

Defining Project Delivery Methods for Design, Construction, and Other Construction-Related Services in the United States

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Over the past several years the number of project delivery methods available to owners to meet their infrastructure and facility construction needs has increased significantly. Despite this, the construction industry's basic definition of the term project "project delivery method" still appears to be in flux. This paper examines the term "project delivery method" and its meanings as defined by notable individuals and organizations associated with the construction industry. In addition this paper briefly examines changes in the industry over time that have influenced the evolution the project delivery processes. Based upon this review, the authors suggest a new definition for the term "project delivery method." This definition takes into account the characteristics of the existing project delivery methods including: 1) the basis of contractor selection, 2) the scope of services provided by the contractor, 3) the type and assignment of responsibilities within the scope, and 4) the method of compensation for work completed under the contract.

Keywords: project delivery methods, design-bid-build, design-build, construction-management-at-risk,

Introduction

During the past two decades there has been a marked increase in the number and variety of project delivery methods utilized to procure the design and construction services for facilities and infrastructure. Despite this increase in the number and variety of project delivery methods, the construction industry appears to have no clear definition and understand of what is included in a project delivery method. The purpose of this paper is explore the term "project delivery method" as it is utilized within the construction industry and to address the issue of defining this term. Without a clear understanding of this term, it is difficult for users of construction services to understand the importance of the project delivery method selected for a particular project to see its relationship to the overall success of the construction process.

Current Definitions

According to the Associated General Contractors of America (AGC), a project delivery method is "the comprehensive process of assigning the contractual responsibilities for designing and constructing a project" (AGC, 2004). To break down this definition we can see that the AGC considers a project delivery method:

1. A comprehensive process

2. Has the purpose of assigning contractual responsibility
3. Has a scope of work limited to the design and construction of a project

In elaborating on this definition, the AGC acknowledges that it is their attempt with this definition to limit the number of project delivery methods to the three most common methods (AGC, 2004):

1. Design-Bid-Build (DBB)
2. CM-At-Risk (CMAR)
3. Design-Build (DB)

These project delivery methods are assigned to a box within a matrix on the basis of the answer to the following two questions (AGC, 2004):

1. Are the design and construction under separate contracts directly with the owner, or are they under one contract?
2. Is the final selection of the constructor based on criteria other than merely the lowest total construction costs?

The result of this can be seen in Table 1.

Table 1 – AGC Matrix of Project Delivery Method Characteristics

Basis of Contractor Selection	Owner has separate contracts with both the designer and the builder	Owner one contract with an entity that provides both the design and construction
Low Bid selection	Design-bid-build	Design-build (low bid selection)
Best Value selection	CM-at-risk (best value selection)	Design-build (best value selection)
Qualifications based selection	CM-at-risk (qualifications selection)	Design-build (qualifications selection)

The AGC goes on to acknowledge the existence of other project delivery methods but relegates them to the category of “hybrids” which are some combination of the three primary project delivery methods. The AGC makes no attempt to classify or expand on their definition of a hybrid project delivery method.

In contrast to this, Charles Thomsen, FAIA (2006), defines a project delivery process as “the sequence of defining responsibility, scope, and compensation.” He goes on further to state that owners should select a project delivery method on the basis the following:

1. Relationship with the contractor ranging from one where the contractor acts in a fiduciary capacity (provider of a service) to one where the contractor is acting as a vendor (provider of a product).
2. Terms of payment that range from a cost-plus arrangement (time and materials) to a lump-sum arrangement (fixed price).
3. Number of contracts held by the owner that from one or few (i.e. design-build) to several contracts where the owner is doing direct procurement of the work.
4. Selection criteria that range from purely qualifications based selection to price based

selection (i.e. low bid).

Taking a closer look at this definition it can be seen that a project delivery method includes:

1. It is a sequence or a process
2. It has a purpose of defining responsibility, scope, and compensation
3. Provides no limitation with respect to the scope

Looking at one more definition, Sanvido and Konchar (1998) define a project delivery system as “the relationships, roles, and responsibilities of parties and the sequence of activities required to provide a facility.” Upon closer examination of this definition it can be observed that a project delivery system is:

1. The relationships, roles, and responsibilities and the sequence of activities
2. It has a purpose of establishing the relationships, roles and responsibilities of the parties
3. It limits the scope to the activities required to provide a facility

In comparing these definitions we can see that all three definitions agree that a project delivery method is a process or sequence. In addition, all three definitions agree that one of the purposes of a project delivery method is to assign or define responsibility. In contrast to their similarities, the most notable difference between these definitions is the scope or work. The AGC has the narrowest scope limiting their definition to only design and construction, while Sanvido and Konchar open up the scope to the “activities” required to provide a facility. Presumably the Sanvido and Konchar definition could be interpreted in a manner so as to include the procurement of property, financing, operation, and maintenance into the scope of services required to provide a facility. As part of the analysis process it may help to look at how the industry arrived at the point where there are a variety of project delivery methods.

Background

Prior to the twentieth century in the United States, design and construction (design-build) was a typical form of integrated services provided by construction contractors (Schexnayder & Mayo, 2004). Though there were firms that specialized in solely design, or solely construction, prior to this period many ordinary construction projects were completed by master builders who provided both the design and the construction. An example of this would be the accomplishments of John A. Roebling in the mid 1800’s. Roebling was trained as a civil engineer in Prussia, but gained notoriety for his design and construction expertise with suspension bridges (Gibbon, 2006).

In the mid to late 1800’s the practices of design and construction began to become more specialized as a technological advances began to allow for more complicated constructed facilities/structures (Thomsen, 2006). This evolution resulted in a split between two of the primary project delivery responsibilities; design and construction. Architects and engineers became the design professionals while construction contractors became the constructors. As an indication of this the American Society of Civil Engineers and Architects (which evolved to ASCE was founded in 1852 to “promote the professional status of civil engineers and architects” (ASCE, 2002). To deepen the split between design and construction, the Associated General Contractors of America (AGC) was founded in 1918 to promote the interest of the construction

industry (AGC, 2007). Thus, an era of specialization was created with the incorporation of specialized groups that represented the separate interests of designers and of constructors.

This split between the design and construction services continued to solidify in the in the early 1900's when one of the largest purchasers of construction services (federal government) began requiring the use a qualification based selection for the procurement of architectural and engineering services (ASCE, 2002). In contrast to this, most government agencies were required to procure construction service on the basis of low bid. Thus while design services were viewed as a premium service where qualifications of those providing the service were more important than cost, construction was relegated to the position of a commodity. In other words, the product of one contractor will be the same as the product of another provided they both follow the design precisely.

This evolutionary process had the affect of institutionalizing the design-bid-build (DBB) project delivery method. DBB is a linear sequence during which the purchaser of construction service, often known as the owner, procures the A/E (architect/engineer) design services separate from the procurement of the construction services. One of the common frustrations with the use of the DBB method is that the design must be fully completed prior to the procurement of the construction services. This is due to the fact that the procurement of construction services is typically based upon a hard bid price which cannot be assembled until there is a full set of plans and specifications. In a world where time is truly of the essence, owners began to recognize that the overall design and construction time could be compressed if there were some overlap of the design and construction. In other words, owners recognized that the selection of interior finishes had very little to do with the sitework and foundations once the configuration and layout of the facility were established.

Another perceived problem with DBB is the owner's misconception that the bid price is the final price. A/E plans and specifications are rarely if ever perfect and the contractor's interpretation of the plans and specs rarely if ever match the intentions of the designer. As result of this, it is common place in construction process that there will be changes and change orders. This often has the untended consequence of placing a stress on the business relationships between the owner, design professional, and the contractor.

Despite these shortcomings, the DBB project delivery method became the primary project delivery process of the twentieth century. However, owners were beginning to note the problems with method. Designs were often less than perfect and the low bid selection process for the constructor provided little incentive to the contractor to provide anything other than the minimum required to complete the project (Gransberg, Koch, & Molenaar, 2006). The typical construction goals of a quality project, completed on-time, and within budget, were not being fully met. Owners were looking for other methods to meet their design and construction needs. As usual where there is a will, there is a way. Thus, the age of the alternative project delivery method was born with the reintroduction of design-build, construction-management-at-risk, and other project delivery methods designed to address the shortcomings of the design-bid-build method.

A Wide Variety of Project Delivery Methods

As the twentieth century came to a close, a wide variety of project delivery methods had appeared. Many of these methods were developed to address the weaknesses of the DBB method and provided incentives to the contracting parties to meet and or exceed the construction goals of a quality project, completed on-time, and within budget.

While there is any number of project delivery methods available to the owner, the following are the general characteristics of several of the more popular methods:

1. Design-Bid-Build also known as hard bid or the low bid method. This is still considered the traditional project delivery method for design and construction where the design precedes the construction and the contracts provides either a lump sum or unit price bid to obtain the work. Typically the lowest responsible and responsive bidder wins the contract to perform the construction. Because the quality, price, and completion date of the contract are all established by the contract requirements, there is little incentive to the contractor to provide any expertise beyond what is minimally required to obtain and complete the project within the requirements of the contract.
2. Design-Build (DB). The design-build method is somewhat a throwback to the years before the design-bid-build method was established as the principle project delivery method for design and construction service. Using this method the owner contracts with a single entity (i.e. the design-builder) to provide the design and construction services for a project. This method has the advantage that the construction can actually begin prior to the completion of the design which typically saves valuable time for the owner. In addition, because the design-builder is provided integrated services, the owner can take advantage of the contractor's expertise during the design phase of the project and the architect/engineer's expertise during the construction phase.
3. Construction-Management-at-Risk (CMAR). While this method has some characteristics similar to the design-bid-build method in that the owner contracts separately with both a designer and a constructor, the construction manager has responsibilities beyond what a general contractor would have. The construction manager will be brought into the design process early to provide input into the design and will provide cost estimating services throughout the design phase to help assure the project will stay within budget. During the construction phase the construction manager will assist the owner in finding and managing the activities of the subcontractors brought in to perform the work. There is typically an open book accounting process between the owner and the construction manager so the owner can see how their money is being spent.
4. Design-Build-Operate (DBO), Design-Build-Operate-Maintain (DBOM), and Build-Operate-Transfer (BOT). This is a family of project delivery methods that extend the owner-contractor relationship beyond just design and construction. In certain circumstances the contractor can also provide operating services, maintenance services, and financing to assist the owner in meeting their needs. An example of this would be a municipality that needs a new waste water treatment facility to meet a growing demand but does not have the financial capital and or expertise to build and operate this type of facility. In this case a contractor with the right knowledge, financing, and expertise can assist and owner in meeting these extended needs.
5. Job-Order-Contracting (JOC). This is a type of indefinite delivery, indefinite quantity

contract (IDIQ) where the owner contracts with a contractor for an unspecified quantity of work within a specified scope of work. Typically the work is relatively small and routine and may include minor design services. This project delivery method is primarily intended for facility owners who regularly have a need for construction services that exceed the capabilities of the maintenance staff but that are not large enough to justify the cost and time required to procure multiple construction services in a conventional manner (i.e. design-bid-build).

In addition, to the basic project delivery methods previously outlined there are variations in the procurement practices (selection criteria) that are utilized to obtain these services (Trauner, 2007). As an example of this an A + B procurement method could be used with a traditional design-bid-build project delivery method. Here the contractor not only bids the cost of the work, but there is a cost factor (the “B” component) associated with the time required to complete the work. The winning bidders for these types of contracts are based upon a combination of price and time. Other procurement practices include (Trauner, 2007):

1. Lump sum bidding
2. Reverse auction
3. Bid averaging
4. A + B
5. A + B + C (cost + time + some other factor)
6. Alternate design
7. Alternate bid
8. Additive alternates
9. Best value

Common Threads

When we review the existing definitions of “project delivery method”, the history of how these methods came to exist, and the characteristics of several of the more common project delivery methods in use today, it becomes apparent that the existing definitions do not accurately reflect the true meaning of the term “project delivery method.” As Charles Thomson (2006) suggested, the defining characteristics of project delivery method appear to include:

1. Contractor selection criteria
 - a. Qualifications only
 - b. Combination of qualifications
 - c. Price only
2. Number of contracts
 - a. Integrated services (i.e. design-build under one contract)
 - b. Separate design and construction contracts
 - c. Multiple prime contractors
 - d. Direct procurement
3. Type of relationship with the owner
 - a. A service provider
 - b. A provider of product and a service
 - c. A product provider

4. Terms of payment
 - a. Time and materials
 - b. Target price with incentives
 - c. Cost plus with a guaranteed maximum price
 - d. Unit price
 - e. Fixed price

From this review it appears that a “project delivery method” is:

The process through which constructed projects are organized and completed including establishing how the contractor will be selected, the scope of services provided, the type of relationship with owner, and how the contractor will be compensated.

While this is not the simplified definition envisioned by many, it appears to be more reflective of how the term is being used.

The Significance of Project Delivery Method Selection

The selection of a project delivery method for a design and construction of a project is one of the most important decisions an owner will make. In 1976 Boyd Paulson (1992) published his findings on “Designing to Reduce Construction Costs” in the ASCE Journal of the Construction Division. In this paper Paulson denoted what has become known as the cost-influence relationship. Essentially as a construction project progresses through the “engineering/design”, “procure/ construct”, and “utilization” phases, the project expenditures increase while the ability to influence the project decreases. Following this concept back to the beginning of a project we can see that the greatest chance to influence a project occurs in the earliest stages of a project. The selection of the project delivery method to be utilized in completing a project is one of the earliest decisions to be made on a project. Without a clear understanding of what is meant by project delivery method, owners and other users of construction services will not be able to make an informed decision as to what is the most appropriate project delivery method for their needs.

Two areas that ripe for influence in the early stages of a project are risk and incentives. As stated above one function of the project delivery method is the assignment of contractual responsibility. Owners, designers, and contractors all have a vested interest in the assignment of responsibilities under the contract since all responsibilities carry risk. Typically owners are at risk for the financing, payments to the designer and contractor, and site conditions. The design professionals are at risk to assure the design meets the aesthetic and functional requirements established by the owner, and that the design is code compliant. The contractor is at risk to assure the construction is completed on time, within budget and with the quality specified. The selection of a particular project delivery method for a particular project will establish how the risks are to be shared and managed on the project. This in turn will affect the cost of the project. As Schexnayder and Mayo (2004) state: “Risks are best assumed by the party with the ability to control the risk.”

As an example, one of the disadvantages of the design-bid-build project delivery method is that it

“tends to create an adversarial relationship among the contracting parties, rather than foster a cooperative atmosphere in which issues can be resolved efficiently and effectively” (Trauner, 2007). Characterized in another way what this states is that the design-bid-build project delivery method provides an incentive for the parties to the contract to not create a cooperative project atmosphere. While a cooperative project atmosphere may or may not be something that an owner would want on a project, the point here is that this is an incentive that can be influenced through the selection of the project delivery method for a particular project.

Two component of the project delivery method that provides the most incentive are the method of contractor selection and terms of payment. If a contractor is selected on the basis of low cost only then there is little incentive for that contractor to provide anything beyond the minimal to fulfill the requirements of the contract. On the other hand, a contractor selected on the basis best value (qualifications and cost) has an incentive to maintain and enhance their value through performance that meets or exceeds the owner’s expectations.

Conclusion

In recent years there has been an increase in the number of project delivery methods available to owners when undertaking the design and construction of a constructed facility. Despite the increase in the number of project delivery methods some organizations such as the AGC have created a definition of “project delivery method” with the intent of forcing all project delivery methods into categories based upon 1) the number of contracts issued for the design and construction of the project, and 2) the method of selecting the contractor. A review of other project delivery definitions and actual project delivery characteristics seems to suggest that the AGC definition does not begin to capture to true sense of what a project delivery method is. Thomsen (2006), Sanvido, and Konchar (1998) suggest that a project delivery method is more than the number of contracts issued by the owner and the contractor selection process. This review suggests that a project delivery method as applied to constructors includes 1) how the contractor is selected, 2) the scope of services provided, 3) type of relationship with the owner, and 4) the method of compensation for services provided.

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