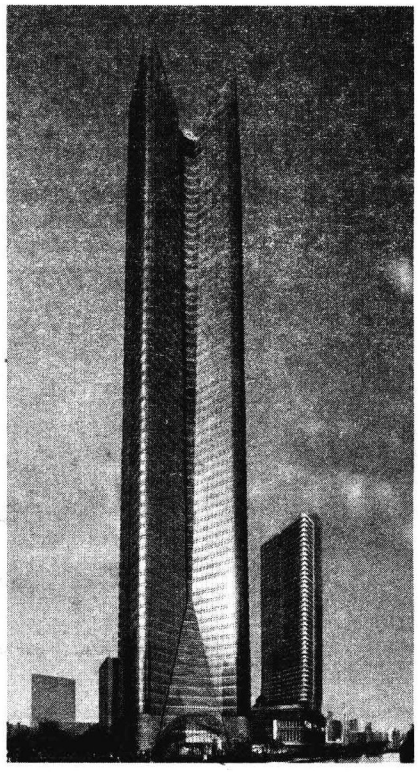

Figure 1-3 Skyscrapers

Because of the higher costs and greater sophistication of office and commercial buildings in comparison with residential housing, this market segment is shared by fewer competitors. Since the construction of some of these buildings is a long process which once started will take some time to proceed until completion, the demand is less sensitive to general economic conditions than that for speculative housing. Consequently, the owners may confront an oligopoly of general contractors who compete in the same market. In an oligopoly situation, only a limited number of competitors exist, and a company's price for services may be based in part on its competitive strategies in the local market.

Industrial Construction[3]

Though industrial construction represents only about 5 to 10 percent of the market, it contains some of the largest projects and is dominated by some of the largest engineering and construction firms. Some of the industrial constructions, especially the specialized industrial construction, usually involve large scale projects with a high degree of the theological

complexity, such as oil refineries, steel mills, chemical processing plants and coal-fired or nuclear power plants, as is shown in Figure 1-4. Other kinds of industrial construction involve mine developments, smelters, steel mills, aluminum plants, large heavy-manufacturing plants and other facilities essential to our utilities and basic industries.

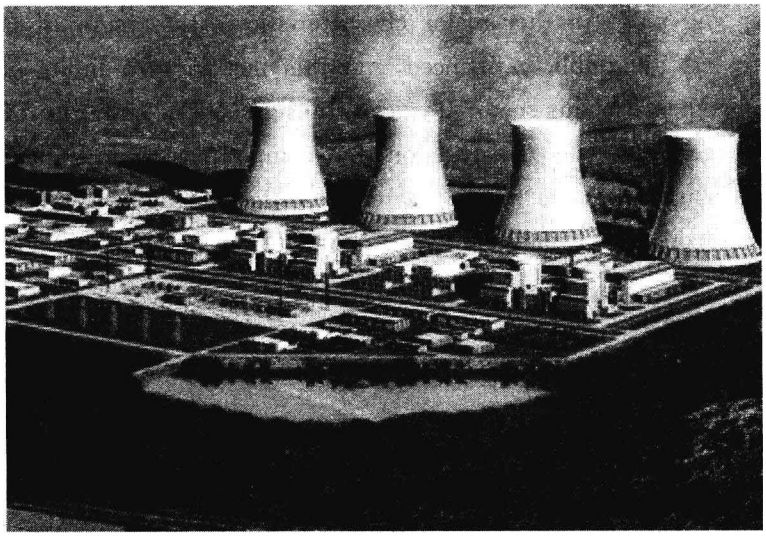

Figure 1-4 A nuclear power plant

Both design and construction require the highest levels of engineering expertise, from not only civil engineering, but also chemical, electrical, mechanical, and other disciplines, and typically all phases of the project are handled by the same firm on a negotiated design-construction. The designers and constructors must be intimately familiar with the technologies and operations of the facility from the owner's point of view, and often they hold some of the key patents for advanced process technologies needed therein. In western free-enterprise countries, most of these industrial constructions are privately financed.

The major factors in industrial construction generally consist of large amounts of highly complex mechanical, electrical, process piping and instrumentation work. This work tends to be much more labor-intensive, though some of the largest hoisting and material-handling equipment are also required.

Heavy Construction[4]

Heavy construction includes projects such as highways, mass transit systems, tunnels, bridges, pipelines, drainage systems and sewage treatment plants, as is shown in Figure 1-5. It accounts for 20 to 25 percent of the market. Most of these projects are publicly owned and therefore financed either through bonds or taxes. This type of construction is characterized by a high degree of mechanization which has gradually replaced some labor-intensive operations.

Both the design and construction phases of heavy construction are primarily the domain of civil engineers, though almost all disciplines play an important role. The construction phase is much more equipment-intensive, characterized by fleets of large dirt movers, cranes, and trucks, working with massive quantities of basic materials such as dirt, rock, steel, concrete, timber and pipe. Another major characteristic is that many, if not most, heavy construction projects are publicly financed, and this fact in turn limits other alternative contractual arrangements in this sector. Typically, design is done either by, or under contract with, a public agency, while construction by competitive open bidding. Construction contractors here usually require much greater expertise in engineering and geology than those in office and commercial building and residential housing construction.

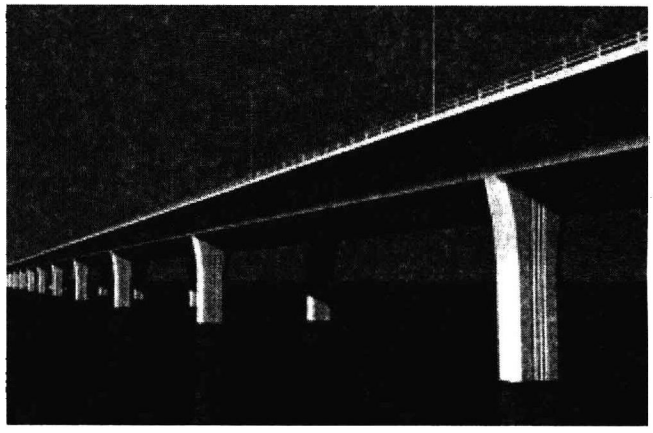

Figure 1-5 A bridge

1.3 Project Management

What is project management and how is it accomplished? Let's try to answer these questions. Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring, controlling, and closing. The project manager is the person responsible for accomplishing the project objectives.

Managing a project includes: identifying requirements; establishing clear and achievable objectives; balancing the competing demands for quality, scope, time and cost; adapting the specifications, plans, and approach to the different concerns and expectations of the various stakeholders.

The core factors of managing a project is called a "triple constraint"—project scope, time and cost—in managing competing project requirements. [5] Project quality is affected by

these three factors. High quality projects deliver the required product, service or result within scope, on time, and within budget. The relationship between these factors is such that if any one of the three factors changes, at least one of the other two factor is likely to be affected. Project managers also manage projects in response to uncertainty. Project risk is an uncertain event or condition that, once occurs, has a positive or negative effect on at least one project objective.

1.4 Professional Construction Management

Briefly, construction management is the project management which is mainly managing the construction project activities with professional tools, skills, techniques and so on. The definition of construction management can be said as: the planning, coordination and control of a project from conception to completion (including commissioning) on behalf of a client requiring the identification of the client's objectives in terms of utility, function, quality, time and cost, and the establishment of relationships among resources, integrating, monitoring and controlling the contributors to the project and their output, and evaluating and selecting alternatives in pursuit of the client's satisfaction with the project outcome.

Professional construction management is usually used when a project is very large or complex. Professional construction management refers to a project management team consisting of a professional construction manager and other participants who will carry out the tasks of project planning, design and construction in an integrated manner[6]. Contractual relationships among members of the team are intended to minimize adversarial relationships and contribute to greater response within the management group. A professional construction manager is a firm specialized in the practice of professional construction management which includes:

1. Working with owner and the A/E firms from the beginning and make recommendations on design improvements, construction technologies, schedules and construction economy.

2. Proposing design and construction alternatives if appropriate, and analyze the effects of the alternatives on the project cost and schedules.

3. Monitoring subsequent development of the project in order that these targets are not exceeded without the knowledge of the owner.

4. Coordinating procurement of material and equipment and the work of all construction contractors, and monthly payments to contractors, changes, claims and inspection for conforming design requirements.

5. Performing other project related services as required by owners.

1.5 Project Delivery Systems[7]

Owners, design professionals, and constructors make the decisions, provide the services, and perform the work to deliver constructed projects. These activities are known collectively as project delivery, and the generic term "project delivery system" describes how the participants are organized to interact, transforming the owner's project goals and objectives into a finished facility.

The marketplace is continuously transforming and redefining many of the project delivery alternatives discussed here. Therefore, it is important that parties entering discussions about project delivery can be clear about their terms, as the definitions used here do not enjoy universal acceptance.

1.5.1 Owner-Provided Delivery[8]

A project where the scope of word is within their range of skills, experience, and resources, owners often choose to perform some or all of the design services and construction work themselves. Projects that involve simple modifications to an exiting facility, as well as projects that are limited in cost or complexity, are good candidates for owner-provided delivery. An owner might also elect to keep repetitive projects in house.

The owner may supplement internal professional staff with design specialists so that the design services are essentially self-provided. Construction may also be accomplished using the owner's resources entirely, or with the owner serving as the general contractor and subcontractors performing much of the work. Of course, the owner must meet professional registrations and contracting licensure requirements. Many larger private and public entities provide some of their design professional services in house and may perform some construction using their own resources.

1.5.2 Traditional Design-Bid-Build[9]

In the U. S., DBB contracting has for many years been the form of project delivery required by law for the owners of most public work projects. Owners of many private projects also frequently choose DBB contracting. DBB is effective on projects where the owner needs both professional design services and construction services. DBB is also effective in cases where the design professional does not require detailed knowledge of the means and methods of construction. DBB provides the owner with a high degree of control and is therefore often the preferred project delivery system for owners who: wish to closely monitor projects (even conventional ones); ane public owners and must account in detail for

expenditures; are obligated by statute to procure professional design services by Qualifications-Based Selection(QBS)[10] regulations and constructors by competitive bidding.

Apart from such needs, the owner of a complex project may simply view the sequential nature of development under DBB as beneficial to quality.

1.5.3 Construction Management[11]

Many owners engage construction managers to assist in developing bid documents and overseeing project construction. In the broadest sense, a construction manager (CM) is professional or firm trained in the management of construction processes; CMs tend to be less involved with the detailed implementation of those processes. Organizationally, a CM is generally inter posed between the owner and some of the participants. There are two general types of construction manager: agency construction manager (ACM) and construction manager-at-risk(CM-at-risk). However, CM roles and responsibilities often vary. Therefore, participants benefit from defining construction management of the project at hand.

Agency Construction Manager(ACM)[12]

A construction manager acting as an agent of the owner extends the owner's internal capabilities in performing traditional owner responsibilities. However, an ACM functions wholly within the policies, procedures, and practices of the owner's organization. The level of service by the ACM can range from on-call advice to full project management. For an owner undertaking few projects, the ACM might become, in effect, the entire technical staff.

In some cases, the owner hires the ACM before the design begins. The ACM may participate in the selection of and contracting with the design professional or might even be the design professional. Before the development of the construction contract, the owner and ACM agree on the scope of the ACM's services during construction. The scope and scale of the services vary with the ACM's effort and authority. An ACM may function within any of the project delivery systems described in this unit, with the owner transferring some control and risk to the ACM.

CM-at-risk

Project delivery under the construction manager-at-risk[13] arrangement increases significantly the owner's delegations of control and risk. A CM-at-risk typically contracts with the owner in two stages. The first stage encompasses services during the conceptual and preliminary design phases, during which the CM-at-risk and the design professional, perhaps acting as the CM-at-risk's sub consultant, manage and undertake those functions, with variable participation by the owner. During this stage, the CM-at-risk is usually a paid consultant. When the design is complete, the owner and CM-at-risk then agree on a price and schedule for the construction work.

The second stage involves the completion of construction for a negotiated fixed or

guaranteed maximum price. At this point, the CM-at-risk and the owner agree on the contractual terms that will apply to the project. Acting as a general contractor, the CM-at-risk then engages the design, specialty, and trade subconsultants and subcontractors necessary to complete construction. CM-at-risk is popular for owners of private projects, and some states in America now allow CM-at-risk on some public work projects.

1.5.4 Design-Build[14]

Design-build project delivery has been used by owners of public and private projects throughout history, in which one entity is responsible for both design and construction.

In design-build delivery, the owner contracts with a single entity to provide the design (or at least a final, detailed design) and to construct the project according to that design. Under design-build delivery, the owner first assesses his or her own in-house capabilities. The contract might be negotiated with a single design-builder or result from competitive proposals. The selection of the design-builder can be based on low price only or on a set of value criteria where factors such as similar project experience, key staff availability and experience, bonding capacity, are considered along with price.

Design-build provides the owner with a single point of contact for project responsibilities, eliminating the need to assist in resolving designer-constructor disputes. With the constructor playing a major role in design, costs are typically defined and maintained to a greater degree, and the coordination of fast-track management to achieve early completion is greatly simplified.

The design-builder makes many decisions that the owner would make under DBB. The owner delegates to the design-builder greatly increased authority to fulfill an increased number of responsibilities. Compared to DBB contracting, this involves a significantly different set of requirements, expectations, timeliness, and communication.

1.5.5 Turnkey[15]

Some owners wish to delegate all responsibilities of design and construction to outside consultants in a turnkey project arrangement. A contractor agrees to provide the completed facility on the basis of performance specifications set forth by the owner. The contractor may even assume the responsibility of operating the project if the owner desires so. In order for a turnkey operation to succeed, the owner must be able to provide a set of unambiguous performance specifications to the contractor and must have complete confidence in the capability of the contractor to carry out the mission.

This approach is the direct opposite of DBB approach in which the owner wishes to retain the maximum amount of control for the design-construction process.

Turnkey project delivery has the characteristics of design-build, but adds to the design-

builder's responsibilities the operation and/or maintenance of the completed project. Turnkey delivery further reduces oversight demands on the owner, so the contractor "turns over the keys" when the project is complete. Turnkey delivery, through this transfer of responsibility and risk, has the potential to bring a new project on line more quickly.

Summary

The owner's selection of a project delivery system is one of the most important decisions affecting qualities. Construction industry professionals with experience in relevant systems of project delivery are important resources in the owner's evaluation of internal capabilities, development of project objectives and plans, and assessment of various stakeholder interests.

Glossary

collectively *adv.* 全体地,共同地
perspective *n.* 远景,前途,观点,看法
schematically *adv.* 概略地,计划性地
conceptual *adj.* 概念上的
feasibility *n.* 可行性,可能性
blueprint *n.* 蓝图,设计图,计划 vt. 制成蓝图,计划
definitive *adj.* 最后的,确定的,权威性的
baseline *n.* 基线
start-up *n.* 启动
shake-down *n.* 最后的测试运行(如对船、飞行器等)
occupancy *n.* 占有
demolition *n.* 破坏,毁坏,毁坏之遗迹
conversion *n.* 变换,转化
sequential *adj.* 连续的,相续的,有顺序的,结果的
iteration *n.* 反复
in-house *adj.* 起源于机构内部的,机构内部的
understandably *adv.* 可理解地
spectrum *n.* 光,光谱,型谱;频谱
residential *adj.* 住宅的,与居住有关的
dwelling *n.* 住处
high-rise *adj.* (建筑物)超高层的,高楼的 *n.* 高楼,大厦
surrogate *n.* 代理,代用品,代理人 *vt.* 使代理,使代替
oligopoly *n.* 求过于供的市场情况
aluminum *n.* 铝
negotiate *v.* (与某人)商议,谈判,磋商,买卖,让渡(支票、债券等),通过,越过

intimately *adv.* 密切地

instrumentation *n.* 使用仪器

hoist *n.* 提升间,升起

intensive *adj.* 强烈的,精深的,透彻的,[语法]加强语气的 *n.* 加强器

domain *n.* 领土,领地,(活动、学问等的)范围,领域

fleet *n.* 舰队(尤指有固定活动地区的舰队),港湾,小河 *adj.* 快速的,敏捷的,浅的

crane *n.* 起重机

distinction *n.* 区别,差别,级别,特性,声望,显赫

accomplish *vt.* 完成,达到,实现

commission *n.* 委任,委托,代办(权),代理(权),犯(罪),佣金 *vt.* 委任,任命

recommendation *n.* 推荐,介绍(信),劝告,建议

constructability *n.* 可施工性

designate *v.* 指定

prequalification *n.* 资格预审

Notes

[1] residential housing construction 居住类住房建设

[2] office and commercial building construction 办公及商务用房建设

[3] industrial construction 工业建筑建设

[4] heavy construction 重型工程建设

[5] the core factors of managing a project is called a "triple constraint"—project scope, time and cost—in managing competing project requirements.

管理一个项目的核心要素就是管理竞争性项目需求中的"铁三角"结构,即项目的范围、时间进度和成本费用。

[6] Professional construction management refers to a project management team consisting of a professional construction manager and other participants who will carry out the tasks of project planning, design and construction in an integrated manner.

专业建设工程管理是指由专业建设工程项目经理和以全面综合的方式承担项目计划、设计和建设任务的其他成员所组成的项目管理专业团队(来完成的项目管理)。

[7] project delivery systems 项目管理模式

[8] owner-provided delivery 转交业主模式

[9] traditional design-bid-build 传统的设计-招标-建设模式

[10] qualifications-based Selection(QBS)基于资质的选择

[11] construction management 专业项目管理模式

[12] agency construction manager(ACM)代理型项目经理

[13] construction manager-at-risk 风险型项目经理

[14] design-build 设计-建设模式