

## **ABSTRACT**

GRASSO, BARTON DANIEL. Benchmarking the Management of Construction Programs.  
(Under the direction of Dr. William Rasdorf.)

The management of large capital improvement construction programs involves the efforts of both internal staff and external service providers. An understanding of how construction programs are managed, either through internal or external staff, is essential in tracking future trends and determining improvements and best practices in the management process. To address this need a survey was developed by a focus group of industry professionals. The survey was distributed to the membership of a number of professional organizations that represented owners within the construction industry. The survey attempted to determine both the current status of managing a construction program throughout a broad range of demographic characteristics (including the definition of program management) and the hiring of an external program manager. The survey and subsequent analysis that focused on the management of a construction program examined the following key points: role of a program manager, internal capabilities, outsourcing, sourcing strategy, and management costs. The survey and subsequent analysis that focused on hiring an external program manager examined: program management fees, type of firms used in managing a construction program, factors considered when hiring a program manager, and organizational structure. The results of the survey have also been segregated by public and private organizations to denote any differences in the management of public and private construction programs. A key contribution of this research was determining the percentage of outsourcing within each phase of the construction process and the number of service providers considered in the selection process. Also, a multifaceted definition of program management was developed from the research for use in clarifying the concept of program management within construction.

# **BENCHMARKING THE MANAGEMENT OF CONSTRUCTION PROGRAMS**

by  
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## **DEDICATION**

This thesis is dedicated to each one of my grandparents. Sometimes support is physical and real, thank you Grandma Dunfield. Sometimes support is spiritual, Grandma Grasso, Grandpa Joe, Grandpa Dunfield, thank you.

## **BIOGRAPHY**

I came to North Carolina State University in the fall of 2005 with the intention of graduating with a Masters of Science in Civil Engineering degree with a concentration in Construction Engineering. And while it looks as if my intentions will be fulfilled I have gained much more than a diploma. The friendships and experiences within the capital city of North Carolina will never be forgotten. I arrived in Raleigh three months after completing my undergraduate degree in civil engineering from Tulane University located in New Orleans, LA. I spent my four years at Tulane University absorbing everything I could from my experiences in the classroom, on the football field, and in one of America's greatest cities. I left New Orleans merely 4 weeks before Hurricane Katrina. After speaking with friends who lived through the hurricane and returning to New Orleans, I am truly blessed for not having to have experienced first hand the devastation and depression New Orleans endured. I have held numerous intern positions intermixed throughout my time in Raleigh, New Orleans, and Birmingham, all in the field of construction. I am a 2001 graduate of John Carroll Catholic High School in Birmingham, AL. Birmingham is my hometown, where I was born and raised.

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## **1.0 INTRODUCTION**

The subject of this thesis is the management of construction programs, specifically program management. This thesis is a compilation of work intended to accomplish a specific objective. The following sections discuss the nature of this objective, along with the scope of work and the methods used to accomplish the objective.

### **1.1 Objective**

The objective of this thesis is to benchmark both the internal management of a construction program and the hiring of an external program manager. Those with the responsibility for managing a construction program are known as program managers. Program managers are both internal and external. Owners of construction are program managers as well as service providers who offer program management services. An understanding of how construction programs are managed, either through internal or external staff, is essential in tracking future trends and determining improvements and best practices in the management process.

One of the concepts related to the management of a construction program covered within this thesis is outsourcing. Outsourcing has become an issue throughout all industry as companies look to streamline their business processes by finding others who can perform functions cheaper and faster than can be done internally. The management and execution of a construction program is no different. Large corporations, organizations, and government institutions with large construction programs that support their core business processes have begun to look to outside firms to manage and execute their construction program. The management of an entire construction program by an outside service provider is known within the construction industry as program management.

The idea of an external program manager has emerged as a management technique offered by service providers within the construction industry. As owners of construction have begun to ask construction managers to expand their service offerings, construction managers have responded with the creation of a service known as program management. However, a



difference of opinion amongst industry professionals exists about the definition of program management and the role of a program manager. As a result, standard practices have not been defined and best practices cannot be identified and made known.

Program management can be performed either by the internal staff of a construction owner or by external staff hired by the construction owner. When an owner hires external staff to perform specific functions within the construction life-cycle this is defined as outsourcing. One objective of this thesis is to determine the amount of outsourcing within each phase of the construction process, effectively denoting how a program is managed and how it is staffed (The staffing or procurement of services throughout the construction life-cycle is referred to as sourcing strategy throughout the thesis). Also, the thesis discusses the hiring and use of an external program manager and evaluates the functions an owner expects an external program manager to perform.

## **1.2 Scope**

The scope of this thesis is the construction industry, specifically non-residential construction. Within the non-residential construction industry the thesis focuses on management techniques for construction programs. The outsourcing of construction programs by construction owners is addressed along with the use of an external program manager. The outsourcing data was segregated by each phase within construction. The phases of construction were determined by a literature review and by discussions with industry experts. The five phases of construction include:

- Pre-Design
- Procurement
- Design
- Construction
- Post-Construction

It should be noted that the survey data was not segregated by the procurement phase. While the procurement phase is commonly considered to be one of the five phases of construction, the procurement phase also references the sourcing of the construction process. By including the procurement phase in the series of questions on sourcing strategy the potential for confusion existed. Respondents may confuse the questions related to sourcing as questions related to procurement.

The use of a program management service provider within the construction industry is also reviewed in the thesis. The thesis reviews both program management performed internally by the owner and program management performed by an external service provider. Program management is a management technique within construction. Management techniques are different from project delivery methods. A project delivery method is defined as, “a comprehensive process of assigning the contractual responsibilities for designing and constructing a project” [Kenig et al. 2004]. A management technique or method is defined as, “a method of managing design and construction services” [Kenig et al. 2004]. This thesis does not focus on project delivery methods within construction such as design-bid-build, construction management at-risk, and design-build. A common misconception exist within the construction industry that management techniques and project delivery methods are one in the same.

The current CMAA definition of program management is

“Program Management is the practice of professional construction management applied to a capital improvement program of one or more projects from inception to completion. Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction and activation - for the purpose of providing standardized technical and management expertise on each project” [CMAA 2006].

The thesis also often refers to the term construction management, another management technique within construction. The current CMAA definition of construction management is,

“a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost and quality” [CMAA 2006]. The term construction management is used in the survey because the FMI/CMAA Annual Survey of Owners has historically centered on the use of construction management as a management technique within construction, it is a more familiar industry term. However, the FMI/CMAA Seventh Annual Survey of Owners specifically focuses on program management. Still, references to construction management remain and thus the reader may see references to construction management throughout the thesis.

### **1.3 Methodology**

The methodology that was used to achieve the proposed objectives of the thesis involved extensive research. The research entailed a literature review, a survey of construction owners, survey analysis, and roundtable discussions. The literature search was focused on:

- Past CMAA surveys
- All management techniques within the construction industry
- Program management procedures and methods
- Outsourcing within construction
- Sourcing strategies within construction
- Risk of managing a construction program

The survey was conducted and analyzed and was accompanied by discussions with industry experts to attempt to gauge the current outsourcing and sourcing strategy trends of construction owners and to determine the extent of use of external program managers. The survey was conducted through FMI Corporation, a Raleigh, NC based construction consulting firm. The survey participants were strictly owners of construction. In order to assure that the respondents of the survey were owners of construction, access to the survey was by invitation only. The survey was circulated to the members of several professional organizations whose members include a majority of construction owners. The following is a

listing of the professional organizations whose membership received an invitation to participate in the survey.

- CMAA (Construction Management Association of America)
- COAA (Construction Owners Association of America)
- CURT (Construction Users Roundtable)
- HFI (Health Facility Institute)
- CEFPI (Council of Education Facility Planners International)
- SAME (Society of American Military Engineers)

Ultimately, all of these previous professional organizations participated in the survey except for SAME. The survey was also sent to specific contacts within the FMI database of construction owners. The survey was disseminated either by a paper copy through standard postal mail or as an internet link to an online version of the survey emailed to select participants.

The roundtable discussions were with select owners and contractors who have used or have significant knowledge of program management. The survey data was analyzed to benchmark the outsourcing of construction programs and to determine the use of program management as a management technique. The analysis of the survey data was refined by segregating the results of the private sector responses and the public sector responses.

## **2.0 PAST CMAA SURVEYS**

For the past six years, Fails Management Institute (FMI) and the Construction Management Association of America (CMAA) have collaborated on an annual survey of owners or purchasers of construction services. FMI and CMAA have created, compiled, analyzed and reported on six surveys. The first three surveys were in a basic report format created only for use by members of the CMAA. FMI and CMAA published the fourth survey in a pamphlet format for distribution to all interested parties and continued this format for both the fifth and sixth surveys. The following sections provide a summary of each survey along with a brief description of their important findings. Thus, the reader gains an understanding of the essence of each previous study so that the context of the current study is clear.

### **2.1 Initial Survey (2000)**

The initial FMI/CMAA survey [Bridgers 2000] of owners focused on the current use and status of construction management as a project delivery method along with understanding the current definitions of the construction management/project management process. The goals of this survey were: to clarify any misunderstandings of terms used in the construction management/project management process; find out how construction management was being used; determine the expectations of owners; and determine how construction management firms can better deliver the desired services. One hundred and sixty people were contacted for this survey and twenty-six responded. It is noted in the survey that, “participants were not randomly selected, thus the survey’s significance is low, and results should be viewed in this light” [Bridgers 2000]. A summary of the significant findings of this survey is provided below.

The initial survey included meaningful conclusions specific to the different parties involved. Conclusions for CMAA were that an opportunity exists to help owners understand when a project is best suited to use construction management as a project delivery method and that construction management certification was essential to the owner’s decision regarding which

construction services to purchase. However, not many of the respondents knew that certification for construction managers even existed.

Conclusions for owners included a need to focus on clarifying objectives for the project, identifying and communicating key measures for values, and selecting the best project delivery method and the firm that can provide the highest quality of the desired services. Another conclusion for owners was that they needed to develop specific criteria for choosing between a general contractor and a construction manager.

Finally, conclusions for construction management/program management firms were that they needed to understand the importance the owner places on their relationship with the project management team and the team's ability to communicate its goals for meeting the owner's needs. Also the survey concluded that it was important for construction management/program management firms to clearly define their services, whether that be, "general contractor" or "construction manager" in order to reduce confusion that can lead to increased costs, and frustration on the part of all parties involved [Bridgers 2000].

Another significant result of the survey was the creation of a decision matrix used to aid owners in their decision of what type of project delivery method to choose: general contractor, construction management, or construction management at risk. The decision matrix was based on FMI research and experience, along with the results of the survey. The matrix included 12 different types of project criteria and matched this criteria with different parameters for a given project delivery method. The criteria used in the matrix focused on three areas: project finances, project complexity, and owner construction experience.

## **2.2 Owner Survey (2001)**

The 2001 owner survey [McComb & Doran 2001] focused on gathering data and information to help owners better understand construction management and its value to the overall construction process. The goal of the survey was to accumulate information that would help CMAA better communicate with owners the advantages of construction management. Four

hundred and twenty-five people, representing federal, state, municipal, quasi-public, and private owners, were contacted for the survey. Forty-four responded, with private owners being the largest group of respondents. The survey also noted that the events of September 11 would have an impact on the construction industry and that when one reviews the results of the 2001 owner survey; they should keep this in mind.

The major conclusions drawn from the 2001 owner survey directly addressed its communication goal. The first conclusion is simply a general statement that owners believe construction managers play a specific role in the construction process. The second conclusion states that owners expect the construction manager to play an important and involved role in safety. The third conclusion lists three characteristics of construction managers (including past performance, knowledge, and a proactive approach) that lead to a successful relationship between themselves and the construction manager. The fourth conclusion derived from the survey was that owners use in-house construction managers for a wider range of activities than they do contracted construction managers. Another conclusion of the survey, which reinforced a major conclusion of the initial survey, was that owners believe certification for construction managers was important. The final conclusion of the survey was directed towards construction management firms and established that it was their responsibility to educate owners on the value of using the construction management method [McComb & Doran 2001].

### **2.3 Owner Survey (2002)**

The 2002 owners survey [Doran & McComb 2002] was geared towards identifying the status of the construction industry from an owner's perspective. It also sought to identify the role of the construction manager within the construction process. The survey consisted of a series of questions that asked the participants to evaluate statements about each phase of the construction process. Again, the participants of the survey were owners within the construction industry. The largest group of participants was the general building owner and operator.

The 2002 owner survey identified certain challenges owners faced within each phase of the construction process. The stated conclusions from the 2002 survey help to establish the most significant of these challenges within each phase. For the pre-design phase, survey results lead to the conclusion that owners felt time constraints were the most significant challenges for owners. For the design phase, owners felt the most significant challenge was the lack of coordination or collaboration among the construction project team members. Better coordination and collaboration is needed to help all members of a construction project understand their roles, along with the nature and relationship of their role with the roles of others on the project team. The owners participating in the survey felt that acquiring knowledge of those with whom they were contracting services was the most significant challenge within the procurement phase. Most owners surveyed felt that there was not sufficient information on past project performance of bidders. During the construction phase, owners felt that the most significant challenges were, “establishing trust and respect to foster collaboration, open sharing of information, shared mission and goals, and various roles of leadership” [Doran & McComb 2002]. The most significant conclusion from the 2002 survey (and its overall theme) was that owners viewed the people involved with the construction process as playing the most influential role in a successful project.

#### **2.4 Fourth Annual FMI/CMAA Survey of Owners (2003)**

The fourth annual survey of owners [Doran 2003] was conducted by FMI along with help from CMAA and CURT. The survey followed the format of previous surveys and asked similar questions in an attempt to identify trends within the construction industry. With CURT’s help, questions were added to the survey on the topic of the design process and Architect/Engineer (A/E) productivity. Ninety-three owners participated in the survey. The participants consisted of owners from five major industry sectors including private, quasi-public, municipal, state, and federal.

The conclusions of the fourth survey were similar to the previous year’s survey. The overall theme of the results of the survey was again the need for owners to have the right people on the right teams involved early in the construction process. Some of the most significant



conclusions of the survey and some of the greatest issues many owners had with the construction process included the following.

- The lack of coordination and collaboration among team members
- The need to spend more time in pre-design
- The need to pre-qualify bidders
- Opportunities for improvement in the start-up and turnover processes [Doran 2003]]

Several other conclusions were drawn from the results of the survey. The first of these was the fact that all owners surveyed considered that compliance with the original construction budget was the most significant factor in defining project success. The second was that there was significant room for improvement in the area of construction documents and the design process. The third was that owners felt that communication and timely decision making were the most important things that they could contribute to a successful project. The final conclusion was that owners felt that their dependence on outside expertise will increase over the next five to ten years and will become one of the biggest issues facing them in the construction process [Doran 2003].

## **2.5 FMI/CMAA Fifth Annual Survey of Owners (2004)**

The fifth survey [Doran 2004] was conducted by FMI with help from CMAA and the participation of the Construction Owners Association of America (COAA). The survey incorporated many of the same questions from previous surveys in an attempt to again gauge the current trends of the construction industry. The survey also included questions on document quality, the role of the construction manager, and ethics. The participants of the survey were owners from a wide range of markets. Private companies represented the largest group of participants. Also, with the help of the COAA, a broader variety of owners participated in the survey.

The fifth annual survey produced some general conclusions on cost issues and schedule issues. The survey found that owners believed the primary reasons for cost overruns were: incomplete drawings, poor pre-planning process, escalating cost of materials, lack of timely decisions by owners, and excessive change orders. Owners also reported that scheduling issues were a uniform problem by indicating that key phases in construction often ran 20% to 50% longer than planned.

The survey also produced other key observations including the following.

- The various issues surrounding efforts of coordination, collaboration, and communication continue to challenge owners and cause confusion on projects.
- The leading causes of cost overruns are incomplete drawings, poor pre-planning, and the escalating cost of materials.
- There is insufficient time and funding in a typical project to give the pre-design stage the attention it requires.
- Owners need to work harder to control scope and avoid “scope creep.”
- More than 70% of respondents say they have experienced a decline in the quality of design drawings.
- Nearly 60% of respondents say having subs complete the design increases miscommunication and delays.
- Architects need to be held more responsible for completing a quality design that can be built without numerous change orders or requests for information.
- Owners expect their construction manager to provide leadership in managing projects from beginning to end, including design, funding, scheduling, and construction.
- Nearly 80% of owners believe project collaboration software can help avoid disputes and miscommunications, but about 65% still do not mandate its use on their projects.

- Although nearly 80% of owners said that interoperability of software products is important, about 65% also said they are not satisfied with vendors' efforts in this direction to date [Doran 2004].

## **2.6 FMI/CMAA Sixth Annual Survey of Owners (2005)**

The sixth survey [Bridgers & Napier 2005] was conducted by FMI and supported by CMAA. Survey questions addressed the value and use of project delivery methods. The survey was circulated to the members of the CMAA, the COAA, and the Construction Users Roundtable (CURT). Survey participants were associated with multiple market sectors with the largest sector being education. The largest organization sector to reply to the survey was the municipal organization. Survey respondents carried titles such as CEO, director of facilities management, program directors, vice presidents, and project executives.

The results of the sixth annual survey produced many similar conclusions to those of past surveys. The conclusions were that owners had concerns with communication and collaboration and that most owners reported that all phases of the construction were running longer or significantly longer than planned. An interesting conclusion to the sixth annual survey involved owners' recognition of project delivery methods. The survey noted that owners had begun to recognize alternative project delivery methods with which to achieve their goals. The survey found that while a large majority (66%) of owners used the design-bid-build delivery method, only a small percentage (23%) believed that it offered the best value [Bridgers & Napier 2005].

The top concerns and issues of the sixth annual survey were as follows.

- Trust and integrity in the construction process
- Coordination and collaboration among team members
- Improved relationships between contractors, CM staff, designers, and final users
- A/E consciousness of the cost to build their designs
- Bringing contractors, subs, and suppliers on board during the design phase

- Scope control and communicating a clear work scope
- Providing drawings that are more complete to build the project
- Owner responsibility for the process
- Owner decision-making responsiveness
- Attaining good project definition [Bridgers & Napier 2005]

### 3.0 THE ROLE OF A PROGRAM MANAGER

Program management services are usually associated with large capital improvement programs. Program management typically implies the management of multiple projects; however the management of one very large project with multiple phases is sometimes described as program management. The projects included within a construction program can contain multiple facilities or be dispersed over different geographical locations.

The concept of program management includes a series of procedures a program manager is expected to perform. These procedures incorporate all phases of the construction process. According to the AGC's *Project Delivery Systems for Construction* [Kenig et al. 2004] the five phases of the construction process are:

- Real Estate
- Financing
- Design
- Construction
- Occupancy

Each of these phases requires some party to take responsibility for its completion, whether that responsibility is delegated to someone internally or outsourced to an external service provider is the owner's decision. Ultimately the completion of all phases of construction is the responsibility of the program manager, whether that program manager is the owner or an external service provider.

The CMAA's *Program Management Procedures* [Cullerton et al. 2003] presents a more detailed review of the responsibilities of a program manager. Within *Program Management Procedures*, the list of phases and activities used in describing the procedures of a program includes:

- Program Development

- Planning
- Procurement
- Design
- Construction
- Activation
- Operations and Maintenance Support

It is important to note that the responsibilities of the program manager within each phase of the construction process may overlap. The AGC explicitly discusses the possibility of overlapping activities within their definitions for the phases of construction, “While the terminology used to define a phase may differ, each construction project can be outlined using the definitions given below. Keep in mind that the scope of work within one phase can overlap with that in another” [Kenig et al. 2004].

An example of when activities overlap can be found in the pre-design and design phases discussed in Section 3.3 of this chapter. It is sometimes difficult to differentiate between phases and to know when one phase ends and another phase begins. The activities to be performed within each phase should be clearly defined, however, even if those activities overlap with activities of other phases. It is important that the program manager have a clear understanding of who is responsible for each phase and the tasks associated with each phase. If certain activities are duplicated within different phases, the program manager should consider using the same service provider for that activity throughout the construction life-cycle.

Duplication of an activity throughout the construction life-cycle may be necessary, but it may also be inefficient and costly. The program manager should always be wary of any duplicated activities. The program manager should determine which activities need to be performed throughout multiple construction phases and which do not, in order to avoid unnecessary costs.

The functions required of a program manager or the functions included in a construction program are not widely agreed upon throughout the construction industry. However, many of the views on the functions of program management are similar when reviewed carefully even if they are given a different name or grouped under a different phase or category. The following sections of this chapter detail the functions of a program manager and a construction program as they are discussed in Construction Management Association of America's *Program Management Procedures* [Cullerton et al. 2003] and the Associated General Contractor's *Project Delivery Methods* [Kenig et al. 2004].

Some of the following sections coincide with the functions studied in the outsourcing portion of the survey included in this thesis. Other functions were not studied in the outsourcing portion of the survey, but are included here to provide the reader with each of the possible program management functions. While the following functions are all part of a construction program, not every external program manager performs all of these functions. The needs and resources of the owner procuring program management services will determine the functions to be performed by the external program manager [Cullerton et al. 2003].

### **3.1 Pre-Design Services**

The pre-design phase is sometimes referred to as the planning phase and incorporates all activities before the design phase including program development. The activities within the pre-design phase generally include:

- Detailed master plan development
- Scope definition
- Master schedule development
- Acquisition of real estate
- Procurement of financing
- Program phasing

During the pre-design phase it is important for the owner to get a grasp of the scope of the entire construction program. The program manager must develop a detailed plan for the construction program during the pre-design phase and review each project and its specific needs. It is important for a program manager to be able to see the big picture and understand not just the intricacies of each project but of the entire program and how each project interacts with one another.

Defining the scope of work for the construction program is one of the first steps in the development of a program. The development of the scope of work for the program is a fluid process and may be altered as the program progresses, however the development of a clear scope of work early on aids in a successful construction program. The preliminary master schedule should be developed with the scope of work. The preliminary master schedule should include the completion date for the program along with the completion date of all sub-project elements.

Also of consideration during the pre-design stage is the acquisition of real estate and financing. The AGC defines these two activities as phases however when the phases are organized as they are within this thesis both would be considered functions of the pre-design phase. The AGC defines the real estate and financing functions as follows:

- Real Estate – The “real estate” phase consists of locating and purchasing real property; identifying its appropriate use; arranging for zoning, permitting, and environmental compliance; and handling other front-end development issues.
- Financing – “Financing” is the process of obtaining funds to pay for and develop real property [Kenig et al. 2004].

The acquisition of real estate and the procurement of financing are classical front-end services that should be performed at the earliest stages of a program. Both of these functions are typically performed in-house by the owner. Even if an external program management service provider is used to manage the construction program, the owner typically takes the lead on acquiring the real estate and procuring the financing for the construction program.



Along with the procurement of financing for the program other financial factors should also be considered including cash flow projections for the entire program.

Following the development of the program and the acquisition of real estate and the procurement of financing the program manager must begin to phase the program. The program manager needs to develop specific requirements for each project within the program. The program manager should also separate the program into separate projects and begin to define the budget, infrastructure, and associated utilities for each project. During this time all possible regulatory concerns with the construction program should be reviewed. Any contingency plans to deal with potential regulatory concerns should also be put into place.

### **3.2 Procurement Services**

Procurement services are either performed in-house or by an external program manager. The owner and the program manager must decide on the procurement strategy to use in procuring professional services both in the design and construction phases. The procurement strategy must also consider the procurement of construction materials. Some of the procurement strategies that should be considered as they are listed in *Program Management Procedures*:

- Design-bid-build, CM-at-risk or design build project delivery methods
- Owner furnished equipment or materials
- Firm fixed price or lump sum contracts
- Cost reimbursement contracts
- Unit price contracts [Cullerton et al. 2003]

The program manager should look to find any possible cost savings in material and equipment purchases by leveraging the buying power of the entire program and not simply the buying power of each individual project. The program manager also performs such activities as contract document issue, addenda issue, and contract award as part of their procurement services.

### 3.3 Design Services

The services associated with the design phase are not widely agreed upon within the construction industry and the two manuals used in this literature review represent this discrepancy. The AGC defines the design phase as including, “all architecture and engineering work associated with the building improvements on real property, including programming and predesign activities” [Kenig et al. 2004].

While CMAA’s definition of the design phase does not include programming and pre-design services, some similarities exist between what CMAA considers to be the activities associated with the design phase and the definition given by AGC. The activities listed in the design phase by CMAA are similar to some of the activities also performed in the pre-design phase. The activities for which the program manager is focused on during the design phase according to CMAA include:

- Design program development
- Design schedule management
- Design packaging
- Construction packaging and phasing
- Project and program interfaces
- Design and peer reviews [Cullerton et al. 2003]

The specific role of the program manager during the design phase revolves around the activities listed above. The program manager typically manages the design process and the performance of the design is typically outsourced. When the performance of design is outsourced it is the program manager’s responsibility to select the individual design firms. The program manager then takes the responsibility for assuring that the designs fall within the desired scope, cost, and schedule both for the individual projects and for the program as a whole.

The program manager is also responsible for developing and managing the design schedule along with configuring the work into different design packages. Within a program, the completion of some projects may hinge on specific elements or information from another project, and thus it is important that each of the designers involved understands this and proper steps are taken to integrate these critical areas of the design. In extremely complex projects, the program manager may choose to develop a detailed design matrix to assure the needed integration and that all requirements for the program are addressed. Depending on the complexity of the project, the program manager may also hire a specialty firm to aid in managing the design process. The specialty firm may also aid in the integration of individual designs for each project as they relate to the program as a whole.

Construction packaging and phasing, also known as programming, and project and program interfaces were activities that were also associated with the pre-design phase. The similarities are due to the overlapping of construction phases which was discussed in detail in Section 3.0 of this chapter.

Design and peer reviews are the responsibility of the program manager as well. The design reviews include technical reviews, detailed code and standards reviews, constructability reviews, and user's reviews. The program manager and the owner should also consider peer reviews in which industry experts are consulted to aid in the review of complex designs.

### **3.4 Construction Services**

The construction phase is similar to the design phase for the program manager. The program manager manages the overall construction phase of the program and the performance of construction is typically outsourced. Some owners do perform the construction, or parts of it, with in-house personnel. If the program manager was also the in-house staff of the owner, the program manager would then be responsible for the performance of construction as well. Obviously if the program manager is responsible for the performance of construction their role differs; however, only the responsibilities of a program manager in an agency role are presented within this section.

AGC simply defines the construction phase as when, “Improvements are made to real property” [Kenig et al. 2004]. This definition however does not stress the intricacies of managing the construction process for a construction program. The management of the construction process of a program typically requires the program manager to handle multiple projects simultaneously. The program manager must be able to evaluate and manage the complicated interface between projects throughout the construction. Any changes to one project may have residual effects on other projects within the program.

The activities that the program manager is responsible for during the construction phase include:

- Definition of program scope
- Schedule monitoring
- Definition of procedures
- Progress payments
- Processing submittals
- Processing contract changes
- Meetings
- Logistics plan
- Quality assurance and control
- Oversee facility commissioning [Cullerton et al. 2003]

A program manager must be able to create a well defined scope and schedule for the entire construction process within the program. This allows the program manager to quantify the needs for project management staff, space, utilities, and equipment for the entire program and for each project within the program. Staffing requirements for the program hinge on its complexity, while staffing requirements for each project within the program may hinge on the type of construction contract (such as design-bid-build or design-build) used for each project.

Developing and monitoring the overall schedule of the construction program is the responsibility of the program manager during construction. The program manager must monitor the overall program schedule and the schedule of each individual project. It is important that the program manager be able to minimize the effect of a delay on one project from delaying the entire construction program.

The program management team should define a set of procedures for each activity within the construction process. Procedures for processing submittals, schedule monitoring, progress payments, inspections, testing, managing subcontracts, and processing contract changes should be developed by the program manager [Cullerton et al. 2003]. The program manager must constantly review the procedures for each activity throughout the construction phase and adjust each phase as needed.

Associated with the review of the progress of construction are the progress payments to those responsible for the performance of construction. Progress payments are typically handled at the project level and not the program level. It is important for the program manager to review the progress payments made on each program and also adjust the retainage, to free up as much cash as possible for the entire program and continue to ensure quality within each project. It is the responsibility of the program manager to review the financial status of the construction program throughout the construction phase.

Procedures for processing submittals and managing contract changes should be developed by the program manager. It is the responsibility of the program manager to process all submittals in a timely and efficient manner. It is also the responsibility of the program manager to minimize all contract changes and manage the contract change process when changes are necessary. Also, similar to schedule delays, the program manager must review all contract changes not simply for their impact on a particular project but on the program as a whole.

A series of meetings need to be held throughout the construction process of any construction program. Program management team members should meet to review issues related to the entire program. The meetings require the attendance of all program management team members. Separate meetings should be held for individual projects or phases within a program.

A logistics plan for each project and the program as a whole must also be developed and constantly monitored. A system of staging areas, roads, and utilities should be developed for the construction program that supports each of the projects within the program.

Quality assurance and control must be performed by the program manager to assure that the design specifications are met. The program manager should review all quality reports and denote any non-conformance issues. These non-conformance issues must then be reviewed as to their effect on the entire program.

Following the completion of construction, it is the program manager's responsibility to oversee the commissioning, or testing, of all the facilities and resolving any disputes between parties that may arise during this process. CMAA defines commissioning as, "the process of validating the expected performance of a facility or infrastructure system as an entity based on the interaction of all its components" [Cullerton et al. 2003]. The program manager must monitor the commissioning process from the early stages of the program including developing a commissioning plan during the design phase that establishes specific performance criteria. It is the program manager's responsibility to compile a detailed report of all commissioning activities once it is complete.

### **3.5 Activation Services**

Program activation is considered by some to be a separate phase of the construction life-cycle. The AGC however includes the activation phase in a broad post-construction phase known as 'occupancy.' Occupancy is discussed in more detail in the following section. CMAA does consider program activation to be a phase of the construction life-cycle and

defines program activation as, “the process whereby the owner prepares to use a new facility or facilities” [Cullerton et al. 2003].

Program activation is performed typically by the owner’s staff. If an external program manager has been hired, the external program manager works together with the owner’s staff during the activation period. The major goals of program activation as stated by CMAA include:

- Ensure that tenant spaces are prepared and occupancy is achieved in a timely and efficient manner.
- Ensure that the intended level of service is achieved from the outset.
- Provide a seamless and transparent move from contractor completion to full operation [Cullerton et al. 2003].

It is important for the program manager to guide the program through this transition period. The activation phase is essential in assuring that the operations associated with the program facilities begin in a timely and efficient manner.

### **3.6 Post-Construction Services**

The idea of what is included in post-construction services varies throughout the construction industry. The operations and maintenance activities are typically always included in the post-construction services and others include decommissioning as well. Decommissioning is simply the process of removing a facility from operation at the end of its life-cycle. Activation, including occupancy, is also grouped by some within the construction industry as part of post-construction services and is sometimes not considered a separate phase of the construction life-cycle.

The AGC refers to the final phase of the construction process as occupancy rather than post-construction and defines it as follows, “In the ‘occupancy’ phase the finished construction product is leased or sold and basic property management services such as operations and

maintenance are set up. This phase also includes decommissioning at the end of the project's useful life" [Kenig et al. 2004]. Operations and maintenance activities, along with activation and decommissioning, are included in the phase.

The owner, or internal program manager, typically manages the operations and maintenance activities. Recently however, the role of an external program manager has extended to planning and implementing the operations and maintenance procedures for the construction program and in some cases even the performance of those operations and maintenance activities. The external program manager may be required to establish the procedures and staff the operations and maintenance activities. The operations and maintenance activities vary depending on the type of facilities and size of the construction program. Very large construction programs sometimes create a separate company that will handle the performance of all their operations and maintenance activities.

The final stage in the construction of a facility is decommissioning especially within the industrial and nuclear power market sectors. Considering the extended life of a building or facility it is rare that an external program manager would handle the decommissioning of a facility within the program or of the entire program. Typically decommissioning is performed by internal staff. It is not feasible that a program manager would be in place long enough to be involved in decommissioning one of their own projects.



## **4.0 LITERATURE REVIEW**

The following sections contain a literature review of the main subjects contained within this thesis including:

- Outsourcing
- Sourcing strategy
- Risks in managing a construction program

Each of the following sections provides a detailed overview of these subjects and the prior research that has been performed. Only a small segment of this literature review focuses on the use and hiring of an external program manager, a concept that is covered in detail in later sections of this thesis. The reason for this is that the writer was not able to determine any substantial sources or documents that related to the hiring or the use of an external program manager.

### **4.1 Outsourcing Studies Within the Construction Industry**

The following sections discuss prior research with respect to outsourcing within the construction industry. Because of the importance of outsourcing to the research topic of this thesis, each of the studies reviewed is summarized in detail in separate subsections. The subsections are fully drawn from each study.

#### **4.1.1 CCIS Study**

The Center for Construction Industry Studies (CCIS) performed research on the outsourcing of construction, specifically owner outsourcing trends. The study reviewed the relationships between owners and their service providers in capital facility projects. The objectives of the study were as follows:

- To gain further knowledge of the outsourcing trends of the Construction Industry Institute (CII) owner companies over the five-year period from 1994 to 1998.

- To further examine the 43 owner companies, both as a whole and by their respective industry sectors, with regard to the owner's level of outsourcing.
- To provide a means for owners to examine their outsourcing practices and to use the conclusions set forth in this report as a benchmark for their work approach in the future [Gibson et al. 2001].

The methodology (used in determining outsourcing trends throughout the construction industry in the CCIS study) reviewed a series of projects and the functions on those projects that were outsourced. The data was obtained from the owner project data sample that makes up the Construction Industry Institute's Benchmarking and Metrics Database. The data sample consisted of 385 owner projects found within the database. The total cost of all projects used in the data set of the CCIS study was approximately \$18.3 billion.

The data sample was grouped into four major market sectors including heavy industrial, light industrial, general building, and infrastructure with projects from the heavy industrial sector representing a large majority of the data set. Table 4.1 from the CCIS study provides the major classifications of each of the projects used in the study, along with the year the project was completed. It is clear from Table 4.1 that the data set is dominated by the heavy industrial sector. Only a minimal number of projects from the infrastructure sector were included in the data set.

**Table 4.1: Data Sample Breakdown [Gibson et al. 2001]**

<b>Sector / Completion Year</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>Total</b>
Heavy Industrial (HI)	18	48	62	75	22	225
Light Industrial (LI)	1	7	11	19	1	39
General Building (BLDG)	4	16	25	26	11	82
Infrastructure (INFRA)	2	3	9	2	3	19
<b>Combined</b>	<b>25</b>	<b>74</b>	<b>107</b>	<b>122</b>	<b>37</b>	<b>365</b>

Table 4.2 is also taken from the CCIS study and provides the number of projects within the study characterized by project type.

**Table 4.2: Data Sample Project Types [Gibson et al. 2001]**

<b>Heavy Industrial</b>		<b>General Building</b>	
Chemical Mfg.	60	Dormitory/Hotel	5
Electrical (Generating)	30	Highrise Office (3+floors)	7
Environmental	6	Hospital	2
Metals Refining/Processing	19	Laboratory	11
Mining	1	Lowrise Office (< 3 floors)	28
Natural Gas Processing	11	Maintenance Facilities	10
Oil Exploration/Production	14	Other	3
Oil Refining	61	Parking Garage	1
Other	2	Residential	1
Pipeline	1	Restaurant/Nightclub	1
Pulp and Paper	20	School	7
<b>Total</b>	<b>225</b>	Warehouse	6
		<b>Total</b>	<b>82</b>
<b>Light Industrial</b>		<b>Infrastructure</b>	
Automotive Assembly	4	Airport	1
Consumer Products Mfg.	11	Electrical Distribution	4
Foods	12	Marine Facilities	2
Light Industrial	2	Pipeline	1
Pharmaceuticals Mfg.	10	Water/Wastewater	11
<b>Total</b>	<b>39</b>	<b>Total</b>	<b>19</b>

The outsourcing trends determined by the CCIS study were for the following scenarios:

- Overall outsourcing.
- Outsourcing of three project functions: pre-project planning, design, and procurement.
- Outsourcing trends within the four project sectors: heavy industrial, light industrial, general building, and infrastructure.

After determining the outsourcing trends the CCIS study then compared those trends to information from the European construction institute in order to identify differences between outsourcing within North America and Europe.

CCIS determined the overall outsourcing trend by combining the trend data from the three project functions: pre-project planning, design, and procurement. The reader should note that the sub data set for 1998 is much smaller than the data sets from other years and this should

be taken into account when reviewing the outsourcing trends determined by CCIS. Table 4.3 provides the results of the outsourcing data for the CCIS study. The results for each project function and the overall outsourcing totals are given. The outsourcing data is given as a percentage and the year the high and low value occurred is given in parenthesis next to the value. Also an average value for the outsourcing data was estimated from the outsourcing graphs for each function found in the CCIS study. For example, for the procurement function the table shows that the highest percentage of outsourcing, 93%, occurred in 1997 and the lowest percentage of outsourcing, 75% occurred in 1994. The estimated average percentage of outsourcing for procurement from 1994 to 1998 was 80%.

**Table 4.3: Outsourcing Percentages for CCIS Study**

<b>Function</b>	<b>High (%)</b>	<b>Low (%)</b>	<b>Average (%)</b>
Pre-project Planning	34 (1997)	6 (1998)	20
Design	81 (1995)	65 (1998)	80
Procurement	93 (1997)	75 (1994)	80
Overall	68 (1997)	52 (1998)	60

The outsourcing data was also analyzed by CCIS based on market sector. Table 4.4 is taken from Table 3.1 found within the CCIS report. The table presents the results of the outsourcing trends segregated by market sector. Each row within the table represents a different function and each column represents a different market sector. Each cell contains a specific conclusion associated with the corresponding function and market sector.

Table 4.4 shows that for pre-project planning no clear trends existed in the outsourcing data between the different market sectors from 1994 to 1998. For the design function, all of the market sectors showed a decline in outsourcing over the five year period except for infrastructure which stayed high and constant until it experienced a large drop in 1998. For the procurement function, an overall increase in the amount of outsourcing was determined for each of the market sectors. Finally the overall outsourcing trends for light industry and general building remained constant from 1994 to 1998 while the trends for heavy industry and infrastructure fluctuated.

**Table 4.4: Summary of Owner Outsourcing Trends by Market Sector [Gibson et al. 2001]**

<b>Function</b>	<b>Heavy Industry</b>	<b>Light Industry</b>	<b>General Building</b>	<b>Infrastructure</b>
<b>Pre-Project Planning</b>	14% drop in 1995, Constant rise to 1997, 19% Drop in 1998	Steep Increase form 1994-95, steady decline from 1995-98	Steady Decline from 1994-96, 7% increase '97, 28% drop in 1998	Constant from 1994-95, Rise in 1996-97, 50% Decrease in 1998
<b>Design</b>	Steady Decline from 1994-96, 21% Increase '97, 16% drop 1998	Increase from 1994-95, Steady Decline 1996-98	Steady Decline from 1994-97, 8% Rise in 1998	High & Constant level 1995-97, 33% Drop in 1998
<b>Procurement</b>	Overall Increase from 1994-97, 5% drop 1998	26% drop 1994-95, Steady Increase from 1995-97, 40% drop 1998	Increase from 94-95, Constant from 95-97, 11% rise in 1998	Overall Increase from 1994-1998
<b>Overall</b>	Steady Decline from 1994-96, 30% Increase '97, 15% drop 1998	Consistent from 1994-97, 30% drop 1998	Constant from 1994-1998	Steady Increase from 1994-97 (47-83%), 27% drop in 1998

CCIS also performed an analysis of the outsourcing data segregated by the 43 owner companies as opposed to the analysis by each project individually. Analysis was done by grouping the owners by their amount of outsourcing and then comparing the characteristics of each group. The owners were grouped into three tiers with the top tier representing the owners that outsourced the most, the middle tier representing the owners that outsource some percentage of the work, and the bottom tier representing owners who outsource the least.

The conclusions drawn by CCIS from the three tier analysis were organized by tier. CCIS found that owners who outsourced most of the project functions had the following characteristics:

1. Tend to view their work as more complex than other owners.
2. Have the least control, on average, over their schedules (schedule performance is less predictable).
3. Prefer to use cost reimbursable contracts for outsourcing of all phases.
4. Have more changes, but seem to have more control over the costs and schedule additions incurred from these changes.

5. Have the best constructability practices (although not statistically significant).
6. Have a tendency to work more with contractors in alliance partnerships (although not statistically significant) [Gibson et al. 2001].

CCIS found that owners who were categorized by the middle tier:

1. Tend to have the highest change costs and schedule additions.
2. Seem to have the best relationships with their contractors [Gibson et al. 2001].

Finally, CCIS found that those who outsourced the fewest project functions:

1. Tend to use lump sum contracts for both procurement and construction. These owners prefer cost reimbursable contracts for procurement and tend to perform their pre-project planning in-house.
2. Are the least affected by project changes.
3. Have the best pre-project planning practices, although not statistically significant.
4. Show the worst change management practices, although not statistically significant [Gibson et al. 2001].

#### 4.1.2 Corporate Real Estate Management Study (CREM)

Further study on outsourcing by construction owners focused on Corporate Real Estate Management (CREM). In a paper titled *Outsourcing of Property-Related Management Functions in Europe and North America, 1993-1998* [Bon & Luck 1999], Ranko Bon and Rachael Luck reviewed the outsourcing trends of several property related management functions. These property related management functions included: design management, construction management, facilities management, and maintenance management.

The CREM study used a survey to gather data on the four property related management functions and the amount of activity with each function performed internally. The percentage of each function performed internally is referred to as the incidence of CREM functions. A low number of responses to the survey were received in each year of the study.

The number of responses were as follows: 21 in 1993, 42 in 1994, 17 in 1995, 27 in 1996, 52 in 1997, and 38 in 1998 [Bon & Luck 1999]. Bon and Luck [1999] reported that a low number of response totals to the survey was due to the time constraints of corporate executives that limited their ability to complete the survey. The reliability of the results should be approached with caution due to the low response totals.

The mean percentage of responses for the incidence of CREM functions over the six year period of the study is given below in Table 4.5 which is derived from Table 1 found within the CREM study. Table 4.5 also incorporates a column that includes the average percentage of time that each function was performed in-house and a column that includes the corresponding average percentage of time the function was outsourced.

**Table 4.5: Incidence of CREM Functions, 1993-1998 [Bon & Luck 1999]**

Function	1993	1994	1995	1996	1997	1998	Average (In-House)	Average (Outsourced)
<b>Design Management</b>	33	49	50	61	52	52	49.5	50.5
<b>Construction Management</b>	29	61	44	71	67	74	57.7	42.3
<b>Facilities Management</b>	52	76	67	75	64	73	67.8	32.2
<b>Maintenance Management</b>	38	51	61	64	58	63	55.8	44.2

Statistical analysis was applied to the data set in the CREM study to, “determine whether the findings were pertinent or due to chance” [Bon & Luck 1999]. The statistical analysis showed there was a significant difference in responses except for the construction management function. The Spearman Rank Correlation Coefficient was also used on the data set to determine if any correlations existed amongst the data set. The research found that each of the functions was interrelated. The main conclusions that arose from the study were as follows:

- Of all the property-related functions studied only construction management shifted away from outsourcing between 1993 and 1994.

- Often design, construction, facilities, and maintenance management functions are linked, i.e., organizations which provide one of these services in-house are likely to provide the others as well [Bon & Luck 1999].

#### 4.1.3 Outsourcing in Building Maintenance

Research in the realm of outsourcing within the construction industry has also been focused on specific phases of the construction life-cycle. Most notably Arditi and Nawakorawit reviewed outsourcing as it related to the building maintenance in *Issues in Building Maintenance: Property Managers' Perspective* [1999]. Arditi and Nawakorawit's study focused on property management firms and the maintenance of the buildings they managed. Building maintenance is considered part of the operations and maintenance phase of the construction life-cycle.

Like most studies involving outsourcing within construction the data for Arditi and Nawakorawit's study was obtained from a survey. The survey was sent to the top 230 property management firms in the United States and 70 responses were received. The pertinent information in the study that related to the outsourcing of building maintenance was how the property managers procured their services. It should be noted that most property management firms are contained within the construction owner's organization. If the property management firm is not contained within the owner's organization then the owner would essential be outsourcing the maintenance of their facilities to the property management firm. Within the study, 75 percent of the respondents owned some or all of the buildings they managed making them part of the owner's organization.

Related to the outsourcing of the maintenance of facilities, The study asked respondents to report the source of the services they offered. According to the study, "44% of the respondents rely on complete outsourcing, 30% use in-house services for some activities and outsourcing for others, and the remaining 26% provide all services with in-house capabilities" [Arditi & Nawakorawit 1999]. Arditi and Nawakorawit also performed a more detailed review of the outsourcing of building maintenance in which they found that:



- Service maintenance, corrective maintenance, and deferred maintenance are mostly delivered by selective outsourcing.
- Routine maintenance and preventive maintenance are mostly delivered by in-house personnel. Only extraordinary maintenance is mostly delivered by outside contractors.
- The staffs used in cleaning the interior and the exterior are mostly obtained by full outsourcing.
- Inspection and repair and replacement of building systems/equipment are mostly delivered by selective outsourcing [Arditi & Nawakorawit 1999].

The maintenance and operations phase of the construction life-cycle is only a small part of the scope of responsibility of the construction program manager. How the construction program manager or construction owner staffs each phase or activity within the construction life-cycle varies widely from one program to the next. The data presented in this section provides some insight into how construction owners or program managers perform certain phases of the construction processes, whether with in-house personnel or by outsourcing the responsibility to an external firm.

#### **4.2 Sourcing Strategies Within the Construction Industry**

The concept of outsourcing is closely associated with sourcing strategies or how an owner staffs their construction program. Owners staff specific functions throughout the construction life-cycle by either using internal staff to perform the tasks or procuring the services of an external firm. The staffing of these specific functions along with the criteria used in determining which external firms to choose is all part of sourcing strategy and covered in the following sections. Also, the owner may decide to use an external program management firm to staff and manage a construction program. Strategic alliances are another sourcing strategy that is covered in the following sections as well.

#### 4.2.1 Staffing a Construction Program

When an owner decides to consolidate their construction activities into a formal program they must decide between staffing up in house and outsourcing their construction program. The extremes of these two cases rarely exist however. Most owners manage some portion of their construction program in-house and outsource others. Owners, at a minimum, need to obtain some form of internal staff to manage the finances related to their construction program.

An owner must consider a multitude of factors when deciding on how to staff their construction program. The question of whether or not to outsource typically is thought of as a cost based decision and many believe owners choose to outsource simply because it is cheaper. This is not typically the case however. Many times the decision of outsourcing is based on the owners experience with the construction process. “Owners with significant in-house expertise may not engage a program manager for “cradle to grave” services, but rather pick and chose services to supplement their resources and expertise” [Cullerton et al. 2003]. According to a white paper by 3D/I that discusses the use of an external program manager, managers and administrators on a large renovation and construction program struggle with experience. In most organizations construction is a support function to the key revenue functions of the business. When a manager or administrator is faced with a construction or renovation project it is only natural for them to use external personnel with experience in construction [3D/I 2006].

Some of the issues an owner should consider when deciding to staff up in-house or outsource that were discussed in 3D/I’s study of the cost of program manager include:

- Downsizing – will using internal staff require the owner to downsize when the construction program is completed?
- Bench strength – is there enough experience within the organization to manage the construction program properly?

- Attracting and keeping staff – how difficult is it for the owner to attract and keep key construction personnel in-house?
- Quality and service – will quality be better with an external program management firm?
- Systems –does the owner have the necessary systems and procedures in place to run a successful program?

All of these are key questions that an owner must address when deciding on how to staff a construction program. Whether the owner staffs a construction program internally or externally, the main role of the program's personnel is to act as representatives for the owner. A construction representative is the link between the owner and the other construction parties. In a study of construction representatives, Samuels and Bruder define the construction representative as, "technically qualified individuals who perform quality actions for the customers or buyers of constructed facilities" [Samuels & Bruder 1996]. A construction representative may perform the following functions for an owner:

- Engineering
- Management
- Administration
- Inspection
- Testing
- Surveys [Samuels & Bruder 1996]

Many organizations retain a staff of construction representatives in-house. For the organizations that outsource the management of their construction programs, the construction representatives are external personnel. Maintaining the necessary amount of construction representatives and personnel can be difficult for any owner or program manager and outsourcing may be necessary when internal expertise is not adequate.

#### 4.2.2 Selection Process for External Service Providers

When an owner procures the services of an external firm a selection process is followed. The selection process of hiring an external firm can also be considered part of the sourcing strategy. Prior research within the construction industry reviews the selection process of contractors but does not specifically review the number of service providers considered in the selection process. Most of the research on sourcing strategy revolves around presenting the criteria considered in the prequalification and selection of bidders or comparing overall construction performance to the sourcing strategy employed.

Owners of construction have historically procured the services of external firms by lowest bid selection criteria while that methodology is changing in the current construction environment. A 1996 study by Hatush and Skitmore found that the lowest bidder was still the dominant criteria used throughout the construction industry to select a contractor [Hatush & Skitmore 1997]. In a more recent study by Waara and Bröchner of the selection of a contractor with price and nonprice criteria, they witnessed a shift away from the low bid selection process [Waara & Bröchner 2006]. Most researchers now agree that the selection process for hiring an external service provider should consider more than just price.

Waara and Bröchner define the cost of construction as the production costs for a contract and all other activities as transaction costs. An owner must look to not only minimize production costs but also transaction costs. Hiring contractors based on both an evaluation of construction costs, or production costs, and the qualifications of the contractor, or transaction costs, can aid in doing this. When a contractor is bidding on price and quality, the contractor can be thought to be bidding on both the technical aspects of construction and the relationship with the procuring unit [Waara & Bröchner 2006].

The criteria that should be considered by an owner during the prequalification process may include:

- Past experience in construction of similar projects

- Safety record
- Safety enhancement programs
- Financial stability [Dozzi et al. 1996].

Other criteria that might be considered outside of the prequalification process when selecting a contractor includes:

- Previous performance
- Location
- Financial measures
- Technical capabilities
- Safety record or safety program
- Project team's expertise
- Working relationship
- Shared understanding of goals
- Objectives and interests
- Quality assurance
- Execution plan
- Company culture
- Management philosophy
- Labor relations
- Specific environment programs [Dozzi et al. 1996].

In addition to the list of criteria to be considered in the selection of a contractor, Hatush and Martin found that financial and technical criteria were mentioned by many sources within their research as factors needed to be considered in selecting a contractor, while the quality of resources and the managerial capability of the firms considered appeared to be secondary issues [Hatush & Skitmore 1997].

The use of alternate criteria besides price for selecting an external service provider is considered to be beneficial but it must be done appropriately. Hatush and Martin found through interviews of construction owner representatives that issues existed with the assessment of the information considered for prequalification. While many of the owner representatives interviewed had a clear process for collecting the data needed for prequalification, some struggle to evaluate the data and many completely abandoned the use of the data in the bid evaluation phase. Hatush and Martin state that, “the formal procedures necessary to collect the information seem to have taken on a life of their own at the expense of the more difficult phases of assessment and evaluation, which in the absence of any formal procedures, appear to take place in a largely subjective and ad hoc manner” [Hatush & Skitmore 1997].

Waara and Bröchner reached a similar conclusion in their study of the selection process of contractors. Waara and Bröchner found that the processes employed in procurement practices by both price and nonprice criteria are lacking especially in the evaluation of nonprice criteria. Owners of construction must develop a procedure for evaluating the nonprice criteria in a bid environment. Also, some nonprice bidding systems incorporate far too many nonprice criteria, making each bid difficult to evaluate. Research has shown that as more criteria are considered in bid selection it becomes increasingly unlikely the winning bidder will change [Waara & Bröchner 2006].

The selection process of an external service provider should consider many factors beyond simply price. The use of multiple criteria can be advantageous to a construction owner; however the owner must be aware of the proper qualitative criteria a contractor should be evaluated on along with having a system in place to evaluate the criteria. Price should be balanced properly with the nonprice criteria to support the most beneficial and selection process for external service providers.

#### 4.2.3 Contractual Relationships for Hiring an External Program Manager

The contractual relationship an owner uses when hiring an external program manager helps to define how an owner staffs their program. There are two forms of program management contracts used when hiring an external program manager: agency and at-risk. In an agency agreement (in some cases referred to as contract administration) the program manager is paid a fixed cost or cost reimbursable fee to manage the contracts between the owner and other professionals and simply acts as an advocate for the owner [Cullerton et al. 2003]. The agency contract relationship between an owner and a program manager is the most widely accepted form of program management.

Program management at-risk differs from program management agency in that it is not a management technique, but rather a project delivery method similar to construction management at-risk. In an at-risk agreement the program manager is paid in a combination of fixed fees, cost reimbursable fees and guaranteed maximum price with incentives to deliver the project [Cullerton et al. 2003]. The program manager is directly responsible for the budget and the schedule of the program, along with directly contracting the services for the program. It should be noted that an at-risk contractual relationship is rarely seen when hiring an external program manager and it is heavily disputed as to whether or not a true at-risk relationship can even exist and still be defined as program management.

#### 4.2.4 Strategic Alliances

One of the latest sourcing strategies being used within the construction industry today is strategic alliances. Strategic alliance is a phrase that is used often within construction and all other forms of industry and multiple definitions exist. The concept of a strategic alliance occurs when, “the value chain between at least two organizations (with compatible goals) is combined for the purpose of sustaining and/ or achieving significant competitive advantage” [Holt et al. 2000].

Strategic alliances within the construction industry grew out of the partnering relationships that were established between owners and contractors in the 1980s [Harper & Bernold 2005]. And while strategic alliances have been shown to be successful, especially in other industries, the construction industry has been slow to adopt them. The Dozzi study reported that of those that responded to their questionnaire on owner-contractor relationships, “there were few opportunities identified for strategic alliances and partnering” [Dozzi et al. 1996]. One of the possible reasons for the slow adoption of strategic alliances is their reliance on trust. Due to the adversarial relationships that have been fostered by the historical low-bid environment in which construction projects operate; the concept of trust is not something to which the construction industry is accustomed.

Typically in a strategic alliance, a strong, trusting relationship is formed between two firms within the construction industry. This relationship may exist between every type of firm involved with the construction process including: owners, contractors, A/E firms, material suppliers, subcontractors, etc. Trust is the key to success in any alliance relationship. It is essential that firms develop some degree of trust in order for the alliance to even work [Harper & Bernold 2005]. Alliance partners must be able to extract knowledge and skills from one another in order to attain all the benefits of an alliance relationship. Without trust, true sharing of knowledge and skills may be minimized along with the benefits of an alliance relationship [Holt et al. 2000].

The structure of a strategic alliance may take on many forms, but essentially these forms may be categorized as either collaborative or co-operative [Holt et al. 2000]. In a collaborative strategic alliance the parties are allowed to examine what their competitors are doing best and benefit from this knowledge [Holt et al. 2000]. However a collaborative alliance can lead to a competitive relationship between the parties of the alliance. This competitive relationship stems from the fear that by providing a firm with ones own competitive advantage then that firm may use that competitive advantage against oneself. Harper and Bernold sum up the fear parties in an alliance may have when they state, “Alliances create loose groups of partners that remain separate parties, driven by their own interests. Each partner thus runs



some risk that the other will act opportunistically and “defect” and work for himself without considering the alliance” [Harper & Bernold 2005]. Any time a competitive relationship between alliance partners is initiated the trust between the parties can be compromised. As was discussed earlier, a strategic alliance cannot be successful without trust.

The second form of strategic alliances, a co-operative strategic alliance, is more beneficial to fostering a healthy alliance relationship, “Co-operative strategic alliances encourage partners to commit resources to the relationship” [Holt et al. 2000]. By committing their resources to the work, the competitive atmosphere that can exist in a collaborative relationship is reduced [Holt et al. 2000]. Holt, Peter, and Li found that the benefits of a co-operative strategic alliance can include:

- The client obtains exclusivity of the contractor’s services.
- The client achieves total satisfaction regarding its trading transaction with the contractor that is, the client satisfies its own customers.
- The client has a reduced administrative burden and associated costs (e.g. procurement, contractor administration, rework, waste, complaints).
- The contractor has something of a ‘guaranteed’ workload.
- The contractor remains in a profitable trading position [Holt et al. 2000].

A strategic alliance can be an extremely beneficial tool in gaining a competitive advantage within the construction industry. The relationship between the partners of a strategic alliance must be based on trust and the parties must remain focused on the objectives of the alliance, however in order for the alliance to be effective [Holt et al. 2000]. While the construction industry is notoriously slow to evolve some believe that strategic alliances will be necessary in the future. Holt et al. support this with the statement, “Strategic alliances are becoming an important means of survival for managing construction organizations” [Holt et al. 2000].

#### **4.3 Risks in Managing a Construction Program**

The management of a construction program can be extremely difficult. A program manager must be able to not only manage each individual project but also the interaction of each

project within the program. In fact some researchers have felt that the management of multiproject programs is perhaps one of the most difficult assignments in the professional world [Zapalac et al. 1994].

With the difficulty of managing a construction program comes the inherent uncertainties and risks. The risk involved with a construction program is magnified due to their high dollar value. It is important that the program manager attempt to minimize all risks within a construction program. In order minimize risks, risk management concepts must be applied at the beginning of the construction program. Risk management includes three phases: risk identification, risk quantification, and risk control and is a continuous cycle that consists of risk analysis, strategy implementation, and monitoring [Minato & Ashley 1998].

Risk management is routinely performed at the project level. According to Minato et al. the tasks of managing risks falls to personnel at the project level and even though a program may constitute multiple projects or phases risks are quantified and controlled one project or phase at a time [Minato & Ashley 1998]. The need for risk management at the program or corporate level is also necessary since some risks can be considered common risks among all the projects in the program manager's portfolio [Minato & Ashley 1998].

A study of cost risk analysis of highway megaprojects, which can be considered construction programs, discusses some of the key concepts of managing risk in a construction program [Molenaar 2005]. Within the transportation sector, construction programs have had difficulty with cost overruns and conceptual planning estimates [Molenaar 2005]. Due to the immense size and extended duration of construction programs, it is difficult to produce accurate schedules and estimates. Poor estimating and planning can lead to the cost overruns discussed above and typically the uncertainty or risk of such immense projects is not considered in the planning stages and is not properly reflected in the budget and schedule of construction programs. According to Molenaar, "Estimating procedures must model both the technical and nontechnical nature of the challenges in quantifying capital costs early in the (mega)project's life-cycle" [Molenaar 2005].

The management of risk is also closely related to sourcing strategy. According to Kashiwagi, there are three types of sourcing strategies employed by construction owners or clients:

- The outsourcing performance based client who contracts out all work to a service provider
- The partnering client who shares the risk with the contractor
- The price-based client who directs the contractor on what to do, when to do it, and how to do it, awards to the low bidder, and then manages and inspects the contractor [Kashiwagi et al. 2005].

Each of the three types of owners described above can be classified by risk with the outsourcing owner pushing all risk to the contractor, the price-based owner accepting all risk, and the partnering owner somewhere in between.

The amount of risk a construction owner pushes to a contractor can affect the quality of personnel involved with the construction process. As construction owners outsource more, contractors will be forced to assume greater risk and in turn use more highly skilled personnel to mitigate the risk. Kashiwagi states that, “If more owners are forced to outsource construction, the industry will be forced to have a higher percentage of highly trained personnel” [Kashiwagi et al. 2005].

The business environment also plays a role into how risk is delegated by the construction owner. According to Dozzi et al., “The business environment affects the aggressiveness of clients in their transfer of risk. Specifically in a buyers market, owners will push risk onto contractors more aggressively than in a busy construction market” [Dozzi et al. 1996].

The benefits of risk management typically outweigh the initial costs especially with construction programs that due to their size carry a large amount of uncertainty. Molenaar found that when risk management procedures are used effectively in the pre-design phase a lower range of expected costs for the completed construction will result [Molenaar 2005].

Proper risk management can lead to early risk avoidance and also aid mitigation planning; however the process is not easy nor is it inexpensive [Molenaar 2005]. Minato et al. summarize the concept of risk management of a construction program best when they state, “While the difficulties of accommodating the interaction of various risk factors into risk analysis are acknowledged, a simple yet comprehensive scientific method of risk quantification of coverable risks should considerably enhance the opportunity for managers to plan effective corporate strategies for implementing a company’s projects” [Minato & Ashley 1998].

#### **4.4 Summary**

The topics discussed previously in this literature review section are closely related to the research performed within this thesis. The concept of outsourcing within the construction industry is a topic that was covered extensively in the mid 1990s by the CCIS study presented in this literature review along with the other studies. The CCIS study presented outsourcing data over a five year period from 1994-1998, for three project functions that included: pre-project planning, design, and procurement. The research within this thesis reviews the outsourcing trends of owners of construction based on the phases of construction (Sections 6.11-6.17, 7.2.8-7.2.14, 9.4). This thesis reviews the outsourcing of all functions of the project life-cycle except for procurement. The phases of construction for the outsourcing study in which this thesis studied included:

- Pre-design phase
- Oversight of design
- Performance of Design
- Oversight of Construction
- Performance of Construction
- Activation
- Operations and Maintenance

There is unity in the project functions studied in this thesis and those in the CCIS study. The pre-design phase studied in this thesis is similar to the pre-project planning stage of CCIS study. Also the performance of design function studied in this thesis is similar to the design function of in the CCIS study.

The research within this thesis also reviews the sourcing strategy employed by each owner within each phase or activity surveyed (Sections 6.11-6.17, 7.2.8-7.2.14, 9.5). Data was collected and analyzed on the number of service providers used when selecting a service provider. While the selection criteria, such as past experience, cost, etc. are not reviewed the number of service providers used does provide insight into the procurement strategy. While it was shown that a large amount of research has been performed in the area of contractor selection most of this research focused on contractor procurement by alternative methods and whether or not these methods lead to contractor success. There was no data found on the actual percentage of use of each selection method or sourcing strategy. This thesis has determined the percentage each sourcing strategy is used within each phase or activity of construction and also the average sourcing strategy employed over the construction life-cycle.

Also, an emerging area of research within construction is strategic alliances. Prior research within construction on the use of strategic alliances focuses on the procedure for creating a successful strategic alliance and not on their use. In a true strategic alliance the owner always staffs a phase or activity within the construction life-cycle with their alliance partner. By studying the number of service providers that the construction owner is selecting from within each stage of the construction process, this thesis attempts to draw conclusions on the use of strategic alliances.

Finally, the literature review presented here contains an overview of the risk involved in managing a construction program and the processes of risk management. While managing risk in a construction program is not specifically covered in the research of this thesis, it was

necessary to inform the reader of this topic due to the close relationship of risk, sourcing strategy, and outsourcing.

## **5.0 FMI/CMAA SEVENTH ANNUAL SURVEY OF OWNERS**

The creation, dissemination and collection of the FMI/CMAA Seventh Annual Survey of Owners was performed over a period of six months. The entire process began with meetings focused on creating the survey in early February and closed with the receipt of the final completed paper copy of the survey in early August. A detailed account of each activity is provided in the following sections along with the professional organizations and contacts invited to participate in the survey and the mediums used to present the survey to these participants.

### **5.1 Survey Instrument Development**

The development of the survey instrument for the 7<sup>th</sup> Annual FMI/CMAA Owner's Survey was an iterative process that involved multiple phases. The phases within the process, in chronological order, consisted of a:

- Series of preliminary meetings
- Program management focus group meeting
- Preliminary survey draft
- Revisions to the preliminary survey draft
- Second survey draft incorporating the revisions
- Revisions to the second survey draft
- Third Survey Draft
- Revisions to the third survey draft
- Final Draft

The objective of the survey was established in the initial meetings as a benchmarking survey for program management. However as the instrument evolved and meetings continued, it became clear that the survey would focus on program management in a general sense, meaning the management of a construction program. The final draft of the survey instrument meets the objective of FMI, CMAA, and this thesis of determining how owners manage their

construction programs and the costs associated with that management. The following sections detail the development of the survey and each phase within the development process.

#### 5.1.1 Meetings

A series of meetings were held to aid in the development of the survey. Initial meetings were held between FMI, CMAA, and North Carolina State University (NCSU) in an attempt to develop a direction and focus for the FMI/CMAA Seventh Annual Survey of Owners. Meetings were also held with experts within the industry to aid in the development of the survey content and structure.

##### *5.1.1.1 Initial Meetings*

Three initial meetings were held between members of FMI, CMAA, and NCSU in order to help determine a direction, a timeline, and a participant list for the survey. Each of these initial meetings was by conference call and the participants from each organization varied for each meeting. Given below is a chart detailing the date, topic, and attendees for each meeting.

**Table 5.1: Initial Meetings**

<b>Date</b>	<b>Topic</b>	<b>Attendees</b>
2/2/2006	Kickoff Meeting for 7th Annual CMAA/FMI Owners Survey	Mark Bridgers Bruce D'Agostino
2/9/2006	Finalize the approach, participants and timing of the 7th Annual FMI/CMAA Owner's Survey	Phil Warner Bruce D'Agostino
2/23/2006	Finalize the topics, participants, and timing of the 7th Annual FMI/CMAA Owner's Survey	Phil Warner Mark Bridgers Bruce D'Agostino



Throughout the course of each meeting different objectives were accomplished regarding the three areas of concern:

- The timeline for the survey
- The direction or focus of the survey
- The participants of the survey

The following sections detail the accomplishments of the preliminary meetings in these three areas of concern.

#### 5.1.1.1.1 Survey Timeline

One of the focuses of the initial meetings was to develop a comprehensive timeline for the survey. A conclusion was reached on a timeline that included three main phases: creation of the survey, survey dissemination and collection, and the published document. The timeline also included the tasks within these phases. The major milestones were the completion of the survey template which was set for June 1, 2006 and the completion of the published document which included the findings of the survey which was set for September 19, 2006.

#### 5.1.1.1.2 Survey Focus

The Annual FMI/CMAA Survey of Owners has historically focused on construction management. The decision reached in the initial meetings for the FMI/CMAA Seventh Annual Survey of Owners was that the survey would again focus on construction management. Also, a strong focus would be placed on program management and the outsourcing of the management of construction programs. Program management and outsourcing were issues growing in significance within the construction industry and research was needed on the topic.

Questions regarding additional areas of interest for the survey were developed. These areas included:

- Building information modeling
- Green building and LEED
- Risk assessment and risk management
- Ethics

Each of these areas of interest was considered as possible question topics to be included within the survey.

#### 5.1.1.1.3 Survey Participants

During each of the preliminary meetings a discussion revolved around who would participate in the survey. A list of possible organizations within the construction industry whose membership would be good candidates for participants in the survey was developed. The following is the list of organizations:

- Construction Management Association of America (CMAA)
- Construction Owners Association of America (COAA)
- Construction Users Roundtable (CURT)
- Council of Educational Facilities Planners International (CEFPI)
- Society of American Military Engineers (SAME)
- Health Facility Institute (HFI)

The membership of each of these organizations provides a diverse group of individuals with strong knowledge and experience within the construction industry.

#### 5.1.1.2 Focus Group Meeting

During the initial meetings, a decision was made to establish a focus group to aid in the development of questions related to program management for the survey. The group is referred to as the program management focus group. The program management focus group consisted of members who were both extremely knowledgeable and experienced within the

realm of program management in construction. The following table provides a listing of each of the members of the program management focus group, their titles, and the company for which they work.

**Table 5.2: Focus Group Members**

<b>Name</b>	<b>Company</b>	<b>Title</b>
Dan Aghdam	The Turner Corporation	Corporate Development
Bruce D'Agostino	CMAA	Executive Director
Robert Fraga	United States Postal Service	Manager: Supply Management Facilities Portfolio
Blake V. Peck	McDonough Bolyard Peck	Executive Vice President & COO
Chuck Thomsen	3D/I	Chairman
Robert B. Wilson	Parsons Brinckerhoff Construction Services, Inc.	Facilities Market Sector Manager
William E. Van Wagenen, Jr.	CH2M Hill Constructors, Inc.	PM/CM Practice Director

The focus group meeting was held on March 7, 2006 in Washington D.C. at the offices of Robert Fraga. All members of the focus group were in attendance except for Chuck Thomsen who attended the meeting via telephone. Also in attendance were Mark Bridges of FMI, Bruce D'Agostino of CMAA, and the writer.

During the meeting, various topics and questions regarding construction program management were discussed. The major topics and questions discussed during the program management focus group meeting included:

- The definition of program management.
- How is construction being performed within a construction program?
- What can be done at a program level that cannot be done at a project level?

- What is pushing owners to use program management?
- What information do we want to obtain from the survey?
- Benchmarking the current state of program management within construction.
- Should the FMI/CMAA Seventh Annual Survey of Owners focus entirely on construction program management.
- Possible survey questions.
- Format and content of the survey.
- What is happening within the five phases of construction during construction program management?

Specific conclusions and ideas were also derived from the discussions that revolved around the topics and questions presented previously. These conclusions and ideas included:

- The FMI/CMAA Seventh Annual Owner's Survey would focus primarily on construction program management instead of construction management as it had in years past.
- A set of demographic questions would be used in the survey.
- A series of questions regarding the use of construction program management within the five phases of construction: pre-design, design, procurement, construction, and post-construction would be developed and used within the survey.
- A series of questions would attempt to understand what areas of a construction program were being outsourced.
- A series of questions focused on specific areas of interest for a service provider providing construction program management services would be developed and used within the survey (This section later became the hiring of an external program manager).

Responsibilities were assigned to the development of specific questions for the survey. Bill Van Wagenen agreed to develop a list of questions regarding construction program management that a service provider would benefit from. FMI agreed to develop a series of

questions focused on the five phases of construction and the outsourcing of the management of a construction program.

#### 5.1.2 Preliminary Survey Draft

There were four topics regarding construction program management that the questions for the FMI/CMAA Seventh Annual Survey of Owners would attempt to address. These four topics included: a service providers perspective of program management, program management within the five phases of construction, the outsourcing of the management of a construction program, and the demographics of the survey participants. A review of each of the topics and questions discussed during the program management focus group meeting and all comments made regarding these topics and questions was used to help develop questions that would address the four topics of concern.

A question set regarding construction program management that a service provider would benefit from was developed by Bill Van Wagenen. The question set was circulated to all members of the program management focus group via email for their review. Comments about each of the questions were collected by Mr. Van Wagenen and the question set was altered to reflect each of the comments.

A conference call was held on March 24, 2006 to review the preliminary list of questions created by Mr. Van Wagenen and the comments made by members of the program management focus group and to create a finalized list of questions for inclusion into the survey. In attendance were all members of the program management focus group, except for Bob Fraga. Mark Bridgers and Phil Warner of FMI and the writer were also in attendance. All comments from the conference call were recorded and then used to alter the question set. The altered question set was then implemented into the preliminary draft of the survey.

A series of questions were also developed for inclusion into the preliminary survey draft that revolved around the outsourcing of a construction program as it related to each phase of the construction process. Again the comments from the program management focus group

meeting on March 7, 2006 along with comments made during the March 24, 2006 conference call where used to aid in the development of this question set. A decision was made to establish activities within each of the phases of construction and ask a uniform set of questions about each of these activities. The uniform question set would attempt to establish:

- Which portions of the construction program were being outsourced and which were performed in-house.
- Where owners found economies of scale within the construction project by using standardized processes across multiple programs.
- How each phase of the construction program was staffed.

The question set was to be developed so that the activity was presented with a short definition followed by the uniform question set. This format was to be repeated for each activity.

Another topic of concern for the survey was providing clarification on the definition of program management to assure the validity of the survey responses. CMAA's current definition for program management was presented in the body of the survey instrument to provide clarity to the survey participant on what was meant by construction program management. This definition which is presented in Section 1.2 of this report is repeated again below:

Program Management is the practice of professional construction management applied to a capital improvement program of one or more projects from inception to completion. Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction and activation - for the purpose of providing standardized technical and management expertise on each project [CMAA 2006].

A question was then asked to the survey participant if they were using an approach similar to the one described in the definition to manage their construction program.

Finally, a series of demographic questions was included in the preliminary survey draft. These demographic questions were taken from previous FMI/CMAA Survey of Owners and included questions on industry type, individual market sector, number of construction projects per year, and annual construction spending. Annual construction spending is defined as the amount of money spent on construction and construction related activities throughout the year.

All question sets were compiled into a preliminary survey draft to be distributed to the program management focus group and research specialist for their review. The preliminary survey draft can be seen in Section 12.1.1 of the appendix.

#### 5.1.3 Preliminary Survey Draft Revisions

The preliminary survey draft was distributed to the program management focus group for their revisions. The focus group was given one week to return all remarks and revisions for the survey. All remarks and revisions developed by the focus group were collected for use in revising the preliminary draft. A detailed summary of all the remarks and revisions made by the program management focus group can be found in Section 12.1.2 of the Appendix.

The preliminary survey draft was also sent to a research specialist from FMI for their review. The research specialist focused on eliminating any discrepancies in the answer choices and any vague or confusing questions. Also, the research specialist focused on improving the overall organization and presentation of the survey. The overall goal of the review by the research specialist was to increase survey participation, eliminate faulty data, and reduce any possible difficulties in the analysis of the survey data. The review by the research specialist was recorded for use in revising the preliminary draft. A detailed summary of the remarks and revisions made by the research specialist can be found in Section 12.1.2 of the Appendix.

#### 5.1.4 Second Survey Draft

The preliminary draft of the survey was altered using the comments from the program management focus group and from the research specialist. Changes were made to the number of questions regarding outsourcing of each phase within construction. Additional questions were added on outsourcing and the use of program management. Also, small changes to the answer choices, such as the addition of an 'other' selection, were made to not limit the respondent's possible answers and to lessen the amount of cognitive resources used on their part in answering the questions. Vague questions or questions without adequate answer choices had the potential to fatigue the survey respondents and cause many to discontinue the survey after they had only partially completed it. All small changes made to the answer choices were to aid in enhancing survey participation.

Grouping the questions by specific activities within each construction phase increased the length of the survey and would make it difficult for survey respondents to know specifically how much of each activity was outsourced. It was determined that the increased length could jeopardize participation in the survey and the specificity of the questions could lead to faulty data. To solve these problems, the outsourcing questions were grouped according to each construction phase and not broken down by specific activities within each phase. However, the design phase was segregated by the management of design services and by the performance of design services. The construction phase was segregated by the management of construction services and by the performance of construction services as well. The phases of construction used for the grouping of questions on outsourcing in the second draft included:

- Pre-Design Phase
- Management of Design Services
- Performance of Design Services
- Procurement Phase
- Management of Construction
- Construction Performance or General Contractor



- Program Activation
- Operations and Maintenance

Due to the possibility for confusion by the respondent, the wording for question 18 (question 15) was changed. Also, answer choices for the respondent were provided for question 21 (question 20 for second draft), replacing the open ended response used in the preliminary draft of the survey. A final question was added to the second survey draft, question 24, to give the respondents an opportunity to provide any comments on important changes needed in the construction industry. A copy of the second survey draft is provided in Section 12.1.3 of the Appendix.

#### 5.1.5 Second Survey Draft Revisions

The second draft of the survey was again circulated to the program management focus group for their review for the final time. The comments from the focus group pertained primarily to the length of the survey.

The second draft of the survey was also reviewed by Mike Kenig, vice chairman of Holder Construction and the AGC Project Delivery Committee Chair. Mike Kenig's review of the survey led to changes in the structure, organization and questions.

#### 5.1.6 Third Survey Draft

A third draft of the survey was completed by revising the second survey draft using the comments provided by the program management focus group and by Mike Kenig. Changes were made to the questions related to the phases of construction and to the final questions related to the use of program management. The definition of program management used in the survey was also changed from the CMAA definition for program management to one created by the program management focus group.

Sub-question a. found in questions 7-14 of the second survey draft was removed to shorten the overall length of the survey. Also the procurement phase, question 10 of the second survey draft, was removed. The procurement phase related to the procurement of construction services only and was potentially confusing to the survey respondent considering the theme related to services throughout the entire construction program. The idea of procuring services must initially come from the owner and thus the outsourcing of procurement is not a relevant question when determining the amount of outsourcing being performed. The construction phases used in grouping the questions related to outsourcing in the third draft and also in the final draft were:

- Pre-Design Phase
- Management of Design Services
- Performance of Design Services
- Management of Construction
- Performance of Construction
- Activation
- Operations and Maintenance

Definitions for each phase were also added in order to provide further clarity as to which specific services included in each phase were being outsourced. The definitions were obtained from CMAA's "Program Management Procedures" and from comments by the program management focus group and Mike Kenig.

For the third survey draft, a clear delineation was established within the survey beginning at question 18. A statement was made following question 17 that the final questions of the survey were to be answered by those that had purchased program management services from a program management services provider. The final questions of the survey, 18-21, were intended to better understand the use and hiring of an external program management service provider. Question 22 from the second survey draft was removed from this question set to shorten the length of the survey.

The structure of the survey was also altered slightly. Questions 20 and 24 of the second survey draft were moved to the beginning of the survey following the demographic questions. The logic used for moving questions 20 and 24 was that they were more general in nature, similar to the demographic questions.

Also, question 8 of the third survey draft was added. Question 8 requires the respondent to give a high-level estimate of the percentage of the management of their construction program that is performed in-house and that is outsourced. This question was designed to allow for correlations between the total amount of outsourcing being performed and other questions within the survey.

Question 6 of the second survey draft (10 of the third survey draft) was altered. The respondents were asked what functions they felt should be performed by a program manager in replace of what concepts they felt should be part of a definition of program management. Finally, question 18 of the third survey draft was added. Question 18 was used to gain an insight into the cost for managing the process of construction for each respondent. The cost was requested to be given as a percentage of the annual construction spend. A copy of the third survey draft can be found in Section 12.1.4 of the Appendix.

#### 5.1.7 Final Draft

A final review of the survey instrument was performed in order to assure the instrument meet the specified objectives of this thesis and of FMI and CMAA. Also, the formatting of the survey instrument was altered so that it would be visually appealing and the relationship between the questions and their specific answer choices would be intuitive to the respondent.

A review of previous FMI/CMAA Owners Surveys and the answers to the demographic questions was undertaken during creation of the final draft of the survey. It was determined that the ranges provided to the survey participants in questions 3 and 4 were inadequate and provided minimal variation in the responses, with a large number of respondents selecting the final answer choice. For question 3 this answer choice was greater than 20 and for question 4

this answer choice was greater than \$500M. Because each answer choice was an indefinite range, it made it difficult to classify this large group of respondents by the number of projects they performed each year and by the amount of construction spend by their organization. To obtain a greater variation in the number of responses and to be able to correlate the construction project and spend data with all other data in the survey, the answer choices were changed. The following table details these changes.

**Table 5.3: Changes in Questions 3 and 4**

Answer Choice	Question 3		Question 4	
	Previous Survey	2006 Survey	Previous Survey	2006 Survey
1	0	< 5	\$1-\$25M	< \$1M
2	1-5	6-20	\$26-\$50M	\$1-\$25M
3	6-10	20-50	\$51-\$75M	\$25-\$100M
4	11-15	50-100	\$76-\$100M	\$100-\$500M
5	16-20	100-500	\$101-\$125M	\$500M -\$1B
6	>20	> 500	\$126-\$150M	> \$1B
7	We have few projects spread out over several years		\$151-\$500M	
8			>\$500M	

Also, examples were added to the answer choices for question 3 to provide further clarity of each market sector. The changes in the demographic questions were intended to provide clarity to the respondent on which answer choice to select and to provide a diverse data set that could be segregated by the demographics and characteristics of the respondents.

Finally, question 6 was added to the final draft of the survey asking for the respondents to rate certain factors on their possible impact on the future of construction. Section 5.2 provides a description and examples of the mediums used for the dissemination of the final draft of the survey instrument.

## 5.2 Survey Instrument

The survey instrument was created in two mediums, both electronic and paper. The paper version of the survey instrument was used to reach internal contacts from FMI's database for

which an email address was not obtained. All other participants accessed the survey instrument electronically through an internet version. The following sections provide a description of the survey instrument and the mediums it was presented in.

#### 5.2.1 Paper Copy

The paper copy of the survey instrument was printed on 3 sheets of letter sized paper with text on both sides of the paper. Answer choices were denoted by a check or an 'x' written directly on the paper copy of the survey instrument. Section 12.2 of the Appendix provides a copy of the paper version of the survey instrument with text printed on only one side of the page.

#### 5.2.2 Online Version

An online version of the survey instrument was created using the survey software Key Survey which was accessed through a subscription held by FMI. Key survey is online survey software used to create web based surveys. The software records the results of the survey and allows for the results to be downloaded to an internal hard drive in various formats. Each question of the electronic version of the survey instrument was created using the Key Survey interface that allows the user to select the format of each question (i.e. multiple choice, short answer, etc.) and provide the proper text for each question and their corresponding answer choices. After each question has been created, the overall format and presentation of the survey was altered.

After the survey instrument was completed, a URL address was generated by Key Survey for the survey instrument. The survey was then accessible by a link to the URL. The URL address used for the FMI/CMAA Seventh Annual Survey of Owners was <http://www.keysurvey.com/survey/112048/a98f>.

The online version of the survey was contained on one webpage with the questions in numerical order. A submit button was provided at the bottom of the webpage for the

participants to submit their responses to the survey. The survey followed the same format and contained exactly the same questions as the paper copy.

### **5.3 Targeted Participants**

The participants for the FMI/CMAA Seventh Annual Survey of Owners were all owners of construction. In order to assure each participant was an owner of construction, participation in the survey was by invitation only. A series of professional organizations were identified as possible participants in the survey. Also, invitations were extended to contacts within FMI's internal database who were also owners of construction. The following sections detail the participants of the survey.

#### 5.3.1 Professional Organizations

The following sections give a description of each professional organization that participated in the survey and their membership. The Society of American Military Engineers (SAME) is not listed in the following descriptions. SAME was invited to participate in the survey, but did not provide the survey link to their membership.

##### *5.3.1.1 CMAA*

The Construction Management Association of America (CMAA) is a professional organization devoted to the interests of professional program and construction management. CMAA's membership is composed of over 3000 individuals and firms. Their membership includes CM practitioners, public and private owners, designers, contractors, attorneys, insurers, services consultants, educators and students [CMAA 2006]. CMAA was also one of the supporting organizations of the survey along with FMI.

##### *5.3.1.2 COAA*

The Construction Owners Association of America (COAA) is a professional organization founded in 1994 that serves the interest of construction project owners. The COAA

membership is made up of both public and private owners. Their membership includes: colleges, universities, school districts, local and state agencies, hospitals and healthcare facilities, retail developers and private industry developers. COAA's membership is also comprised of associate members including: general contractors, owner representatives, attorneys, and software providers [Construction Owners Association of America (COAA) 2006].

#### *5.3.1.3 CURT*

The Construction Users Roundtable (CURT) was formed by construction and engineering executives in 2000. CURT provides a forum for owners of construction allowing them to exchange information, views, practices and policies. CURT's membership includes some of the largest construction owners in the United States and the world such as major utility companies and large petroleum companies. Contractors are included in CURT's membership as associate members [Construction Users Roundtable (CURT) 2006].

#### *5.3.1.4 CEFPI*

The Council for Educational Facility Planners International (CEFPI) is a professional organization founded in 1921 whose mission is to improve the facilities where children learn. CEFPI's membership includes over 3000 professionals involved with school planning, design, and construction. Their members are architects, planners, engineers, K-12 administrators, higher education professors, construction management firms, facility maintenance and operations professionals, consultants, manufacturers, suppliers, and state and provincial agency representatives [The Council of Educational Facility Planners (CEFPI) 2006].

#### *5.3.1.5 HFI*

The Health Facility Institute (HFI) is a professional organization that is dedicated to the education of health facility professionals. HFI's membership is devoted to the construction

of health facilities. Their membership includes architects, engineers, health care executives, project managers, equipment planners, etc. [Health Facility Institute 2006].

#### 5.3.2 FMI Internal Database Contacts

To increase participation, contacts within the FMI internal database were also contacted to take part in the survey. The contacts included all participants of the FMI/CMAA Sixth Annual Survey of Owners and all participants in the FMI K-12 Education Survey, both recent surveys completed by FMI whose respondents were all owners of construction.

Also, a review of all FMI construction owner contacts was performed. Contacts were selected by market sector and their potential to respond to the survey. The list of contacts was then cross-referenced with the list of contacts for the two previous FMI surveys, in order to assure no one was contacted twice. Email invitations for participation in the survey were provided to a majority of the contacts along with the link for accessing the online version of the survey. Paper copies of the survey were also mailed to the respondents of the FMI K-12 Education Survey. Section 5.4 details how the survey was distributed to the participants introduced herein.

### **5.4 Survey Distribution and Collection**

The survey instrument was distributed to the participants through the electronic and paper format and the results of the survey were collected in the same medium they were distributed in. The following sections detail the distribution of the survey and the collection of the responses.

#### 5.4.1 Professional Organizations

The task of managing the distribution of the survey within each of the professional organizations was performed through FMI and CMAA. FMI aided in managing CURT, HFI, and CEFPI while CMAA aided in managing their own membership and COAA's membership. The entire distribution process to the members of the professional



organizations was performed electronically. The URL address for the online version of the survey was accessible from June 7, 2006 until July 29, 2006. Survey participants had the opportunity to complete the survey at any time during these 45 days. All that was required was for them to either type the URL address in their internet browser or click on the link provided in the emails described below.

A general survey invitation email was drafted that contained an introductory statement explaining to the participants the purpose of the survey and the importance of their involvement. The introductory statement was followed by a link to the survey's URL address. The email was then edited to be specific to each organization.

The survey invitation email was sent to specific contacts on the administrative staff of each organization detailed in Section 5.3 and followed with a phone call to insure that the contact had received the survey invitation email and understood how to distribute it. Electronic mailing lists were used by administrative staff within each organization to reach their entire membership.

Approximately two weeks after the survey invitation email was sent to the membership of the professional organizations, a reminder email was drafted. The reminder email again restated the purpose of the survey and the importance of participating in the survey along with the link to the URL address of the online version of the survey. The reminder email was sent to the administrative staff of the organizations who in turn distributed the email to their entire membership.

Approximately two weeks after the reminder email was sent, a final email was drafted alerting the participants of the amount of time the survey would be available online and again explaining the importance of participating in the survey. The URL address for the online version of the survey was also provided in the email. The draft of the final email was sent to the administrative staff of each organization who in turn distributed it to their membership via an email mailing list.

#### 5.4.2 Internal Database Contacts

Using an internal database of contacts maintained by FMI, possible survey participants were identified and invited to take part in the survey. A grouping of participants to FMI's K-12 Education Survey were identified. Since no email address was obtained for these contacts, a letter, with the paper copy of the survey attached, was sent to each of the K-12 Education Survey respondents asking them to participate in the FMI/CMAA Seventh Annual Survey of Owners. A return address was given at the end of the survey for the participants to return their completed questionnaires.

All other potential participants within FMI's internal database of contacts who were invited to take part in the survey were reached by email. Using client relationship management software, all the contacts identified to take part in the survey were selected and an email blast, or multiple emails to different addresses sent simultaneously, was used to distribute the survey invitation email. The contacts within FMI's internal database who were invited to participate were only contacted once, with the survey invitation email. No reminder emails were sent to the contacts within FMI's internal database because the contacts were not invited to participate in the survey until two weeks before the close of the online survey instrument.

#### 5.4.3 Survey Response Collection

The collection of the survey results was dependent upon the medium in which the survey was presented. For the respondents who completed the electronic version of the survey, the survey software Key Survey stored their results automatically in an electronic format. The results of all the respondents were then downloaded in a Microsoft Excel format from the Key Survey webpage.

For the responses to the paper copy of the survey, all completed surveys were returned by mail. The completed surveys were then stored until the electronic survey had closed and no additional responses were accepted. After the Excel version of the final set of results to the

electronic survey was downloaded, all responses to the paper copy of the survey were added manually to the Excel spreadsheet in the same format as the electronic responses. A total of 171 surveys were collected. Of the total number of surveys collected, 159 were completed using the electronic surveying instrument and 12 were completed using the paper survey instrument.

### **5.5 Survey Timeline**

The following timeline illustrates each event presented in Section 5.0 involved with the creation, distribution, and collection of the survey. The events recorded in the timeline are listed in chronological order. All dates occurred during the calendar year 2006 and some approximations have been made in the duration and timing of some events related to the invitations to participate in the survey because exact dates are not attainable since the distribution of the invitation emails was handled by numerous individual professional organizations.

**Table 5.4: Overall Survey Timeline**

<b>Event</b>	<b>Description</b>	<b>Start Date</b>	<b>End Date</b>
Conference Call	Kickoff Meeting	2/2	2/2
Conference Call	Meeting: Approach, Participants, and Timing	2/9	2/9
Conference Call	Meeting: Topics, Participants, and Timing	2/23	2/23
Panel Discussion	Focus Group Meeting	3/7	3/7
Survey Creation	Preliminary Survey Draft	3/8	3/24
Conference Call	Review Preliminary Survey Draft	3/24	3/24
Survey Review	Focus Group Review of Preliminary Survey	3/24	4/7
Survey Review	FMI Research Analyst's Review	4/21	4/21
Survey Creation	Second Survey Draft	4/24	4/28
Survey Review	Focus Group Review of Second Survey Draft	5/1	5/12
Opening Letter	Letter to Professional Organizations asking for Participation	5/2	5/2
Survey Review	Mike Kenig's Review	5/23	5/23
Survey Creation	Third Survey Draft	5/24	5/26
Survey Review	Internal Review of Third Survey Draft	5/29	6/2
Survey Creation	Survey Final Draft - Online Medium	6/5	6/7
Survey Launch	URL Link for Survey Opened	6/7	6/7
Survey Creation	Survey Final Draft - Paper Medium	6/12	6/16
Survey Invitation	Invitation Email to Professional Organizations	6/15	6/15
Survey Invitation	Invitation Email Sent to Past Owners Survey Participants	6/16	6/16
Survey Invitation	Invitation Letter Sent to K-12 Survey Participants	6/21	6/21
Survey Invitation Reminder	Reminder Email to Professional Organizations	6/23	6/23
Survey Results Received	Receipt of Paper Results from K-12 Survey Participants	6/29	8/11
Survey Invitation Reminder	Final Reminder Email to Professional Organizations	7/11	7/11
Survey Invitation	FMI Internal Database Contacts	7/12	7/14
Survey Closed	URL Link for Survey Closed	7/29	7/29
Survey Results Downloaded	Online Survey Results Downloaded from Key Survey	7/31	7/31

## **6.0 RESULTS**

Following the collection of the completed surveys, the results of all the responses were obtained, tabulated, and analyzed by spreadsheet calculations using Microsoft Excel. Of the 171 surveys that were collected, a majority (157) were fully completed. Any surveys that were returned partially completed were still included in the analysis, however, only the questions that were completed were used and any incomplete questions were removed. The raw data from all survey responses is contained in Section 12.3 of the Appendix.

The following sections present the results of the survey. Each section presents the results of a single specific question within the survey. The sections are ordered in ascending order starting with question 1. The question and the answer choices used in the survey instrument are presented in a tabular format throughout their respective sections.

This chapter is organized in a format similar to that of the survey instrument. The format for each of the sections follows the basic format described in the previous paragraph. However, deviations from the basic format do exist within this chapter. The deviations primarily reflect the layout of the survey instrument. The major deviations in format are found in the sections related to questions 11 through 17. These were a series of questions devoted to determining the amount of outsourcing that is occurring throughout the functions or phases of the construction life-cycle and how each function or phase is being staffed. The format used mirrored how the questions were presented in the survey.

Each section for questions 11 through 17 first presents the phase or function of the construction life-cycle that is being considered. A description of the phase or function is given in order to eliminate any confusion by the reader over the separate activities contained within each phase or function as defined in this document and in the survey. The phase or function and its description are then followed by two sub-questions labeled a. and b. Sub-question a. focuses on the amount of outsourcing that is occurring within the respondent's organization. Sub-question b. focuses on the way in which that work is being staffed.

Finally, not all respondents were asked to complete the final four questions (19 through 22) in the survey. These were a set of questions developed to identify the characteristics of hiring an external program manager. Whether or not the respondents answered the final four questions in the survey was based on the respondent's experience with the use of an external program manager.

Respondents were asked if they had ever hired an external program manager. If the respondent had previously hired an external program manager, they were asked to continue with the survey and complete questions 19 through 22. However, if the respondent had not hired an external program manager, they were informed that they had completed the survey and were asked not to continue. Because the hiring of a program manager is not as commonplace as other management techniques like construction management, a large number of the respondents (74) did not complete any of the questions (19 through 22) related to the hiring of an external program manager. The response totals for questions 19 through 22 reflect this. The following sections detail the results of the survey.

## 6.1 Question 1

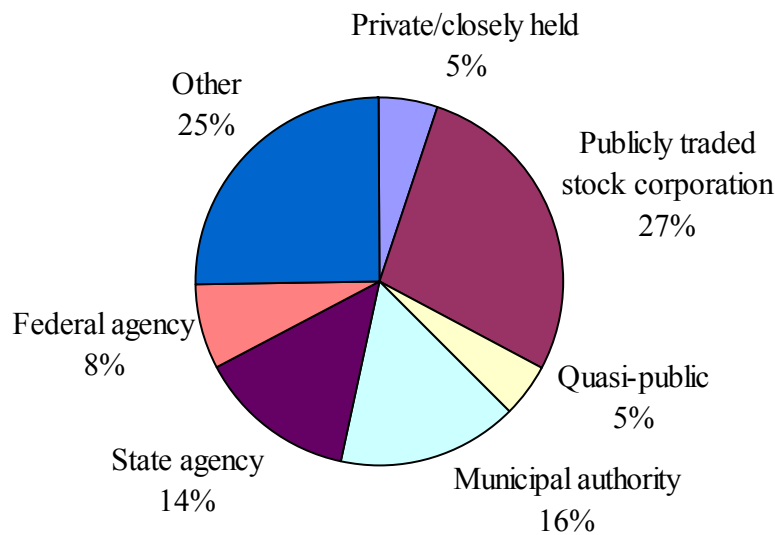
Question 1 of the FMI/CMAA Seventh Annual Survey of Owners was the first of a series of demographic questions directed at obtaining the characteristics of the respondents' organization. The following table, 6.1, provides the question asked in the survey instrument and the answer choices associated with the question.

**Table 6.1: Question 1**

1. Which of the following best describes your organization?	
1	Private/closely held
2	Publicly traded stock corporation
3	Quasi-public
4	Municipal authority
5	State agency
6	Federal agency
7	Other

A total of 171 respondents completed question 1. The results of all the responses are presented in Figure 6.1. Figure 6.1 provides a visual depiction of the percentage of respondents from each organization. The type of organization along with the percentage of responses is provided in the figure.

The largest majority of those responding to question 1 classified their organization as a publicly traded stock corporation. Municipal authorities and state agencies also made up a large percentage of the respondents to the survey. Private/closely held firms, federal agencies, and quasi-public organizations made up a small portion of the number of respondents, each less than 10 percent.



**Figure 6.1: Description of Respondent's Organization**

A review of the figure shows that 25% of the respondents classified their organization as 'other.' A large majority of the respondents who classified their organization as 'other' provided a clarification of their response. A majority of the respondents designated their

organization as a K-12 public school district, a university, not-for-profit private company, or various other responses. Those that provided clarifications to their selection of ‘other’ were reclassified in a later section to perform an analysis of the survey results using a breakdown of public and private organizations. The analysis along with the reclassification of the responses to question 1 is given in Section 7.1.

## 6.2 Question 2

Question 2 of the survey addressed the market sector of each of the survey respondents. Respondents were given the option to select all the market sectors that applied to their particular organization. Because of allowing the respondents to select all that apply, the total number of answer choice selections to question 2 was greater than the number of respondents to the survey. Table 6.2 presents the question and the answer choices to question 2 that were provided within the survey.

**Table 6.2: Question 2**

<b>What industry/market sector(s) do you work in? (Please select all that apply.)</b>	
1	Amusements and Recreation (i.e. Amusement parks, sports arenas, movie theaters)
2	Churches/Houses of Worship (i.e. Churches, chapels, mosques, synagogues)
3	Commercial (i.e. Supermarkets, restaurants, retail, warehouse)
4	Conservation and Development (i.e. Dam/levee, dredging, breakwater/jetty)
5	Education (i.e. K-12 and higher education)
6	Energy (i.e. Electric, gas, petroleum, etc.)
7	Highways and Streets (i.e. Pavement, lighting, bridge)
8	Hospitals and Nursing Homes (i.e. Hospitals, nursing homes, medical buildings)
9	Hotels and Motels
10	Manufacturing (Including all buildings and structures at manufacturing sites)
11	Military Facilities
12	Private Office and Professional (Including state and federal office or court buildings)
13	Public Safety, Administrative, and Other (i.e. Detention centers, police and fire stations)
14	Telecommunications
15	Water Supply/Waste Water Facilities (i.e. Plants, wells, lines, reservoirs)
16	Other

A total of 169 responses and 311 unique market sector selections were recorded for question 2. The largest market sector represented in the survey is that of education of which 1 in 3



respondents reported that they worked with in education. Energy and private office and professional were also well represented within the survey with nearly 20 percent of the survey population reporting they had worked in either. Very few respondents to the survey (around 2 percent) reported their market sector as being either military facilities, churches/houses of worship, or hotels and motels. Table 6.3 provides a detailed account of the survey responses to question 2. The market sectors are provided in the table along with the number of selections and the percentage of respondents selecting each particular market sector.

An ‘other’ selection was also provided as an answer choice for question 2. Nearly 20 percent of the survey population reported their market sector as other. Of that 20 percent nearly all of them clarified their response. A majority of the clarification responses to the selection of other was transportation. Additional clarifications included:

- Airports/aerospace
- Research facilities/laboratories
- Marine facilities
- Electric utilities
- Senior housing
- Public works facilities

**Table 6.3: Market Sectors of Survey Respondents**

<b>Description</b>	<b>Number of Selections</b>	<b>Percentage*</b>
Education	60	35.5%
Other	33	19.5%
Energy	33	19.5%
Private Office and Professional	32	18.9%
Water Supply/Waste Water Facilities	23	13.6%
Public Safety, Administrative, and Other	21	12.4%
Highways and Streets	21	12.4%
Manufacturing	20	11.8%
Hospitals and Nursing Homes	15	8.9%
Telecommunications	14	8.3%
Commercial	11	6.5%
Amusements and Recreation	9	5.3%
Conservation and Development	8	4.7%
Military Facilities	4	2.4%
Churches/Houses of Worship	4	2.4%
Hotels and Motels	3	1.8%

\*This number is calculated using the total number of responses (169)

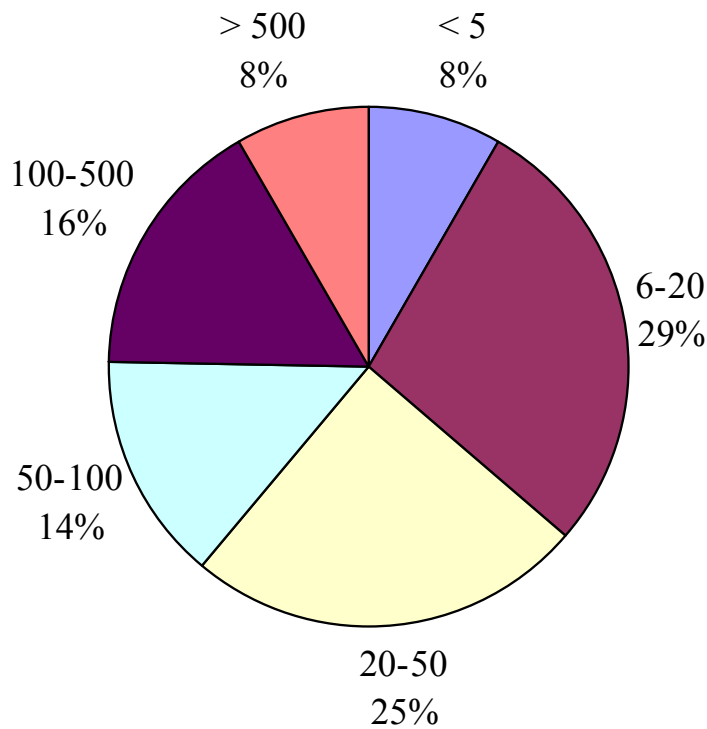
### **6.3 Question 3**

Question 3 is the third of the series of questions directed at obtaining demographic data about the respondents' organization. Question 3 concerns the number of construction projects performed by the respondent's organization each year. Specific ranges were given as answer choices. Ranges were used to allow the respondent to easily estimate the amount of projects performed by their organization. Table 6.4 provides the question and the answer choices, or specific ranges that were used for question 3 within the survey instrument.

**Table 6.4: Question 3**

Number of projects your organization starts each year.	
1	< 5
2	6-20
3	20-50
4	50-100
5	100-500
6	> 500

A total of 170 responses were recorded for question 3. The largest majority of respondents started a range of 6 to 20 projects a year followed by those respondents who started a range of 20 to 50 projects each year. The following chart, Figure 6.2, provides the percentage of the number of responses for each range of projects started per year.



**Figure 6.2: Number of Construction Projects Started Per Year**

In order to gain a better understanding of the total number of projects performed by the entire survey population each year, the ranges that were given as answer choices were revised.

Using the midpoint of each range as the value for the number of projects performed by each respondent, the total number of projects started each year by the entire survey population was found to be approximately 26,336. Table 6.5 shows the total number of selections for each range, the midpoints used for each range, and the total number of projects calculated for each range.

**Table 6.5: Total Number of Projects Started Annually by each Respondent**

Number of Projects Started	Number of Selections	Mid-Point	Total Number of Projects
< 5	14	3	42
6-20	48	13	624
20-50	42	35	1470
50-100	24	75	1800
100-500	28	300	8400
> 500	14	1000	14000

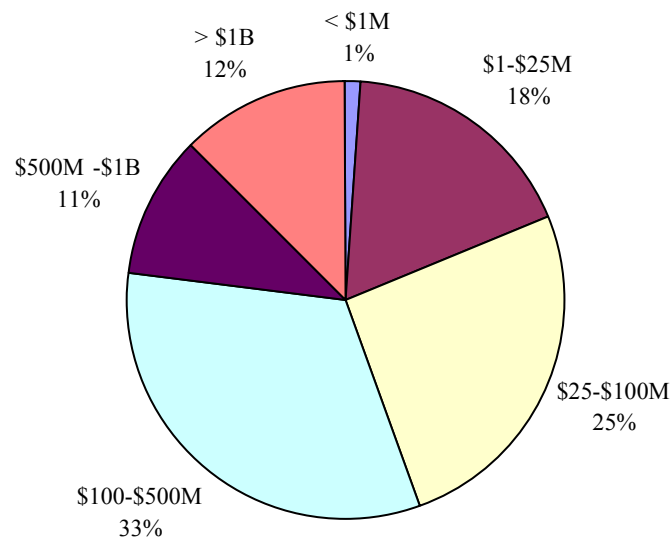
#### 6.4 Question 4

Question 4 was the final question in the series of demographic questions. Question 4 was directed at obtaining the total amount spent on construction by the respondent's organization. As in question 3, respondents were again given a series of ranges to choose from to allow them to better estimate their total construction spend. Table 6.6 details the question and answer choices used for question 4 in the survey instrument.

**Table 6.6: Question 4**

Annual construction spending by your organization.	
1	< \$1M
2	\$1-\$25M
3	\$25-\$100M
4	\$100-\$500M
5	\$500M -\$1B
6	> \$1B

A total of 169 responses were collected for question 4. The largest majority of respondents, 33 percent, reported their annual construction spending to be between 100 and 500 million dollars. The smallest number of respondents, 2, reported their spending to be below one million dollars. Figure 6.3 provides a visual depiction of the percentage of respondents who selected each answer choice for question 4.



**Figure 6.3: Annual Construction Spending of Survey Population**

Similar to question 3, a methodology was undertaken to determine the total amount of annual construction spending for the entire survey population. Assigning mid-points to each specific range of construction spending, the total amount of spending was calculated by multiplying the total number of respondents by the midpoint of each range. The total value for each range was then summed to estimate the total amount of annual construction spending by the survey population. Table 6.7 provides the results of the survey responses along with the results of the methodology presented above by showing the total number of selections, the mid-point, and the total amount of construction spend calculated for each range.

**Table 6.7: Total Amount of Annual Construction Spending**

<b>Annual Construction Spend</b>	<b>Number of Selections</b>	<b>Mid-Point (in Millions)</b>	<b>Total Amount of Construction Spend (in Millions)</b>
< \$1M	2	1	1
\$1-\$25M	30	13	390
\$25-\$100M	43	63	2,709
\$100-\$500M	55	300	16,500
\$500M -\$1B	18	750	13,500
> \$1B	21	2,000	42,000

The respondents to the FMI/CMAA Seventh Annual Survey of Owners were found to have a cumulative total annual construction spend of approximately \$75.1 billion. Considering that the construction market totaled \$1.14 trillion in 2005 [Simonson 2006] and the non-residential market accounted for 51.7 percent of industry revenues, the non-residential construction market put in place an estimated \$590 billion in 2005 [Datamonitor 2006]. The survey population accounts for an estimated 13 percent (75.1/1,140) of the overall non-residential construction dollars spent in the United States.

### **6.5 Question 5**

Question 5 was the first of two questions asking the respondents to comment on the future of construction. Question 5 was an open ended question intended to gauge what construction owners thought needed to be changed within the construction industry. The question read as follows on the survey instrument: What are the three most important changes construction industry owners should make in the next five years?

A majority of the survey respondents gave multiple responses to question five. However due to the large number of responses not all are presented in this section. An exhaustive list of all the responses to question five can be found in Section 12.3 of the Appendix. Some of the recurring comments or themes that appeared in the responses to question 5 were:

- Improvement of project delivery methods

- Technology and software improvements
- Development of skilled labor
- Labor shortages
- Material cost
- Construction cost
- Adjust to global environment
- LEED and Green Building
- Better planning/budgeting/scheduling

## 6.6 Question 6

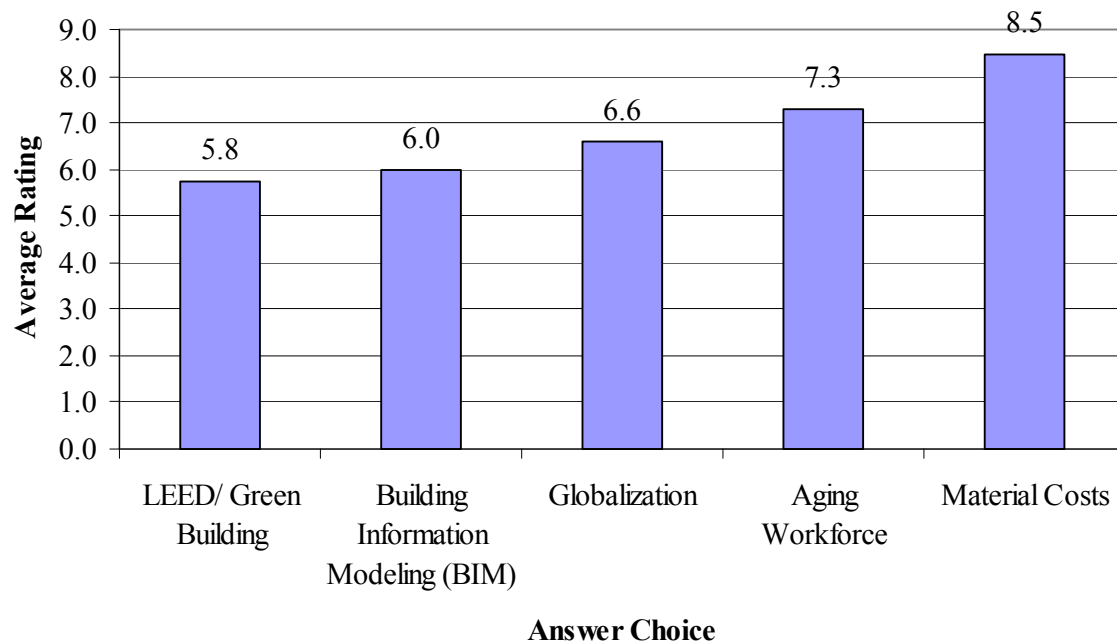
Question 6 is the second of two questions directed at obtaining the view point of owners of construction on the future of the construction industry. Question 6 uses a different format from question 5 in that a listing of specific items are provided for the respondent to rate as opposed to the open ended format used in question 5. Table 6.8 provides the question and answer choices for question 6 along with the rating scale. Respondents were provided with a scale from 1 to 10 with 1 representing the least impact and 10 representing the greatest impact.

**Table 6.8: Question 6**

Please rate each of the following on their possible impact on the future of construction.										
	Minimal Impact					Significant Impact				
Globalization	1	2	3	4	5	6	7	8	9	10
LEED/Green Building	1	2	3	4	5	6	7	8	9	10
Aging Workforce	1	2	3	4	5	6	7	8	9	10
Building Information Modeling (BIM)	1	2	3	4	5	6	7	8	9	10
Material Costs	1	2	3	4	5	6	7	8	9	10

A total of 169 responses were recorded for question 6. The importance placed on each possible choice was determined by taking the average rating given by all respondents. Of the choices, material costs had the highest rating and was thus considered to be of the greatest impact on the future of construction by the survey respondents. Figure 6.4 gives a visual

depiction of the impact each item will have on the future of construction as perceived by the survey population. The y-axis of Figure 6.4 gives the average rating of all the responses to each specific choice which is given on the x-axis.



**Figure 6.4: Average Rating for Question 6**

LEED/Green building and building information modeling (BIM) were both rated as having the least impact on the future of construction with both choices receiving an average rating of 6 or below.

### 6.7 Question 7

Question 7 was directed at obtaining the capabilities and resources of the organization's construction program. A scale from 1 to 10 was provided for the respondents to rate their organization on the ability to manage their entire construction program. A rating of 1 indicated that the organization lacked the capabilities to manage their construction program, while a rating of 10 indicated the organization had the ability to manage their entire



construction program with internal staff. Table 6.9 presents the question and rating scale for question 7.

**Table 6.9: Question 7**

<b>As the owner, how would you rate your organization on its capabilities and resources to manage a major construction program in-house?</b>									
Insufficient number or experience of staff to manage the entire program					Sufficient staff with the ability to manage the entire program				
1	2	3	4	5	6	7	8	9	10

After the online version of the survey was opened for participants, a problem occurred with the scale and rating criteria used to answer question 7. The problem affected the first 41 respondents to the survey, rendering their responses to question 7 meaningless. The scale and rating criteria were adjusted for the rest of the respondents to the online survey, and also for all those responding to the paper version of the survey draft. A total of 127 responses were collected for question 7 using the corrected scale and rating criteria. Table 6.10 presents the results of the 127 responses.

**Table 6.10: Ability to Manage a Construction Program**

<b>Rating*</b>	<b>Number of Selections</b>	<b>Percent</b>
1	11	8.7%
2	7	5.5%
3	8	6.3%
4	10	7.9%
5	8	6.3%
6	11	8.7%
7	24	18.9%
8	28	22.0%
9	8	6.3%
10	12	9.4%

\*1=Insufficient number or experience of staff to manage the entire program  
10= Sufficient staff with the ability to manage the entire program

A review of the results to question 7 shows that a majority of the respondents felt that their organization was capable of managing a construction program with 56.7 percent of the respondents rating their organization at a 7 or higher. Nearly 1 in 10 respondents felt that their organization was capable of managing their entire construction program, while 8.7 percent of the respondents felt that their organization lacked the ability to manage a construction program.

## 6.8 Question 8

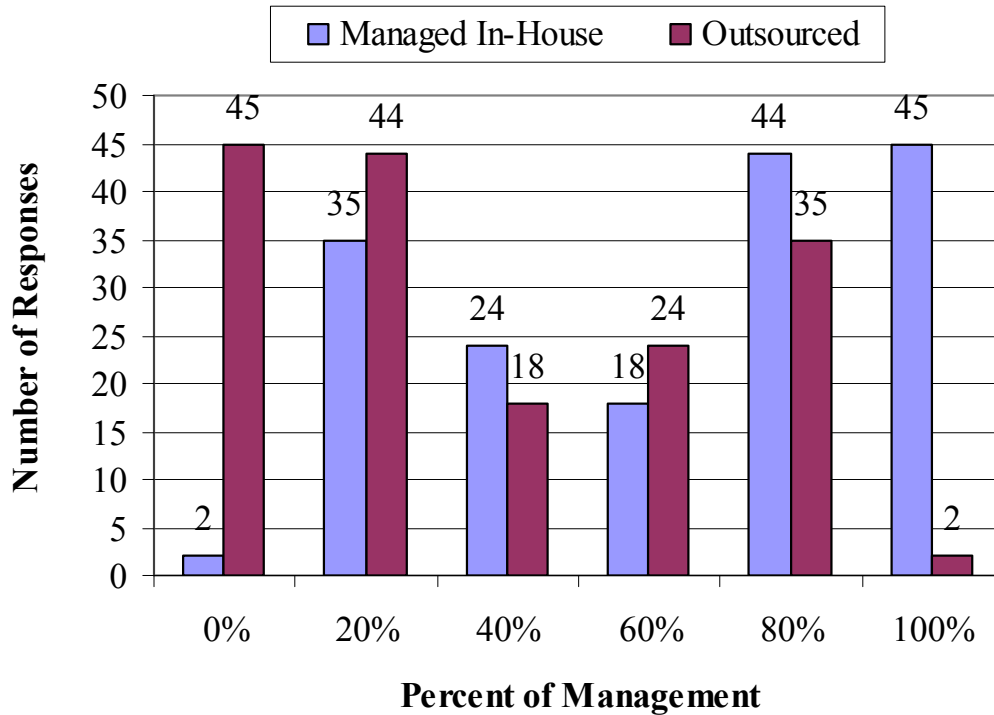
Question 8 was a high-level question directed at obtaining the amount of outsourcing that occurred within each respondent's construction program. The respondents were asked to provide an estimate of the total amount of their construction program they managed in house and the total amount they outsourced. The answer choices were given in percentages in increments of 20 from 0 percent to 100 percent. The respondents were instructed to have the percentages reported for the both in-house and outsourced to sum to 100 percent. The question and answer choices for question 8 are presented in table 6.11.

**Table 6.11: Question 8**

Please estimate what percentage of the management of your construction program is performed in-house and what percentage is outsourced. (Total between both in-house and outsourced should equal 100%)					
<b>Manage in-house:</b>					
0%	20%	40%	60%	80%	100%
<b>Outsource:</b>					
0%	20%	40%	60%	80%	100%

A total of 170 responses were recorded for question 8. However, two respondents did not correctly complete question 8. One respondent reported that their organization managed 20 percent of their construction program in-house and outsourced 100 percent of their construction program. Another respondent reported that they both managed 100 percent of their construction program in-house and outsourced 100 percent of their construction program. Since interpretation of these responses was not possible, they were not included in the final results for question 8 thus reducing the total number of responses to 168.

Figure 6.5 presents the results to question 8. The chart presents the percentage managed in-house or outsourced on the x-axis and the number of responses recorded for each percentage on the y-axis. The bar charts appear to be mirror images of one another and in fact are because of the restriction that required all responses to question 8 to sum to 100 percent.



**Figure 6.5: Percentage of Management Performed In-house and Outsourced Within Construction Programs**

## 6.9 Question 9

Question 9 of the survey addressed the issues of the use of program management or a program management approach. Respondents were asked if they felt they were using a program management approach for their construction needs. A definition of program management was produced by the program management focus group during the development of the survey. The definition developed by the program management focus group was a

variation of the CMAA definition for program management presented in Section 1.2. The definition is presented below.

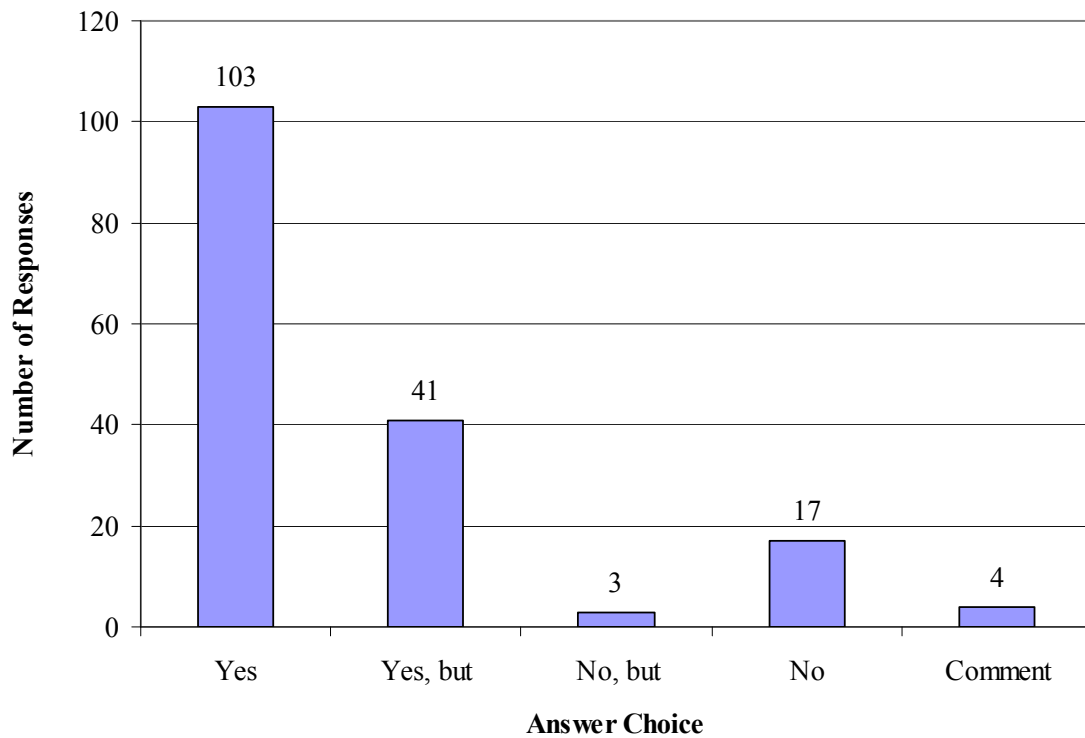
*Program management* is the unified management of a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management principles are used to integrate the different facets of the construction process - planning, design, procurement, construction, and activation - for the purpose of providing standardized technical and management expertise on each project.

The definition was used to provide clarity to the respondents on exactly what was meant by program management and a program management approach. The definition also applied to any use of program management or the concept of program management that appeared throughout the survey. Table 6.12 provides the question and answer choices for question 9.

**Table 6.12: Question 9**

Using the definition above, are you currently using a program management approach (process) for your construction needs?	
1	Yes, we are currently using program management for our construction needs.
2	Yes, but the way we approach it is different from the definition given.
3	No, but we plan to adopt an approach like this.
4	No, we are not currently using program management for our construction needs.
5	Comment

A total of 168 responses were recorded for question 9. An overwhelming majority of the respondents selected the first answer choice, stating that they do in fact use a program management approach for their construction needs, followed by those who also use a program management approach, but their approach varies from the definition given in the survey. Only 20 respondents or 12 percent of the respondents did not use a program management approach. Figure 6.6 presents the breakdown of responses to question 9.



**Figure 6.6: Use of Program Management by Respondents**

Four of the respondents selected answer choice 5, or ‘comment,’ and all four provided a comment. Their comments are presented below.

- Are interested in moving that direction, but government bureaucracy continues to resist.
- For a portion of our work (a major transportation initiative).
- No, but we have in the past and will when workload increases.
- We are using program management on a defined number of projects related to one another but are not using it uniformly across our enterprise.

#### **6.10 Question 10**

Question 10 was used to determine what functions a program manager should perform. Respondents were asked to select from a listing of functions that represented the entire construction life-cycle. The listing of possible functions was developed by the reviewers of

the survey and may not incorporate all the functions within the construction life-cycle. The question and answer choices as they appeared in the survey instrument are shown in Table 6.13.

**Table 6.13: Question 10**

<b>Please choose the functions that you feel should be performed by a program manager, regardless of whether or not you feel you are using program management. (Check all that apply)</b>	
1	Acquisition of real-estate
2	Procuring program financing
3	Pre-Design planning (Developing the scope, project definition, program and project planning, financial planning, and program schedule)
4	Design oversight
5	Design performance
6	Procurement oversight (Bid advertising, questions and answers, bidding, addenda issue, bid review, and contract award)
7	Construction oversight
8	Construction performance
9	Post-construction services (Commissioning, activation)
10	Operations and Maintenance

A total of 168 responses were collected for question 10. The largest percentage of respondents to question 10 felt that construction oversight and design oversight should be performed by a program manager. Other functions that were more management related as opposed to performance related, such as pre-design planning, procurement oversight, and post construction services also were selected by a high percentage of respondents. The performance of construction had a high response rate as well with 71.4 percent of respondents selecting this function as one that should be performed by a program manager. Acquisition of real-estate, a front end service, and operations and maintenance, a back end service, both were selected by a low percentage of respondents. Table 6.14 provides the results of the question 10 by providing the number of selections of each answer choice and the percentage of respondents' that selected each answer choice. The results are presented in descending order of the percentage of respondents that selected each answer choice.

**Table 6.14: Functions to be Performed by a Program Manager**

<b>Function</b>	<b>Number of Selections</b>	<b>Percentage of Respondents*</b>
Construction oversight	155	92.3%
Design oversight	145	86.3%
Pre-Design planning	143	85.1%
Procurement oversight	138	82.1%
Post-construction services	131	78.0%
Construction performance	120	71.4%
Design performance	105	62.5%
Procuring program financing	61	36.3%
Acquisition of real-estate	45	26.8%
Operations and Maintenance	30	17.9%

\*Calculated by dividing the number of selections by the total number of responses (168)

## **6.11 Question 11**

Question 11 focuses on the pre-design phase of the construction life-cycle and was labeled “Performance of Pre-Design Services.” The description used for the pre-design phase in the survey is presented below.

The performance of pre-design services includes setting up the business end of a construction program, classical front end services, and planning activities. Examples of classical front end services during the pre-design phase include requirements definition, financial planning, and program schedule. Examples of planning activities during the pre-design phase include scope and project definition and program and project planning.

### **6.11.1 Question 11a**

Question 11a is a sub-question of question 11 and is directed at determining the amount of outsourcing that occurs in the pre-design phase of the construction life-cycle. Respondents were given a series of ranges that represented the percentage of the activity involved with the pre-design phase they outsourced. Ranges were used to make it easier for respondents to

estimate the amount outsourcing that occurred within their organization. Table 6.15 provides the question and answer choices used for question 11a within the survey instrument.

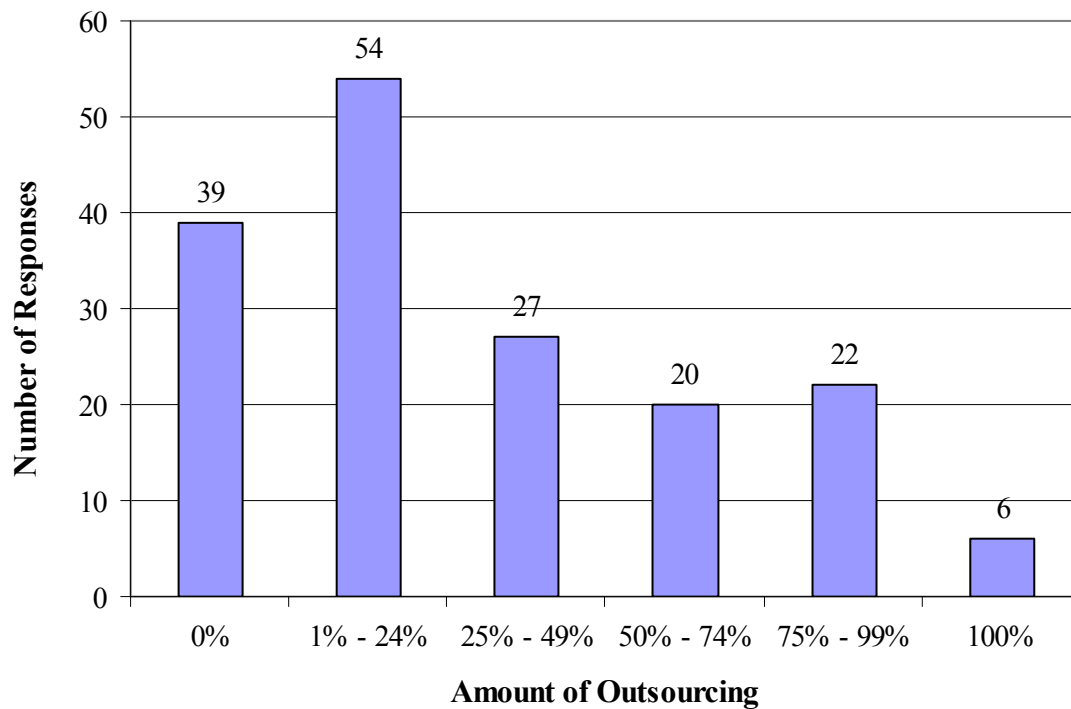
**Table 6.15: Question 11a**

<b>What percentage of activity involved with the pre-design phase of your program is outsourced?</b>	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.7 presents the results of question 11a. The different ranges provided as answer choices to question 11a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 168 responses were obtained for question 11a with a majority of the respondents, 71.4 percent  $((39+54+27)/168)$ , reporting that they outsource less than 50 percent of all activity involved with the pre-design phase. Very few respondents, 3.6 percent  $(6/168)$ , reported outsourcing all of the activity associated with the pre-design phase of their construction program.





**Figure 6.7: Amount of Outsourcing Within the Pre-Design Phase**

The average amount of outsourcing that occurred within the pre-design phase of construction was also calculated using the results of question 11a. A midpoint was assigned to each range given as an answer choice to question 11a. Table 6.16 presents the midpoints used for each range. Each respondent's answer was then assigned the respective midpoint of the range they selected. The average of all the selections was then taken using the midpoint value instead of the range in order to obtain the average amount of outsourcing reported by all the survey respondents. The average amount of outsourcing within the pre-design phase was found to be 32.3 percent.

**Table 6.16: Midpoints for Question 11a**

Range	Mid Point
100%	100%
75% - 99%	87%
50% - 74%	62%
25% - 49%	37%
1% - 24%	13%
0%	0%

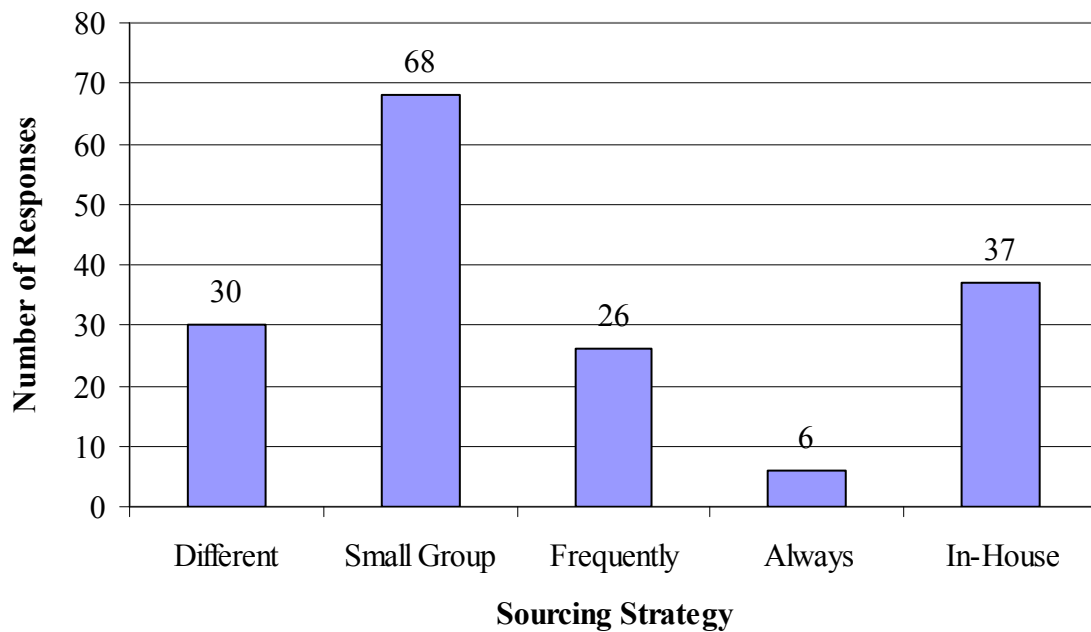
#### 6.11.2 Question 11b

Question 11b is a sub-question of question 11 and is directed at determining how the respondents procure pre-design services. The respondents were given a series of answer choices related to the number of service providers they used to staff all activities related to the pre-design phase. An answer choice (item 5 in Table 6.18) was also provided for the respondents who performed all activity related to the pre-design phase in-house. Table 6.17 presents the question and the answer choices for 11b that appeared in the survey.

**Table 6.17: Question 11b**

If you outsource the activities associated with the pre-design phase of your program, do you:	
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 11a)

A total of 167 responses were recorded for question 11b with a majority of the respondents, 58.7 percent  $((38+68)/167)$ , reporting that they use multiple service providers for sourcing the pre-design phase. Those reporting that they use multiple service providers either selected answer choice 1, “Always select a different service provider for each project” or answer choice 2, “Consistently select from a small group (4 or less) of service providers for each project.” Figure 6.8 provides the results of question 11b with each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.8: Sourcing Strategy Used in the Pre-Design Phase**

#### **6.12 Question 12**

Question 12 was the second question in the series of questions related to the outsourcing of construction programs. Question 12 focuses on the design phase of the construction life-cycle, specifically the management of design services. Question 12 was titled “Oversight of Design Services.” The description used for the oversight of design services in the survey is presented below.

The oversight of design services involves establishing a process to select the individual design firm(s) for design phase services of the construction program; managing the design schedule; and creating the design packages for a construction program.

### 6.12.1 Question 12a

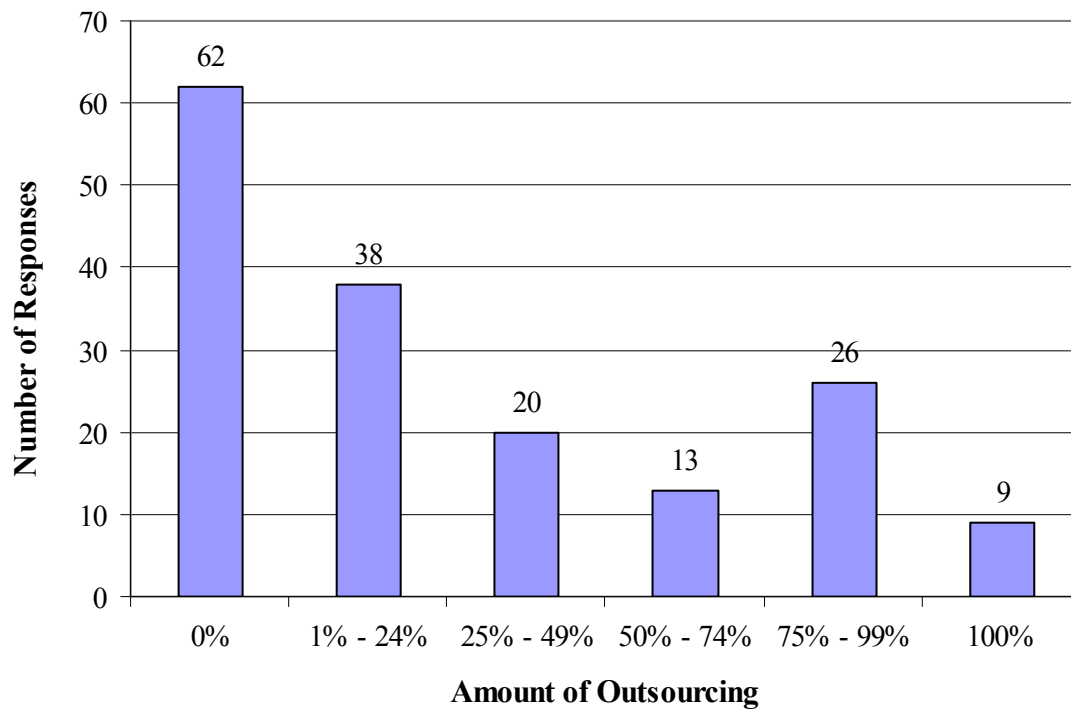
Question 12a is a sub-question of question 12 and is directed at determining the amount of outsourcing that occurs in the oversight or management of design services. Respondents were given a series of ranges that represented the percentage of the activity involved with the oversight of design services they outsourced. Table 6.18 provides the question and answer choices used for question 12a within the survey instrument.

**Table 6.18: Question 12a**

What percentage of the oversight of design phase services is outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.9 presents the results of question 12a. The different ranges provided as answer choices to question 12a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 168 responses were obtained for question 12a with a majority of the respondents, 71.4 percent  $((62+38+20)/168)$ , reporting that they outsource less than 50 percent of all activity involved with the pre-design phase. Very few respondents, 5.4 percent  $(9/168)$ , reported outsourcing all of the activity associated with the pre-design phase of their construction program.



**Figure 6.9: Amount of Outsourcing Within the Oversight of Design Function**

The average amount of outsourcing that occurred within the oversight of design services was calculated using the results of question 12a. The methodology used for calculating the average amount of outsourcing is similar to that used in calculating the average amount of outsourcing for the pre-design phase, which can be found in Section 6.11.1. The average amount of outsourcing within the oversight of design services was found to be 30.9 percent.

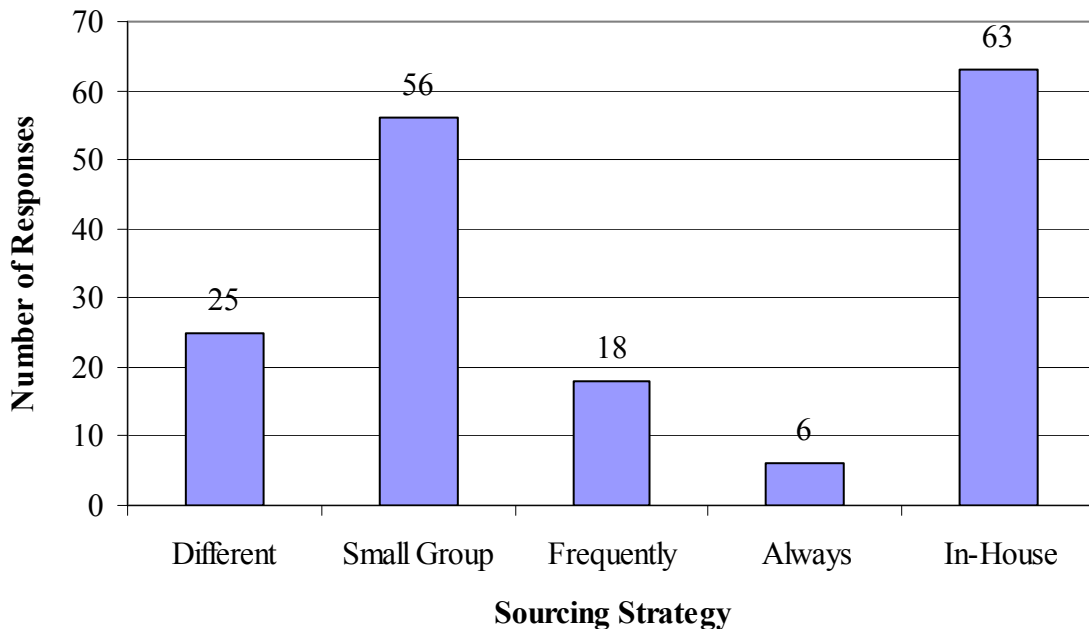
#### 6.12.2 Question 12b

Question 12b is a sub-question of question 12 and is directed at determining how the respondents procure the oversight of design services. The respondents were given a series of answer choices related to the number of service providers they selected from in procuring the oversight of design services. An answer choice (item 5 in Table 6.19) was also provided for the respondents who performed all activity related to the oversight of design services in-house. Table 6.19 presents the question and the answer choices for 12b that appeared in the survey.

**Table 6.19: Question 12b**

If you outsource the oversight of design phase services, do you:	
1	Always select a different firm to oversee design services for each project
2	Consistently select from a small group (4 or less) of firms to oversee design services for each project
3	Frequently use the same firm to oversee design services
4	Always use the same firm to oversee design services
5	N/A (Please select this option if you chose 0% for question 12a)

A total of 168 responses were recorded for question 12b with a slight majority of the respondents, 51.8 percent  $((18+6+63)/168)$ , reporting that they frequently use the same firm, always use the same firm or perform all of the activity in-house. The rest of the respondents, 48.2 percent  $((25+56)/167)$ , reported that they used multiple service providers. Figure 6.10 provides the results of question 12b with answer choices provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.10: Sourcing Strategy Used in the Oversight of Design Function**

### 6.13 Question 13

Question 13 was the third question in the series of questions related to the outsourcing of construction programs. Question 13 focuses on the design phase of the construction life-cycle, specifically the performance of design services. Question 13 was titled “Performance of Design Services.” The description used for the performance of design services in the survey was, “Performance of design services involves the development of the design for each phase or project within the program.”

#### 6.13.1 Question 13a

Question 13a is a sub-question of question 13 and is directed at determining the amount of outsourcing that occurs in the performance of design services. Respondents were given a series of ranges that represented the percentage of the activity involved with the performance of design services they outsourced. Table 6.20 provides the question and answer choices used for question 13a within the survey instrument.

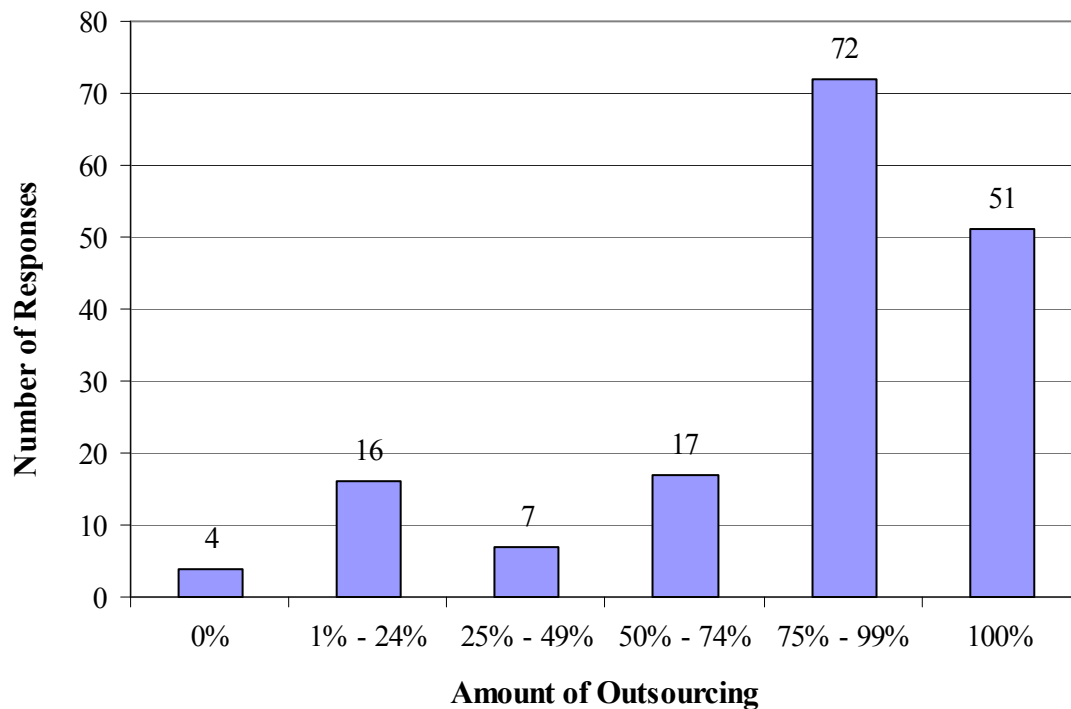
**Table 6.20: Question 13a**

What percentage of the performance of design services is outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.11 presents the results of question 13a. The different ranges provided as answer choices to question 13a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 167 responses were obtained for question 13a with a large majority of the respondents, 73.7 percent  $((51+72)/167)$ , reporting that they outsource 75 percent or more of all activity involved with the pre-design phase. One in three respondents  $(51/167)$  reported

that they outsource 100 percent of all design activity. Only 2.4 percent (4/167) of the respondents perform all of the design activity in-house.



**Figure 6.11: Amount of Outsourcing Within the Performance of Design Function**

The average amount of outsourcing that occurred within the performance of design services was also calculated using the results of question 13a. The methodology used for determining the average amount of outsourcing within the performance of design services is the same methodology used in determining the average amount of outsourcing for the pre-design phase. A description of the methodology can be found in Section 6.11.1. The average amount of outsourcing within the performance of design services was found to be 77.1 percent.

#### 6.13.2 Question 13b

Question 13b is a sub-question of question 13 and is directed at determining how the respondents procure the performance of design services. The respondents were given a series

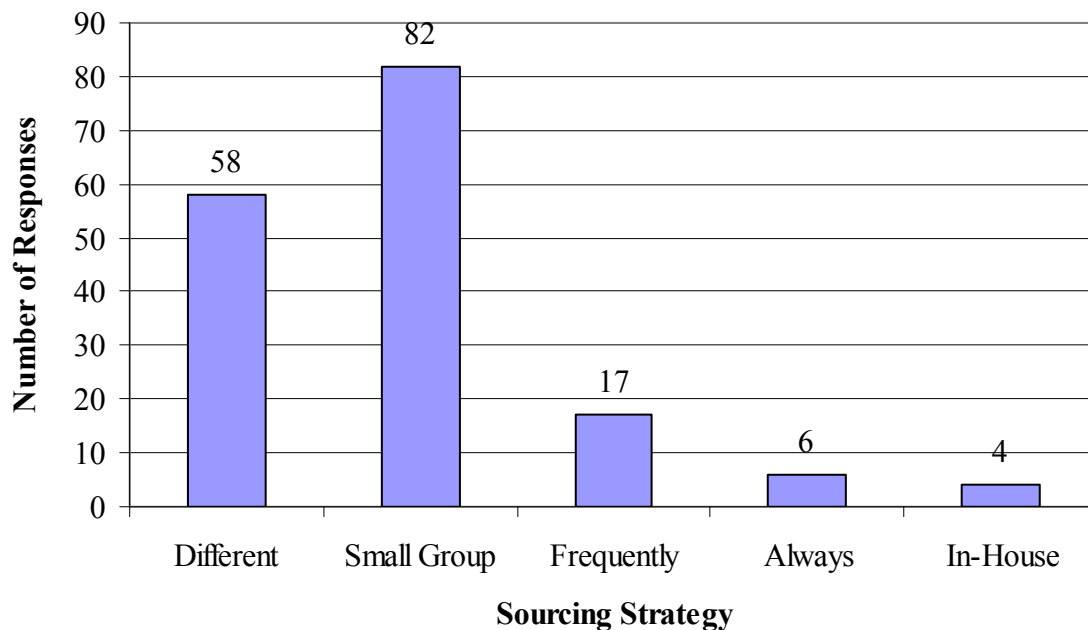


of answer choices related to the number of service providers they used to staff the performance of design services. An answer choice (item 5 in Table 6.21) was also provided for the respondents who performed all activity related to the performance of design services in-house. Table 6.21 presents the question and the answer choices for question 13b.

**Table 6.21: Question 13b**

If you outsource design services, do you:	
1	Always select a different design firm for each project
2	Consistently select from a small group (4 or less) of design firms for each project
3	Frequently use the same design firm
4	Always use the same design firm
5	N/A (Please select this option if you chose 0% for question 13a)

A total of 167 responses were recorded for question 13b with a large majority of the respondents, 83.8 percent  $((58+82)/167)$ , reporting that they select from multiple service providers when outsourcing the performance of design services. Those that were classified as selecting from multiple service providers chose answer choice 1 or 2 from Table 6.21. Only a small percentage of respondents, 3.6 percent  $(6/167)$ , reported that they always used the same design firm. Figure 6.12 provides the results of question 13b with each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.12: Sourcing Strategy Used in the Performance of Design Function**

#### **6.14 Question 14**

Question 14 was the fourth question in the series of questions related to the outsourcing of construction programs. Question 14 focuses on the construction phase of the construction life-cycle, specifically the oversight of construction. Question 14 was titled “Oversight of Construction.” The description used for the oversight of construction in the survey is presented below.

The oversight of the construction process typically includes logistics planning, schedule monitoring, change management, quality assurance and control, and facility commissioning. The owner’s representative or a construction manager working in the role of an agent typically performs this function.

##### **6.14.1 Question 14a**

Question 14a is a sub-question of question 14 and is directed at determining the amount of outsourcing that occurs in the oversight of construction. Respondents were given a series of

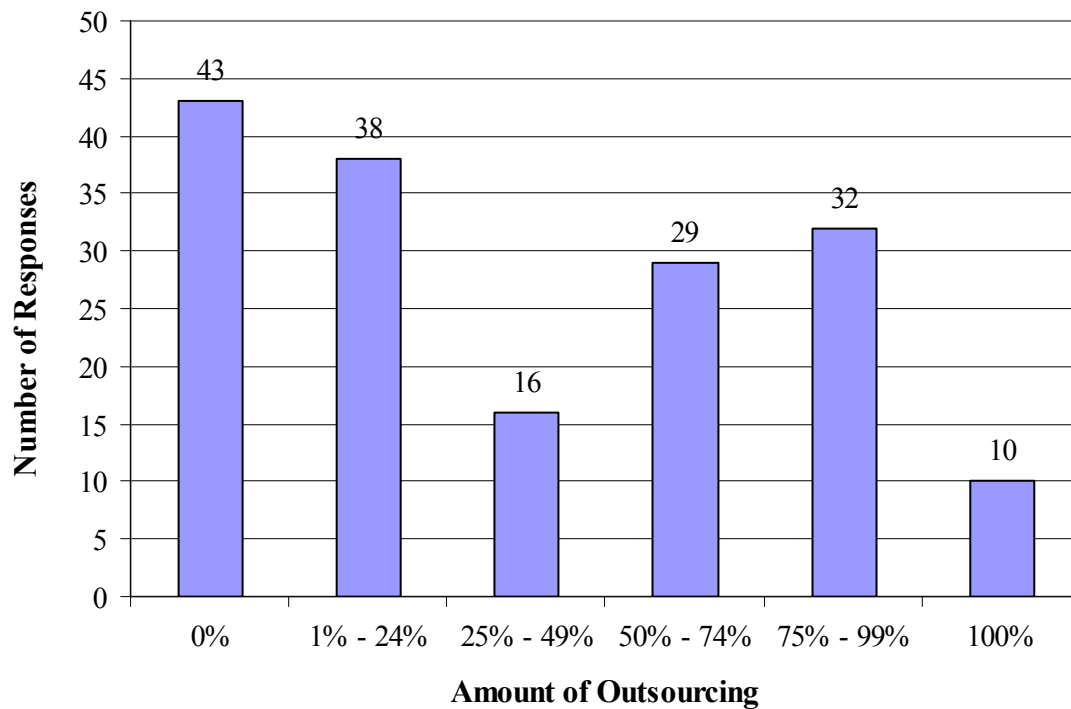
ranges that represented the percentage of the activity involved with the oversight of construction they outsourced. Table 6.22 provides the question and answer choices used for question 14a within the survey instrument.

**Table 6.22: Question 14a**

What percentage of the oversight of construction is outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.13 presents the results of question 14a. The different ranges provided as answer choices to question 14a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 168 responses were obtained for question 14a. The results for question 14a show the amount of outsourcing that is occurring within the oversight of construction is varied. The largest amount of respondents, 43, reported that they performed all of the oversight of construction in-house. The least amount of respondents, 10, reported that they outsourced all activity related to the oversight of construction.



**Figure 6.13: Amount of Outsourcing Within the Oversight of Construction Function**

The average amount of outsourcing that occurred within the oversight of construction was also calculated using the results of question 14a. The methodology used for determining the average amount of outsourcing within the oversight of construction is the same methodology used in determining the average amount of outsourcing within pre-design phase. A description of the methodology can be found in Section 6.11.1. The average amount of outsourcing within the oversight of construction was found to be 39.6 percent.

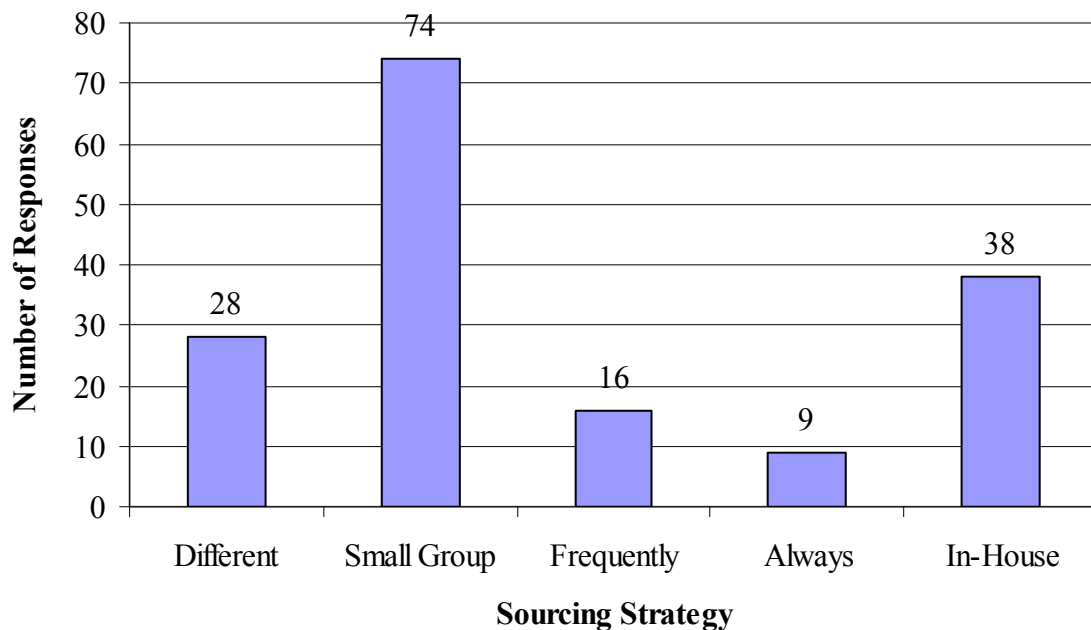
#### 6.14.2 Question 14b

Question 14b is a sub-question of question 14 and is directed at determining how the respondents procure services for the oversight of construction. The respondents were given a series of answer choices related to the number of service providers they used to staff the oversight of construction. An answer choice (item 5 in Table 6.23) was also provided for the respondents who performed all activity related to the oversight of construction in-house. Table 6.23 presents the question and the answer choices for 14b.

**Table 6.23: Question 14b**

If you outsource the oversight of construction, do you:	
1	Always select a different firm to provide oversight of construction for each project
2	Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project
3	Frequently use the same firm to provide oversight of construction
4	Always use the same firm to provide oversight of construction
5	N/A (Please select this option if you chose 0% for question 14a)

A total of 165 responses were recorded for question 14b with a large majority of the respondents, 61.8 percent  $((28+74)/165)$ , reporting that they select from multiple service providers when outsourcing the oversight of construction. Those that were classified as selecting from multiple service providers chose answer choice 1 or 2 from Table 6.23. The largest number of respondents, 74, reported that they consistently selected from a small group of firms to oversee their construction activity. Only a small percentage of respondents, 5.5 percent  $(9/165)$ , reported that they always used the same firm. Figure 6.14 provides the results of question 14b with each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.14: Sourcing Strategy Used in the Oversight of Construction Function**

### 6.15 Question 15

Question 15 was the fifth question in the series of questions related to the outsourcing of construction programs. Question 15 focuses on the construction phase of the construction life-cycle, specifically the performance of construction. Question 15 was titled “Construction Performance.” The description used for construction performance in the survey is presented below.

Construction performance involves the responsibility of schedule and cost performance for the construction phase. This function is typically performed by a general contractor, construction manager at-risk, or through a multi-prime contract.

#### 6.15.1 Question 15a

Question 15a is a sub-question of question 15 and is directed at determining the amount of outsourcing that occurs in the performance of construction. Respondents were given a series of ranges that represented the percentage of the activity involved with the performance of

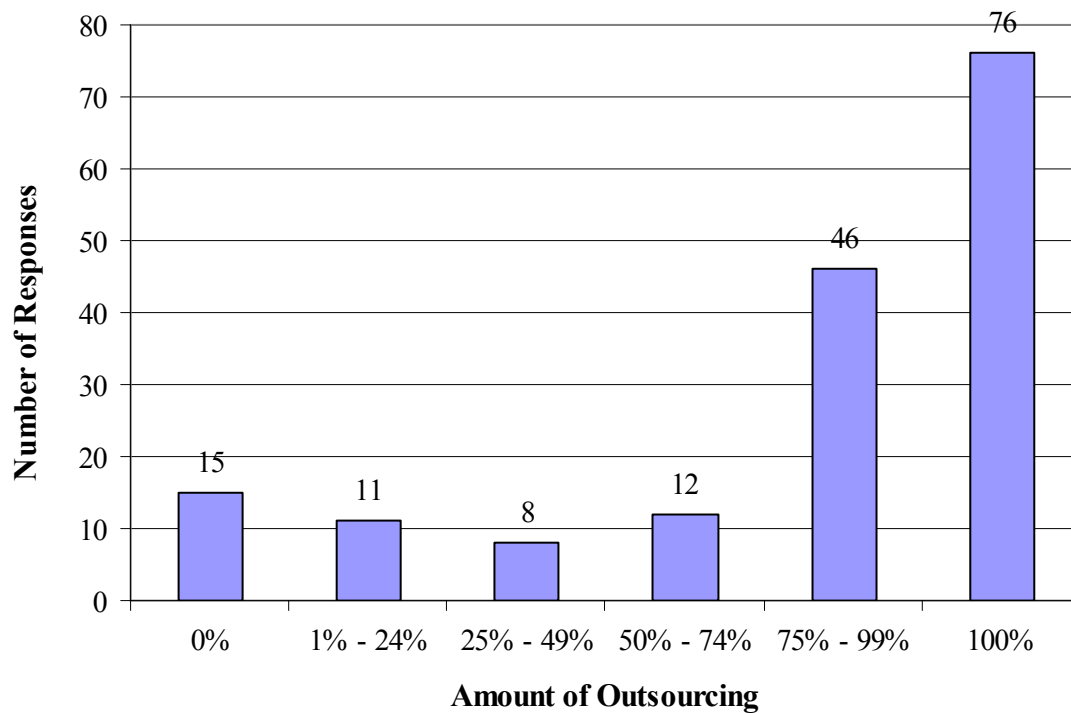
construction they outsourced. Table 6.24 provides the question and answer choices used for question 15a.

**Table 6.24: Question 15a**

What percentage of construction performance activity is outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.15 presents the results of question 15a. The different ranges provided as answer choices to question 15a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 168 responses were obtained for question 15a with a majority of respondents, 72.6 percent  $((76+46)/168)$  reporting they outsource 75 percent or more of all activity associated with the performance of construction. Only 8.9 percent  $(15/168)$  of the respondents perform all of their construction in-house.



**Figure 6.15: Amount of Outsourcing Within the Performance of Construction Function**

The average amount of outsourcing that occurred within the performance of construction was also calculated using the results of question 15a. The methodology used for determining the average amount of outsourcing within the oversight of construction is the same methodology used in determining the average amount of outsourcing within the pre-design phase. A description of the methodology can be found in Section 6.11.1. The average amount of outsourcing within the performance of construction was found to be 76.1 percent.

#### 6.15.2 Question 15b

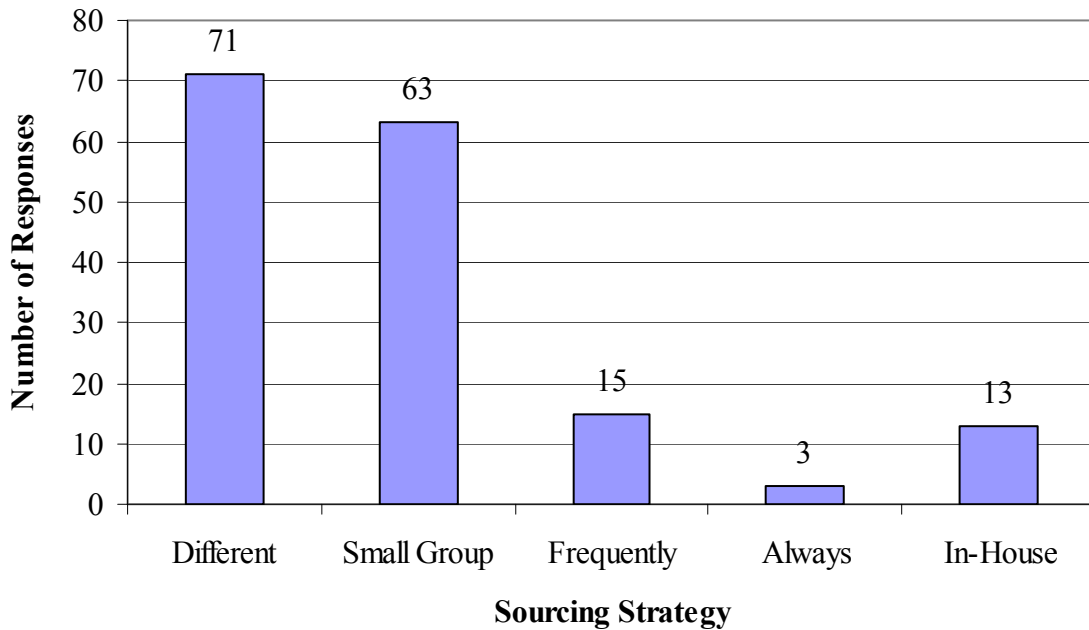
Question 15b is a sub-question of question 15 and is directed at determining how the respondents procure services for the performance of construction. The respondents were given a series of answer choices related to the number of service providers they used to staff the performance of construction. An answer choice, item 5 in Table 6.25, was also provided for the respondents who performed all activity related to the performance of construction in-house. Table 6.25 presents the question and the answer choices for 15b.



**Table 6.25: Question 15b**

If you outsource the performance of construction, do you:	
1	Always select a different construction firm for each project
2	Consistently select from a small group (4 or less) of construction firms for each project
3	Frequently use the same construction firm
4	Always use the same construction firm
5	N/A (Please select this option if you chose 0% for question 15a)

A total of 165 responses were recorded for question 15b with a large majority of the respondents, 81.2 percent  $((71+63)/165)$ , reporting that they select from multiple service providers when outsourcing the performance of construction. Those that were classified as selecting from multiple service providers chose answer choice 1 or 2 from Table 6.25. Only a very small percentage of respondents, 1.8 percent  $(3/165)$ , reported that they always used the same construction firm. Figure 6.16 provides the results of question 15b with the each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.16: Sourcing Strategy Used in the Performance of Construction Function**

## 6.16 Question 16

Question 16 was the sixth question in the series of questions related to the outsourcing of construction programs. Question 16 focuses on the post-construction phase of the construction life-cycle, specifically program activation. Question 16 was titled “Program Activation.” The description used for program activation in the survey is presented below.

Program activation is the process whereby the owner prepares to use a new facility or facilities. The goals of activation are ensuring that facilities are prepared and occupancy is achieved in a timely and efficient manner; ensuring that the intended level of services is achieved from the outset, and providing a seamless and transparent move from contractor completion to full operation.

### 6.16.1 Question 16a

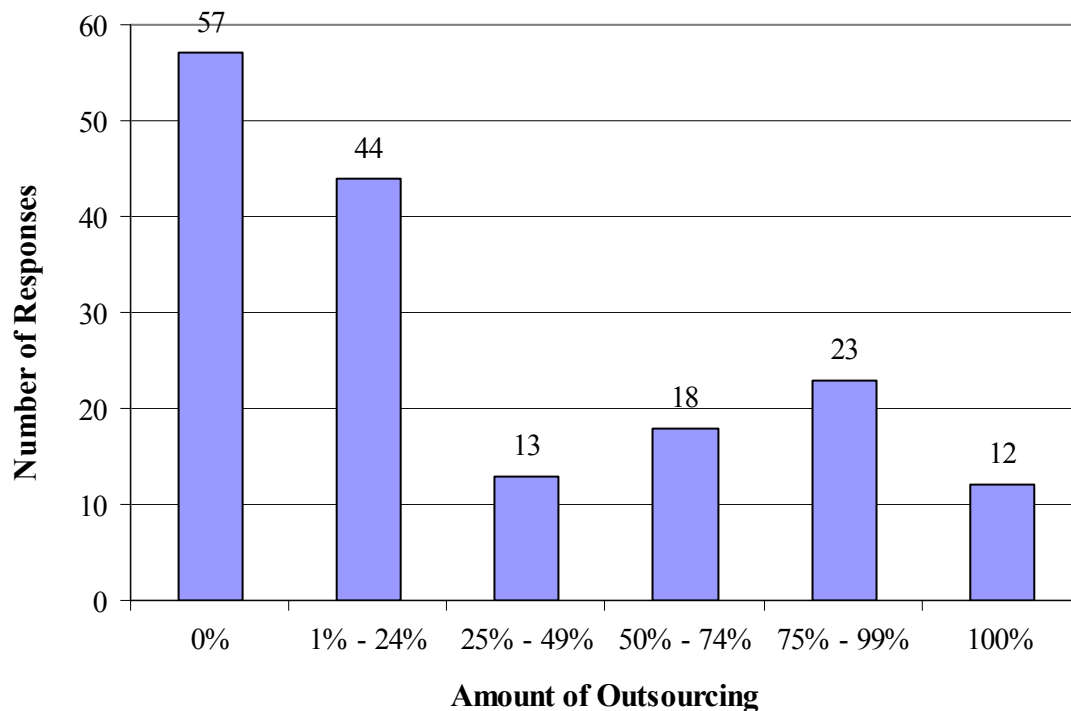
Question 16a is a sub-question of question 16 and is directed at determining the amount of outsourcing that occurs during program activation. Respondents were given a series of ranges that represented the percentage of the activity involved with program activation that is outsourced. Table 6.26 provides the question and answer choices used for question 16a.

**Table 6.26: Question 16a**

What percentage of your program activation activities is outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.17 presents the results of question 16a. The different ranges provided as answer choices to question 16a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 167 responses were obtained for question 16a with a majority of the respondents, 60.4 percent  $((57+44)/167)$  reporting they outsource less than 25 percent of all activity associated with program activation. Only 7.2 percent  $(12/167)$  of the respondents outsource all of the activities associated with program activation.



**Figure 6.17: Amount of Outsourcing Within the Activation Phase**

The average amount of outsourcing that occurred within program activation was also calculated using the results of question 16a. The methodology used for determining the average amount of outsourcing within the activation stage of the program is the same methodology used in determining the average amount of outsourcing for the pre-design phase. A description of the methodology can be found in Section 6.11.1. The average amount of outsourcing within the activation stage was found to be 32.0 percent.

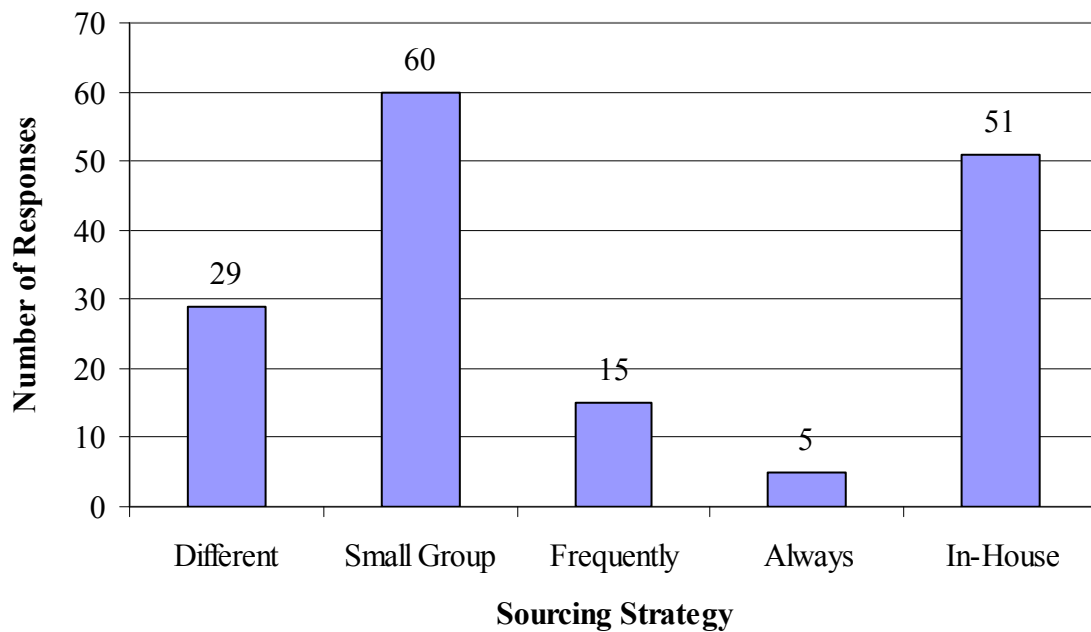
### 6.16.2 Question 16b

Question 16b is a sub-question of question 16 and is directed at determining how the respondents procure services for program activation. The respondents were given a series of answer choices related to the number of service providers they used to staff the program activation stage. An answer choice (item 5 in Table 6.27) was also provided for the respondents who performed all activity related to the activation stage in-house. Table 6.27 presents the question and the answer choices for 16b.

**Table 6.27: Question 16b**

If you outsource program activation activities, do you:	
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 16a)

A total of 160 responses were recorded for question 16b with a majority of the respondents, 55.6 percent ((60+29)/160), reporting that they select from multiple service providers when outsourcing program activation activities. Those that were classified as selecting from multiple service providers chose answer choice 1 or 2 from Table 6.27. Only a small percentage of respondents, 6.3 percent (5/160), reported that they always used the same service provider. Figure 6.18 provides the results of question 16b with each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.



**Figure 6.18: Sourcing Strategy Used in the Activation Phase**

### **6.17 Question 17**

Question 17 was the seventh and final question in the series of questions related to the outsourcing of construction programs. Question 17 focuses on the post-construction phase of the construction life-cycle, specifically operations and maintenance. Question 17 was titled “Operations and Maintenance.” The description used for operations and maintenance in the survey read as follows, “Operations and maintenance includes all operations and maintenance procedures to be performed on the constructed facilities within the program.”

#### **6.17.1 Question 17a**

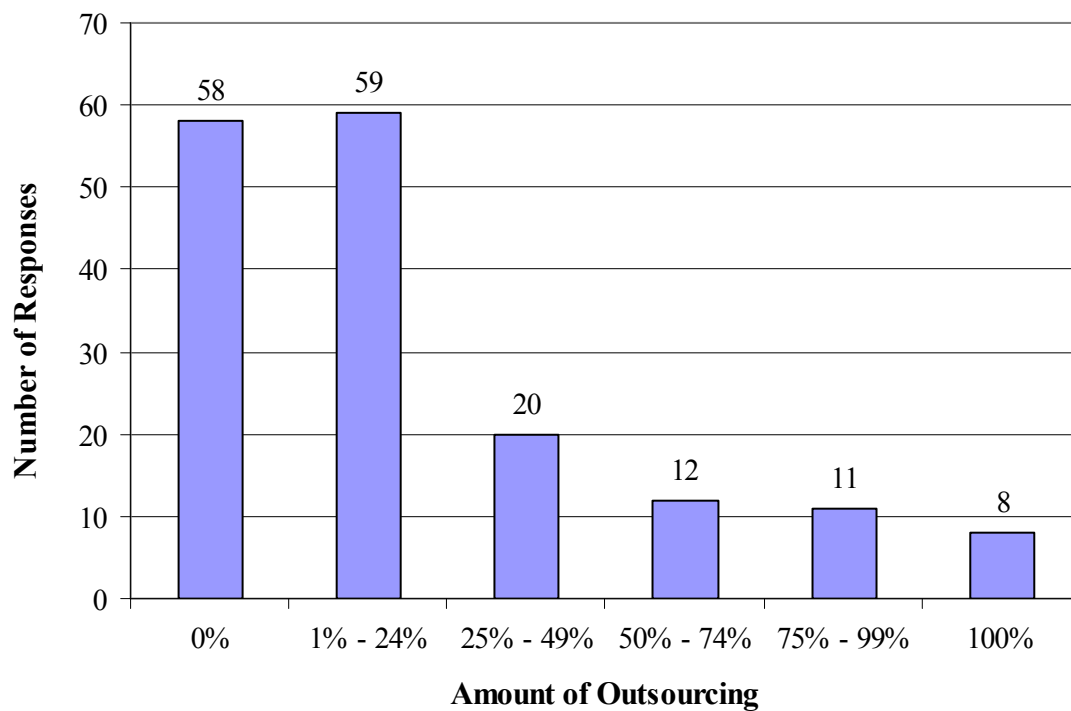
Question 17a is a sub-question of question 17 and is directed at determining the amount of outsourcing that occurs during the operations and maintenance activities. Respondents were given a series of ranges that represented the percentage of activity involved with the operations and maintenance phase that is outsourced. Table 6.28 provides the question and answer choices used for question 17a.

**Table 6.28: Question 17a**

What percentage of operations and maintenance activities are outsourced?	
1	100%
2	75% - 99%
3	50% - 74%
4	25% - 49%
5	1% - 24%
6	0%

Figure 6.19 presents the results of question 17a. The different ranges provided as answer choices to question 17a are presented on the x-axis of the bar chart with the number of responses of each answer choice presented on the y-axis.

A total of 168 responses were obtained for question 17a with a majority of respondents, 69.6 percent  $((58+59)/168)$  reporting they outsource less than 25 percent of all activity associated with program activation. Also, one in three  $(58/168)$  respondents reported performing all activities associated with operations and maintenance in-house. Only 4.8 percent  $(8/168)$  of the respondents outsource all of the activities associated with operations and maintenance.



**Figure 6.19: Amount of Outsourcing Within the Operations and Maintenance Function**

The average amount of outsourcing that occurred within the activities associated with operations and maintenance was also calculated using the results of question 17a. The methodology used for determining the average amount of outsourcing within the operations and maintenance phase of the program is the same methodology used in determining the average amount of outsourcing in the pre-design phase. A description of the methodology can be found in Section 6.11.1. The average amount of outsourcing within the operations and maintenance stage was found to be 23.7 percent.

#### 6.17.2 Question 17b

Question 17b is a sub-question of question 17 and is directed at determining how the respondents procure services for operations and maintenance. The respondents were given a series of answer choices related to the number of service providers they used to staff operations and maintenance. An answer choice, item 5 in Table 6.29, was also provided for

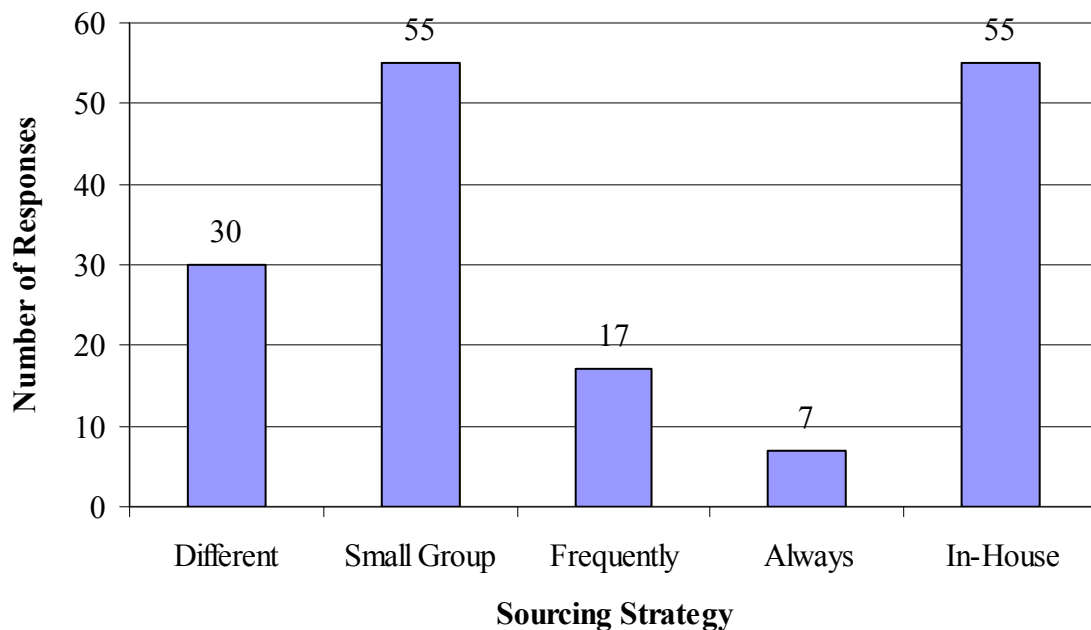
the respondents who performed all activity related to the operations and maintenance stage in-house. Table 6.29 presents the question and the answer choices for 17b.

**Table 6.29: Question 17b**

<b>If you outsource operations and maintenance activities, do you:</b>	
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 17a)

A total of 164 responses were recorded for question 17b with a slight majority of the respondents, 51.8 percent  $((30+55)/164)$ , reporting that they select from multiple service providers when outsourcing operations and maintenance activities. Those that were classified as selecting from multiple service providers chose answer choice 1 or 2 from Table 6.29. Only a small percentage of respondents, 4.3 percent  $(7/164)$ , reported that they always used the same service provider. Figure 6.20 provides the results of question 17b with each answer choice provided on the x-axis, and the number of selections of each answer choice provided on the y-axis.





**Figure 6.20: Sourcing Strategy Used in the Operations and Maintenance Function**

#### **6.18 Question 18**

Question 18 was an open-ended question directed at determining the management cost associated with a construction program. Respondents were asked to give the cost of managing their program as a percentage of the total construction spend reported in question 4. The management cost included both internal management cost and any cost associated with outsourcing the management of the construction program. Question 18 was intended to determine strictly the cost of managing a construction program. It was not intended to determine the total cost associated with a construction program. Question 18 was presented in the survey document as follows:

Of your annual construction spending identified in question 4, what percentage is utilized to manage the process of construction (Combine both internal construction management and oversight costs with external or outsourced, program management, construction management, and oversight costs).

Respondents were given a blank space in which to provide their answer as a percentage. A total of 157 responses were recorded for question 18 and were used to determine the average management cost reported by all the respondents. Because question 18 was open-ended, some of the responses needed to be discarded and others needed to be modified in order to standardize the data set so that an average could be calculated.

All deviations from the percentage format were discarded. One respondent reported staff salaries and their response was discarded. Other respondents reported a non-numerical response such as, “Do not know” and “varies”, and their responses were also discarded. No other deviations from the percentage format were found.

After all responses that deviated from the percentage format were removed, modifications were necessary to certain responses to question 18 in order to be able to calculate the average management cost. All unmodified responses to question 18 can be found in Section 12.3 of the Appendix.

Some respondents reported their response as a range (i.e. 10-15%). All responses that were given as a range were modified by substituting the mid-point of the range for the response. Other responses included a qualifier. Table 6.30 gives all the responses to question 18 that included a qualifier and the modified percentage that was used in calculating the average management cost. Any responses that included a qualifier were modified by removing the qualifier and reporting the percentage without the qualifier. If the response was reported as a range with the qualifier, then the qualifier was removed and the mid-point of the range was reported. If a mathematical qualifier was used, such as less than or greater than, then the response was reported as the value with the mathematical qualifier removed as opposed to assuming a percentage based on the qualifier.

**Table 6.30: Responses to Question 18 that included a Qualifier**

<b>Reported Percentage with Qualifier</b>	<b>Modified Percentage</b>
10% +/-	10.00%
Less than 1%	1.00%
6 % +/-	6.00%
10% maximum	10.00%
about 2.5%-3.0%	2.75%
approximately five percent	5.00%
3%(est)	3.00%
<10%	10.00%
about 10%	10.00%
near 0%	0.00%

Following the removal of three responses and the modifications to 29 others, a total of 154 responses were used in calculating the average total management cost. The average management cost for a construction program was calculated by taking the average of all 154 responses. The average management cost for a construction program as a percentage of the annual construction spend was found to be 12.1 percent.

### **6.19 Question 19**

Question 19 was an open-ended question with a similar format to question 18. Question 19 was directed at determining the cost for hiring a program manager. Respondents were asked to provide the fee for obtaining the services of a program manager as a percentage of the total program value. Question 19 was presented in the survey as follows, “When hiring an external program management service provider, what is the approximate fee associated, as a percentage of the program value?”

A total of 64 responses were recorded for question 19. The responses to question 19 were standardized so that an average could be calculated. Some responses to question 19 needed to be discarded while others needed to be modified.

The response to question 19 was asked to be given in a percentage format. Responses that deviated from this format were removed when calculating the average fee for an external program manager. The responses that deviated from the percentage format are listed below.

- Does not apply - done in house
- Should be flat fee and based on the project
- N/A or not applicable

Those that responded to question 19 with “Not applicable” possibly could have felt the question was too sensitive and did not want to reveal this information. Fee data within the construction industry has typically been sensitive and classified information for many companies. It is also possible that the respondents that reported “Not applicable” for question 19 did not recognize the statement following question 18 asking them not to proceed with the survey unless they had hired an external program manager. If this were the case, the respondent would not have a fee associated with the cost of an external program manager and thus may respond with “Not applicable.”

Some responses to question 19 were given as a range. All responses given as a range were modified by substituting the mid-point of the range that was reported. Other responses to question 19 were provided in a percentage format but included a qualifier. Any responses that included a qualifier were modified by removing the qualifier and reporting only the percentage. Table 6.31 presents the responses to question 19 that were modified. The unedited response is given along with its corresponding modified response in Table 6.31.

**Table 6.31: Modified Responses to Question 19**

Original Response (Unedited)	Modified Response
4-8%	6.00%
8-10	9.00%
2-3%	2.50%
4 - 6%	5.00%
8 -10%	9.00%
10-20%	15.00%
3-4%	3.50%
20-30%	25.00%
3 -6%	4.50%
3.5% - 5%	4.25%
7-10	8.50%
3.5 to 4%	3.75%
From 0-15% (varies from project to project)	7.50%
2 - 3%	2.50%
3-6%	4.50%

After the methodology presented above was applied to the original responses for question 19, the number of responses was reduced to 58. Using the 58 responses, an average fee for hiring an external program manager was determined. The average fee for hiring an external program management service provider as a percentage of the program value was found to be 6.0 percent. All unmodified responses to question 19 can be found in Section 12.3 of the Appendix.

## 6.20 Question 20

Question 20 was the second question in the series of questions based on the hiring of an external program manager. Question 20 was focused on determining what type of firm owners use most often to manage their construction program. A series of answer choices were provided to the respondents that included different firms within the construction industry. Table 6.34 presents the question and the answer choices used for question 20. An “other” selection (item 5 of Table 6.32) was provided for respondents who used a firm other

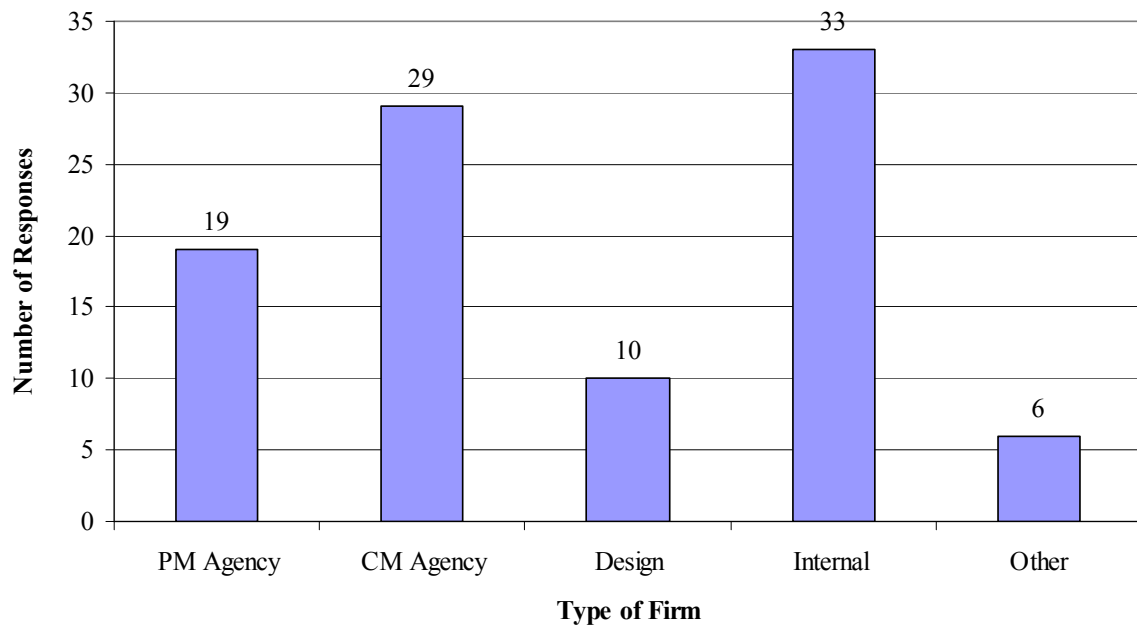
than the ones provided in items 1 through 3 of Table 6.32 to manage their construction program. Respondents who answered “other” for question 20 also had the ability to expand on their answer with the adjacent space provided. Finally an answer choice was also provided for respondents who managed their entire program in-house (item 4 of Table 6.32).

**Table 6.32: Question 20**

<b>Which of the following do you use most often to manage your construction program?</b>	
1	Program Management Firm (Agency)
2	Construction Management Firm (Agency)
3	Design Firm
4	Internal Staff
5	Other

Figure 6.21 presents the results of question 20. The number of the answer choice is given on the x-axis and the number of responses for each answer choice is presented on the y-axis. A total of 97 responses were recorded for question 20. A large number of the respondents, 33, selected answer choice 4 or “Internal Staff.” Program management firms were used most often to manage the construction programs of 19.6 percent (19/97) of the respondents. Six of the respondents selected the choice “Other.” All six of these respondents clarified their response. The six clarifications were as follows:

- All of the above as a team
- EPCM contractor
- Mixture of all
- Owner’s representative
- EPC contractor
- Construction management at risk



**Figure 6.21: Type of Firm Used Most Often to Manage a Construction Program**

### 6.21 Question 21

Question 21 is the third question in the series of questions related to the hiring of an external program manager. Question 21 is directed at determining the factors most often used in determining whether or not to hire a particular program manager. The respondents were given a series of factors and asked to rate these factors on a percentage scale from 0 to 100 percent. A selection of 0 percent would mean that the respective factor is considered 0 percent of the time (or not considered) in determining whether or not to hire a particular program manager. A rating of 100 percent means that the respective factor is considered 100 percent of the time or strongly considered when determining whether or not to hire a program manager. The rating scale was given in percentage multiples of 20. Table 6.33 presents the question and answer choices for question 21.

**Table 6.33: Question 21**

<b>21. Please rate the percentage each of the following factors is considered in selecting a program manager (0% = Not a Factor, and 100% = Strongly Considered):</b>						
Individual lead program manager	0%	20%	40%	60%	80%	100%
Program controls	0%	20%	40%	60%	80%	100%
Experience with similar projects/programs	0%	20%	40%	60%	80%	100%
Depth on the bench	0%	20%	40%	60%	80%	100%
Past experience with your organization	0%	20%	40%	60%	80%	100%
Technical approach	0%	20%	40%	60%	80%	100%
Safety record	0%	20%	40%	60%	80%	100%
Projects and programs consistently delivered on time	0%	20%	40%	60%	80%	100%
Savings in design costs	0%	20%	40%	60%	80%	100%
Savings in construction costs	0%	20%	40%	60%	80%	100%
Greater economies of scale/efficiencies/integration	0%	20%	40%	60%	80%	100%
Other	0%	20%	40%	60%	80%	100%

A total of 90 responses were recorded for question 21, but not all respondents rated every factor. The number of responses for each individual factor segregated by the specific percentage ratings is given in Table 6.36. The table shows that while responses for all the factors was varied, most respondents considered all the factors to be important at least 60 percent of the time. Very few respondents even considered any of the factors presented as answer choices to not be factor in the process of determining whether or not to hire an external program manager. No respondents rated the “other” answer choice and thus it does not appear in Table 6.34.



**Table 6.34: Number of Responses for Each Factor in Question 21**

Function	Number of Responses for Each Rating					
	0%	20%	40%	60%	80%	100%
Individual lead program manager	2	3	6	11	30	38
Program controls	1	3	8	23	35	20
Experience with similar projects/programs	1	0	4	14	29	41
Depth on the bench	0	3	14	25	36	12
Past experience with your organization	1	6	8	21	38	16
Technical approach	1	6	11	26	31	15
Safety record	6	4	13	20	17	30
Projects and programs consistently delivered on time	1	2	3	11	42	31
Savings in design costs	6	10	15	19	25	15
Savings in construction costs	5	5	9	22	29	20
Greater economies of scale/efficiencies/integration	3	10	11	21	32	11

Using the response data presented in Table 6.34, the average rating of each factor was calculated. Each factor is ranked in descending order of importance in Table 6.35. The factors that had the highest percentage ratings are the ones that are most strongly considered by construction owners when selecting a particular external program manager.

Respondents to question 21 reported that experience with similar projects or programs, projects and programs consistently delivered on time, and individual lead program manager were all considered more than 80 percent of the time when selecting a program manager. Also, respondents felt that the issues or factors related to cost were of least of importance in selecting an external program manager. Savings in construction costs, greater economies of scale, efficiencies, and integration, and savings in design costs were assigned the least importance in selecting a program manager by the respondents to question 21.

**Table 6.35: Factors Considered in Selecting an External Program Manager**

<b>Function</b>	<b>Rating</b>
Experience with similar projects/programs	86.1%
Projects and programs consistently delivered on time	84.1%
Individual lead program manager	83.0%
Program controls	77.4%
Past experience with your organization	75.4%
Depth on the bench	74.1%
Safety record	73.7%
Technical approach	73.1%
Savings in construction costs	73.1%
Greater economies of scale/efficiencies/integration	69.3%
Savings in design costs	67.0%

**6.22 Question 22**

Question 22 was the final question in the series devoted to the use or hiring of an external program manager and the final question in the survey. Question 22 was directed at determining the organizational model most typically used when hiring a program manager. Table 6.36 presents the question and answer choices for question 22. Respondents were given a series of answer choices (items 1 through 4 in Table 6.36) that presented different organizational models used when hiring a program manager. An “other” selection (item 5 in Table 6.36) was also provided for those respondents that did not use one of the organizational models given.

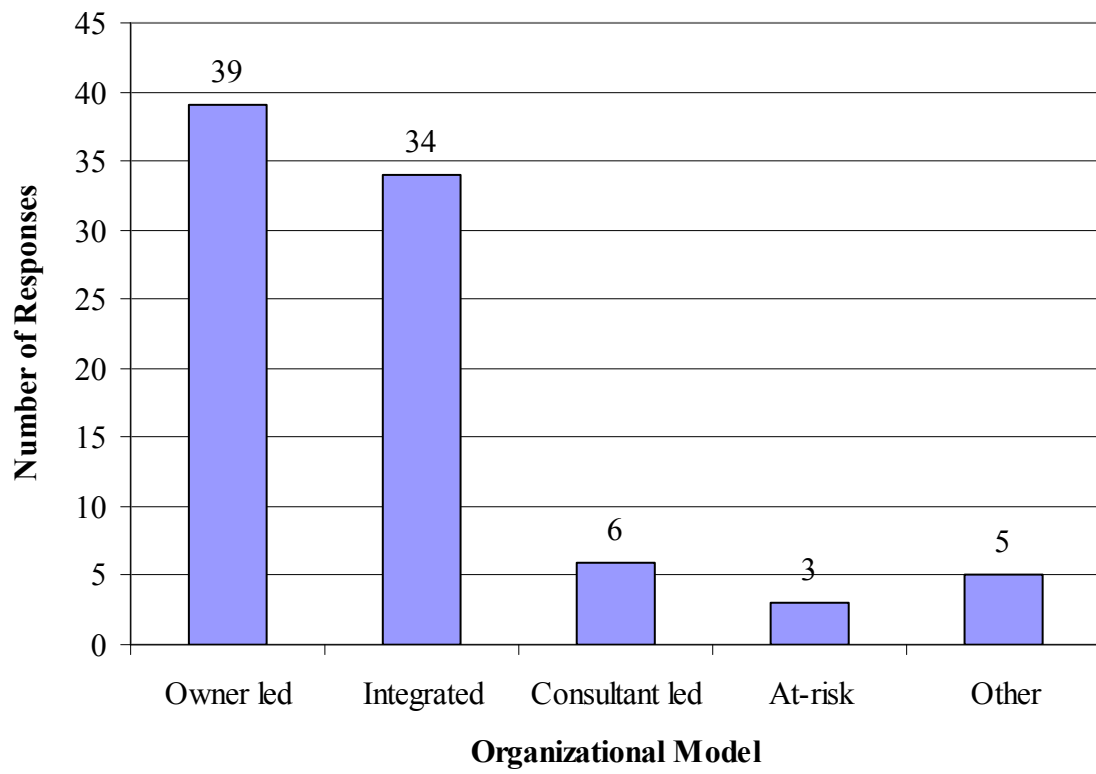
**Table 6.36: Question 22**

<b>When hiring a program manager which of the following models do you most typically use?</b>	
1	Owner led, with program management firm providing staff support
2	Integrated owner and program management team
3	Program management consultant led
4	Program management at risk
5	Other

The results for question 22 are presented in Figure 6.22. Each answer choice is presented on the x-axis and the number of responses for each answer choice is presented on the y-axis.

A total of 87 responses were recorded for question 22 with a majority of the respondents, 83.9 percent  $((39+34)/87)$  selecting either “Owner led, with program management firm providing staff support” or “Integrated owner and program management team.”

Program management at-risk was only selected by 3 of the 87 respondents. Program management at-risk is a controversial project delivery method within construction, and many industry experts believing it is not a valid project delivery system. This may have lead to the low response rate. However, three respondents selected program management at-risk as the typical organizational model when hiring an external program manager. Either these respondents do believe that program management at-risk is a valid project delivery or they were unsure of what was meant by program management at-risk.



**Figure 6.22: Organizational Models Used When Hiring a Program Manager**

## **7.0 ANALYSIS OF PUBLIC VS. PRIVATE**

An analysis of the survey results was undertaken to determine any differences in how public organizations and private organizations managed their construction programs. Question 1 of the survey was used to determine whether or not the respondents' organization was public or private. A separate analysis of each question was performed by segregating the public and private responses. Further analysis was also performed that included:

- Determining the average project size of the public and private respondents.
- Comparing the confidence in an owner's internal capabilities to the amount of work they performed in-house.
- Comparing the average amount of outsourcing for the public and private respondents.
- Comparing the sourcing strategy of the public and private respondents.

The following sections detail the analysis of the survey results based on the responses of the public and private organizations. The analysis of each question is presented in the order the questions were presented in the survey instrument. The additional analysis detailed above follows the analysis of each question.

### **7.1 Methodology**

In order to perform an analysis that provided a detailed breakdown of the outsourcing data as it related to public and private institutions, the response to question 1 (how each respondent categorized their organization) was analyzed and adjusted. The following table provides the categories for classifying each respondent's organization and the number of responses for each of the categories.

**Table 7.1: Question 1 Categories and Response Totals**

<b>1. Which of the following best describes your organization?</b>							
<b>Survey Answers</b>	Private/closely held	Publicly traded stock corporation	Quasi-public	Municipal authority	State agency	Federal agency	Other
<b>Number of Responses</b>	9	47	8	27	24	13	43

Due to the large number of other responses, a decision was made to reclassify all of the respondents who selected the other category. All the respondents who replied to question 1 as ‘other’ were reclassified depending upon the description they gave as to the type of organization they felt they were. The respondents were classified into one of the 6 existing categories or added to a new category, private: not for profit.

Inferences had to be made on the type of organization of some of the respondents, however most of the respondents were able to be reclassified by reviewing the contact information they provided in the completed survey. This contact information does not appear in this thesis. The following sections provide a breakdown of the other response clarifications. The sections are organized by the category in which they were reclassified.

#### 7.1.1 Municipal Authority

A total of 28 responses to question 1 were reclassified from ‘other’ to a municipal authority. A municipal authority is an agency or organization that operates within a region smaller than that of a state agency. A municipal authority is usually an agency or organization associated with a city or county. Typically school districts and local water and sewer authorities are included in this category. A review of the ‘other’ response clarifications given by the respondents to question 1, shows that a majority of the responses were school districts. Table 7.2 provides the clarifications to the ‘other’ response that were reclassified as a municipal authority.

**Table 7.2: Reclassified ‘Other’ Responses for Municipal Authority**

<b>Municipal Authority</b>
School District
Regional Government Agency
Educational
County
Regional Airport Authority
County K-12 School District
K-12 Public School District
School District
Local Government agency
Transit Authority
Local government
K12 School Public District
County Government
City
Public School District
Educational/School District
Public School District
Public Education
Local Education Authority/ LEA
County Government
Private law firm representing over 40 local government entities and municipalities in Idaho
School District
School District
Public School
Public K-12 School District
K-12 Public Schools
School District
Public School District

### 7.1.2 State Agency

A total of seven responses to question 1 were reclassified from ‘other’ to a state agency. A state agency is an agency or organization associated with state government and typically department of transportations and public universities fall within this category. The ‘other’

response clarifications given by the respondents to question 1 show that a majority of the responses were public universities. Table 7.3 provides the clarifications to the ‘other’ response that were reclassified as a state agency.

**Table 7.3: Reclassified ‘Other’ Responses for State Agency**

<b>State Agency</b>
University
University & Hospital
Quasi State and Local Agency
Private and State Land Grant University
Public University
State University
Higher Education

#### 7.1.3 Federal Agency

Only one response to question 1 was reclassified from ‘other’ to a federal agency. The ‘other’ response was given as ‘Quasi-Government (State & Federal).’ A review of the contact information for this respondent revealed that the organization was a transit authority. Considering the location of the transit authority it was decided to classify this respondent as federal agency. The reader may notice that a response of ‘Transit Authority’ was reclassified as municipal authority in Section 7.1.1. The reason for this was again a review of the contact information for this respondent. Table 7.4 provides the clarification to the ‘other’ response that was reclassified as a federal agency.

**Table 7.4: Reclassified ‘Other’ Response for Federal Agency**

<b>Federal Agency</b>
Quasi-Government (State & Federal)



#### 7.1.4 Private Not for Profit

A total of seven responses of ‘other’ to question 1 were reclassified as Private Not for Profit. Private Not for Profit was a category that was created during the analysis of the responses to question 1 due to the large number of respondents that clarified themselves as a private company that was operating as a non-profit. Table 7.5 provides the clarifications to ‘other’ responses that were reclassified as Private Not for Profit.

**Table 7.5: Reclassified ‘Other’ Responses for Private Not for Profit**

<b>Private Not for Profit (Created)</b>
Not For Profit Healthcare
Private Educational Institution (Non-Profit)
Healthcare Authority- Non-Profit
Not-For-Profit
Private/Non-Profit
Private University
501c3

#### 7.1.5 Reclassified Responses and Categories

After the reclassification of the organization of each respondent, no more respondents were left as ‘other.’ All respondents were either assigned to one of the six original categories or added to the new category of Private Not for Profit. Table 7.6 gives the categories used to reclassify the responses to question 1 and the number of responses to each category after the reclassification.

**Table 7.6: Reclassified Categories and Response Numbers to Question 1**

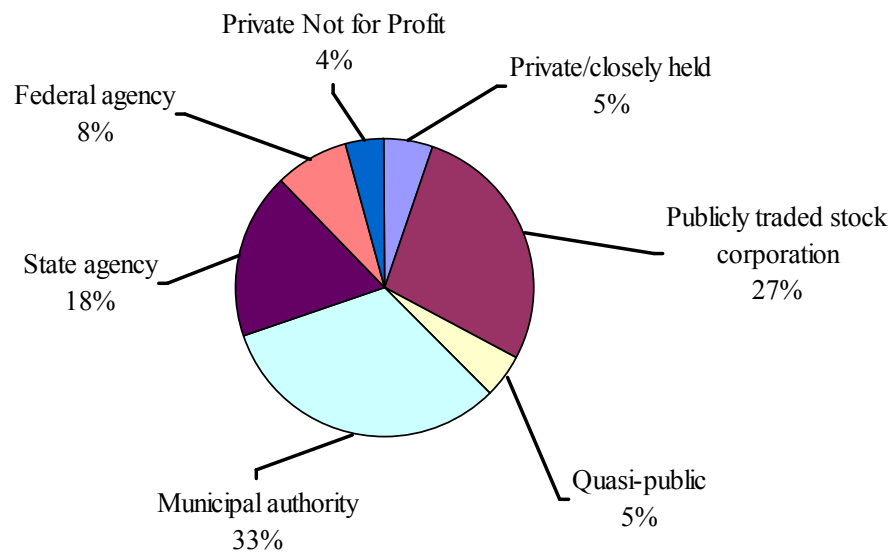
<b>Reclassified Categories</b>	Private/closely held	Publicly traded stock corporation	Quasi-public	Municipal authority	State agency	Federal agency	Private Not for Profit
<b>Number of Responses</b>	9	47	8	55	31	14	7

In order to give the reader an easy visual comparison of the original categories and response totals for question 1 and the reclassified categories and their response totals, Table 7.7 is presented below. Table 7.7 gives the number of responses for both the original and the reclassified responses.

**Table 7.7: Question 1 Categories and Response Totals**

<b>1. Which of the following best describes your organization?</b>								
<b>Survey Answers</b>	Private/ closely held	Publicly traded stock corporation	Quasi- public	Municipal authority	State agency	Federal agency	Other	Private Not for Profit
<b>Original</b>	9	47	8	27	24	13	43	0
<b>Reclassified</b>	9	47	8	55	31	14	0	7

A breakdown of the percentage of respondents within each classification was obtained using the reclassified response totals. Figure 7.1 provides a visual depiction of this breakdown.



**Figure 7.1: Reclassified Organization Classification**

As is shown by Figure 7.1, the largest category of respondents (31 percent) was municipal authority. This was mostly due to the large number of respondents whose organization was classified as a public school district. The second largest category of respondents (28 percent)

was publicly traded stock corporations. State agency included a large percentage of the respondents with 19 percent of all respondents, while all other categories contained less than 10 percent of all respondents. The reclassification of the responses to question 1 was then used to separate those respondents who were considered a public organization from those respondents who were considered a private organization.

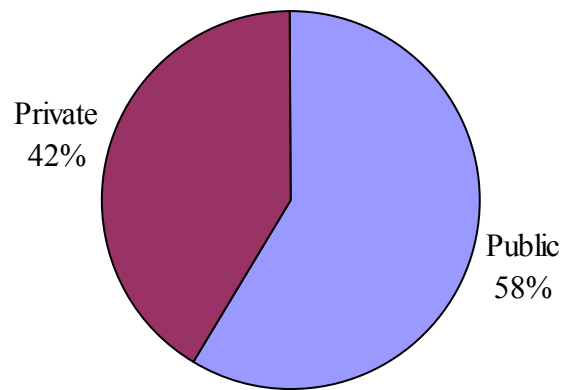
#### 7.1.6 Public and Private Classification

Using the detailed classifications of each organization, all responses were classified as either strictly private or public. Federal agency, state agency, and municipal authority were classified as public organizations while private not for profit, private/closely held, publicly traded stock corporations, and quasi-public were classified as private organizations. Table 7.8 presents the results of classifying each category as public or private. The response totals are presented in a format similar to tables 7.6 and 7.7 with the total number of responses given for both the public and private classifications below the total number of responses. The reader should note that the category private not for profit has been moved from its initial position in Tables 7.6 and 7.7 to the center of Table 7.8. This move was necessary in order to provide a better visual presentation and to associate that category with the other private categories. The change in the figure simply identifies those columns that are private and those that are public. Also, the percentage for both the public and private categories of the total number of responses is provided.

**Table 7.8: Private and Public Classification of Question 1 Responses**

	<b>Private</b>				<b>Public</b>		
<b>Reclassified Categories</b>	Private/ closely held	Publicly traded stock corporation	Quasi - public	Private Not for Profit	Municipal authority	State agency	Federal agency
<b>Number of Responses</b>	9	47	8	7	55	31	14
<b>Total Number of Responses</b>	71				100		
<b>Percentage of Total Responses</b>	42%				58%		

Forty-two percent (71 of the respondents to the survey) were classified as private, while 58 percent (100 of the respondents to the survey) were classified as public. Figure 7.2 illustrates this breakdown.



**Figure 7.2: Percentage of Public and Private Respondents**

The classifications discussed in this section, were then used to separate the responses of the survey by those respondents who classified their organization as private and those respondents that classified their organization as public. The following section details the analysis of each question within the survey instrument based on the public and private responses.

## **7.2 Question Specific Analysis**

The analysis of the survey responses is meant to determine the differences in how public owners manage their construction programs and how private owners manage their construction programs. The results of each question within the survey were analyzed by the public and private responses, except for questions 5 and 6. Questions 5 and 6 were omitted

from the analysis because they did not pertain to the use of the program management but to the concerns the respondents had with the future of the construction industry.

The following sections provide the results of each question used in the analysis. The results of each question are separated by the private organizations' responses and the public organizations' responses. A short description of the nature of the question is given at the beginning of each section. The reader should refer to Section 6.0 for a more thorough discussion of the nature of each question.

Within many of the sections similar figures and tables representing the results of the private organizations' responses and the public organizations' responses are given. In the additional analysis sections a combined figure or table that includes both the public and private responses is given. The questions are ordered in ascending order beginning with question 2. Question 1 does not appear in the following sections because it was used to determine if the respondent's organization was either public or private, and the results of the analysis of question 1 are presented in the preceding section.

#### 7.2.1 Question 2

Question 2 of the survey instrument was used to determine the percentage of respondents that work within each market sector. Respondents were asked to check all of the market sectors that applied to their organization. A review of the responses to question 2, segregated by public and private respondents provides insight into the type of market sectors in which public and private firms work. A total of 169 respondents replied to question 2 with 98 of those respondents coming from the public sector and 71 of those respondents coming from the private sector.

The public sector is dominated by the education market sector. A large number of the public respondents, 53.5 percent, worked within the education market sector. This number however, is skewed due to the involvement of CEFPI with the study. CEFPI's membership

base is made up of a majority of school districts who perform education related construction. A large number of other public respondents performed work in the following market sectors:

- Private office and professional
- Water supply/waste water facilities
- Highways and streets
- Public safety, administrative, and other

The answer choice for private office and professional included a qualifier that designated the category to also include state and federal office and court buildings. The answer choice for public safety, administrative and other included detention centers, police stations and fire stations.

Each of the market sectors selected most often by the public respondents is indicative of the work performed by public organizations. For example, the owners for all highways and streets are typically state departments of transportation, water supply/waste water facilities are typically owned by counties, and public safety and administrative facilities are typically owned by municipalities. Table 7.9 gives the results of the number of responses for each market sector by the public respondents. Respondents were given the opportunity to select all answer choices that applied, thus the total number of responses in Table 7.9 is higher than the 100 respondents from the public sector that replied to question 2.

**Table 7.9: Market Sectors of Public Sector Respondents (Question 2)**

<b>Market Sector</b>	<b>Number of Responses</b>	<b>Percentage*</b>
Education	53	53.5%
Private Office and Professional	24	24.2%
Water Supply/Waste Water Facilities	20	20.2%
Highways and Streets	19	19.2%
Public Safety, Administrative, and Other	19	19.2%
Other	18	18.2%
Telecommunications	13	13.1%
Energy	9	9.1%
Amusements and Recreation	7	7.1%
Conservation and Development	7	7.1%
Hospitals and Nursing Homes	7	7.1%
Commercial	5	5.1%
Churches/Houses of Worship	2	2.0%
Military Facilities	2	2.0%
Hotels and Motels	1	1.0%
Manufacturing	1	1.0%

\*This number is calculated using the total number of responses (98)

Within the private market sector a large number of the respondents, 33.8 percent, reported working within the energy market sector. A large number of private sector respondents also selected manufacturing, 26.8 percent. Due to the nature of the respondents to the survey, it is expected that the largest number of private respondents would work within the energy and manufacturing market sectors since these types of market sectors usually include some of the largest construction owners who in turn have some of the largest construction programs. The other market sectors that are typically dominated by private organizations and that are also well represented in the survey included:

- Education
- Hospitals and nursing homes
- Commercial

A majority of the respondents who were classified as private institutions and reported working within the education market sector were private universities or colleges. Table 7.10 presents the results of the number of responses for each market sector by the private respondents. Similar to the public sector respondents, private sector respondents were given the opportunity to select all answer choices that applied, thus the total number of responses in Table 7.10 is higher than the 100 respondents from the public sector that replied to question 2.

**Table 7.10: Market Sectors of Private Sector Respondents (Question 2)**

Market Sector	Number of Responses	Percentage*
Energy	24	33.8%
Manufacturing	19	26.8%
Other	15	21.1%
Education	8	11.3%
Hospitals and Nursing Homes	8	11.3%
Private Office and Professional	8	11.3%
Commercial	6	8.5%
Water Supply/Waste Water Facilities	3	4.2%
Amusements and Recreation	2	2.8%
Churches/Houses of Worship	2	2.8%
Highways and Streets	2	2.8%
Hotels and Motels	2	2.8%
Military Facilities	2	2.8%
Public Safety, Administrative, and Other	2	2.8%
Conservation and Development	1	1.4%
Telecommunications	1	1.4%

\*This number is calculated using the total number of responses (71)

### 7.2.2 Question 3

Question 3 of the survey instrument was used to determine the number of projects performed by each respondent annually. A total of 99 responses were recorded for question 3 from those working within the public sector. The total number of projects started each year by the public respondents was calculated using the same methodology to calculate the total number



of projects by all respondents which is presented in Section 6.3. The total number of projects started each year by all the public sector respondents was found to be 10,138.

A total of 71 responses were recorded for question 3 from those working within the private sector. The total number of projects started by all the private sector respondents was found to be 16,198 using the same methodology that was used to calculate the total number of projects started per year for the public sector respondents.

The average number of projects started by each respondent was found for the public sector respondents and the private sector respondents. The average number of projects started was calculated by dividing the total number of projects started by the total number of respondents. The average number of projects started each year by respondent, rounded to the nearest project, was found to be 102 (10,138/99) and 228 (16,198/71) for the public and private sectors respectively.

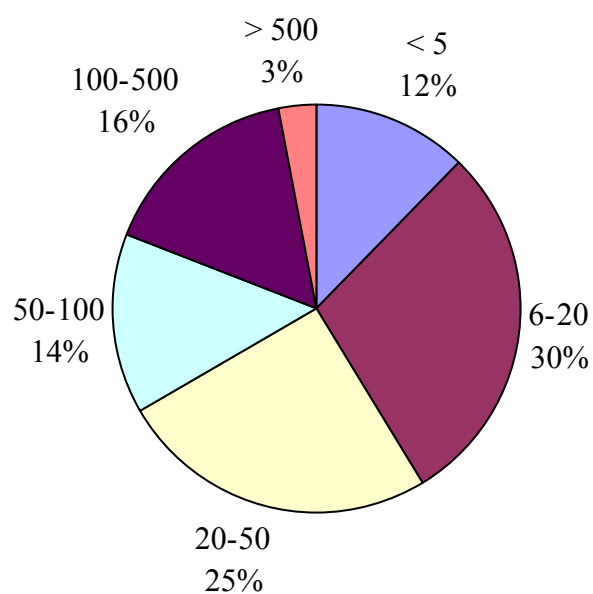
For the survey population, the private sector respondents, on average, started 2.2 (228/102) times more projects each year than those from the public sector. Tables 7.11 and 7.12 provide the breakdown of the number of responses for question 3 for the public and private sector respectively. Figures 7.3 and 7.4 provide a visual depiction of the percentage of responses for each answer choice for question 3 for the public and private sector.

**Table 7.11: Number of Projects Started Each Year by Public Sector (Question 3)**

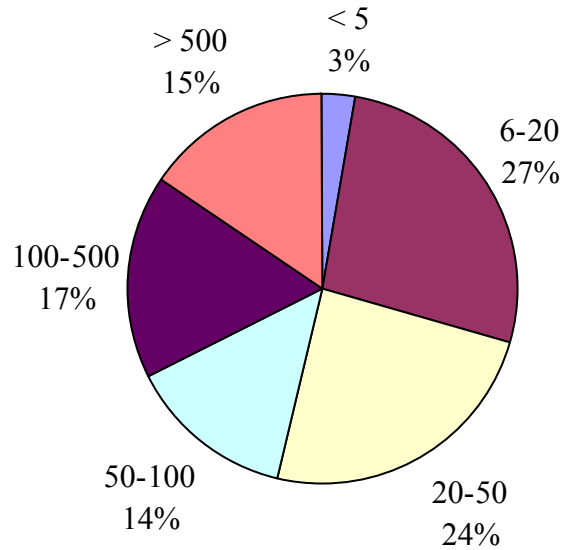
Number of Projects Started	Number of Responses	Mid-Point	Total Number of Projects
< 5	12	3	36
6-20	29	13	377
20-50	25	35	875
50-100	14	75	1,050
100-500	16	300	4,800
> 500	3	1000	3,000
Totals	99	N/A	10,138

**Table 7.12: Number of Projects Started Each Year by Private Sector (Question 3)**

Number of Projects Started	Number of Responses	Mid-Point	Total Number of Projects
< 5	2	3	6
6-20	19	13	247
20-50	17	35	595
50-100	10	75	750
100-500	12	300	3,600
> 500	11	1000	11,000
Totals	71	N/A	16,198



**Figure 7.3: Projects Started Each Year per Public Sector Respondents (Question 3)**



**Figure 7.4: Projects Started Each Year per Private Sector Respondents (Question 3)**

#### 7.2.3 Question 4

Question 4 of the survey instrument was used to determine the amount of annual construction spending by each respondent's organization. A total of 99 responses were recorded for question 4 from those working within the public sector. The total amount of annual construction spending by the public respondents was calculated using the same methodology used to calculate the total amount of annual construction spending by all respondents which is presented in Section 6.4. The total amount of annual construction spending for all the public sector respondents was found to be \$25.8 billion.

A total of 70 responses were recorded for question 4 from those working within the private sector. The total amount of annual construction spending for all the private sector respondents was found to be \$49.2 billion using the same methodology that was used to calculate the total amount of annual construction spending for the public sector respondents.

The average amount of annual construction spending for each respondent was found for the public sector respondents and the private sector respondents. The average amount of annual

construction spending for each respondent was calculated by dividing the total amount of annual construction spending by the total number of respondents. The average annual construction spending by respondent, rounded to the nearest million, was found to be \$261 million (25.8/99) and \$693 million (49.2/71) for the public and private sectors respectively.

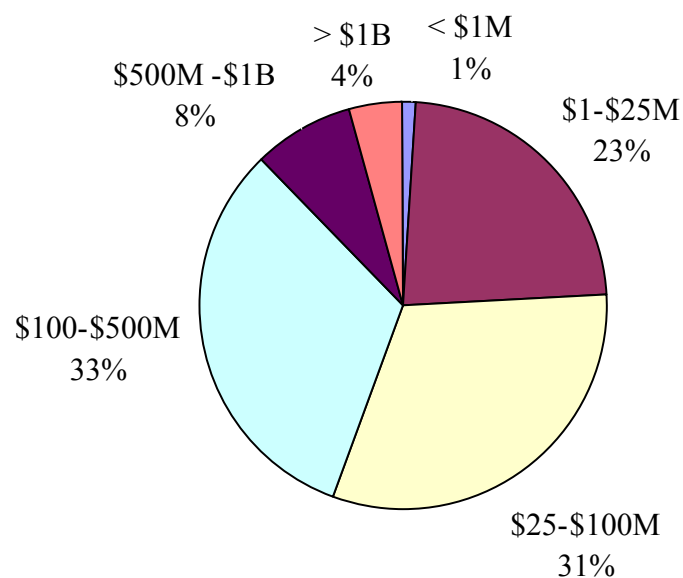
For the survey population, the private sector organizations, on average, had an annual construction spending amount of 2.7 (693/261) times that of the public sector. Tables 7.13 and 7.14 provide the breakdown of the number of responses for question 4 for the public and private sector respectively. Figures 7.5 and 7.6 provide a visual depiction of the percentage of responses for each answer choice for question 4 for the public and private sector.

**Table 7.13: Annual Construction Spending of Public Sector Respondents (Question 4)**

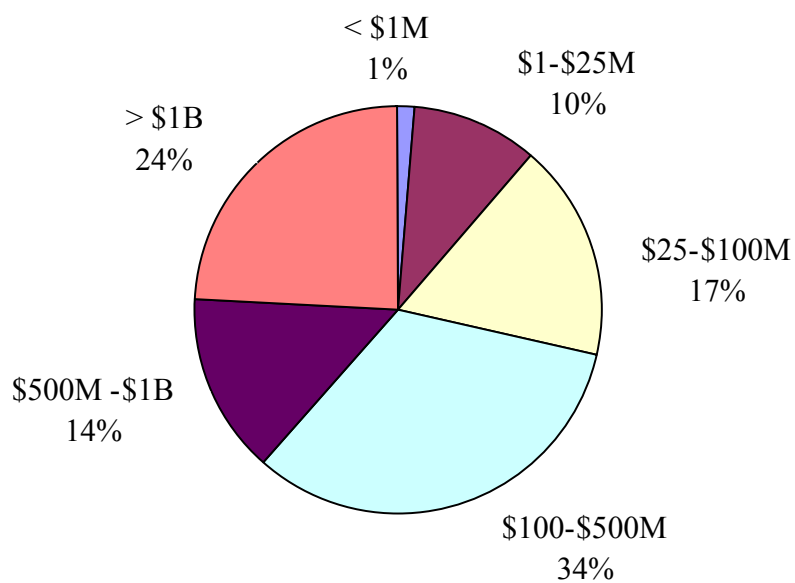
<b>Annual Construction Spend</b>	<b>Number of Responses</b>	<b>Mid-Point (in Millions)</b>	<b>Total Amount of Construction Spend (in Millions)</b>
< \$1M	1	1	1
\$1-\$25M	23	13	299
\$25-\$100M	31	63	1,953
\$100-\$500M	32	300	9,600
\$500M -\$1B	8	750	6,000
> \$1B	4	2,000	8,000
Totals	99	N/A	25,853

**Table 7.14: Annual Construction Spending of Private Sector Respondents (Question 4)**

<b>Annual Construction Spend</b>	<b>Number of Responses</b>	<b>Mid-Point (in Millions)</b>	<b>Total Amount of Construction Spend (in Millions)</b>
< \$1M	1	1	1
\$1-\$25M	7	13	91
\$25-\$100M	12	63	756
\$100-\$500M	23	300	6,900
\$500M -\$1B	10	750	7,500
> \$1B	17	2,000	34,000
Totals	70	N/A	49,248



**Figure 7.5: Annual Construction Spending per Public Sector Respondents (Question 4)**



**Figure 7.6: Annual Construction Spending per Private Sector Respondents (Question 4)**

#### 7.2.4 Question 7

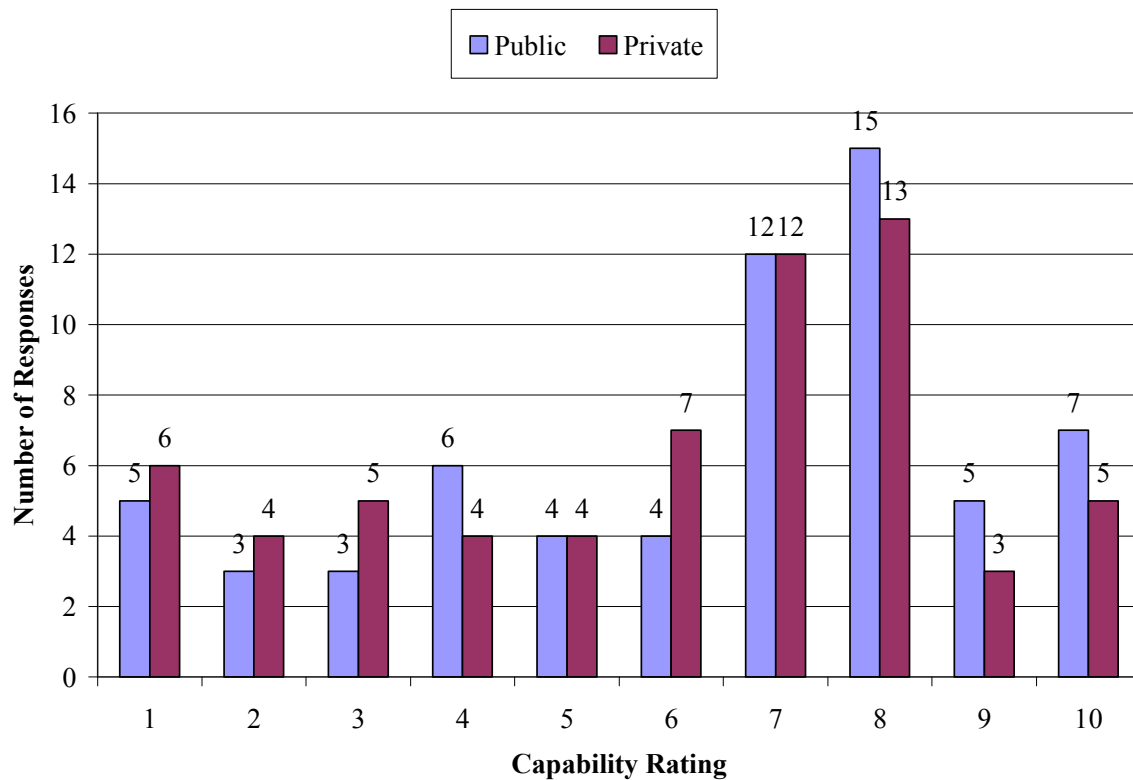
Question 7 of the survey instrument was used to gain a better understanding of the internal capabilities of the each respondent's construction program. Respondents were asked to rate their construction program on a scale of 1 to 10 with a rating of 1 meaning "Insufficient number or experience of staff to manage the entire program," and a rating of 10 meaning, "Sufficient staff with the ability to manage the entire program."

The results of the responses to question 7 were segregated by the public and private respondents in order to compare the in-house capabilities of public owners to private owners. Due to the problems with the answer choices presented to the participants on the online version of the survey instrument (discussed in Section 6.7) the response totals for question 7 are lower than those of other questions within the survey.

A total of 64 responses were recorded for question 7 from respondents from the public sector. The largest number of public respondents, 15, rated their construction programs as an 8. The average rating given by the public respondents was 6.4.

A total of 63 responses were recorded for question 7 from respondents from the private sector. The largest number of public respondents, 13, rated their program as an 8. The average rating of the capabilities of their construction program by the private respondents was 5.9. Figure 7.7 presents the results of the public and private responses for question 7.

Public and private respondents both reported a similar confidence in their internal capabilities with the public respondents reporting an average rating of 0.5 points higher than the private programs. Also, the rating chosen by the most respondents within both the public and private sectors was the same at 8.



**Figure 7.7: Internal Capabilities of Public and Private Respondents' (Question 7)**

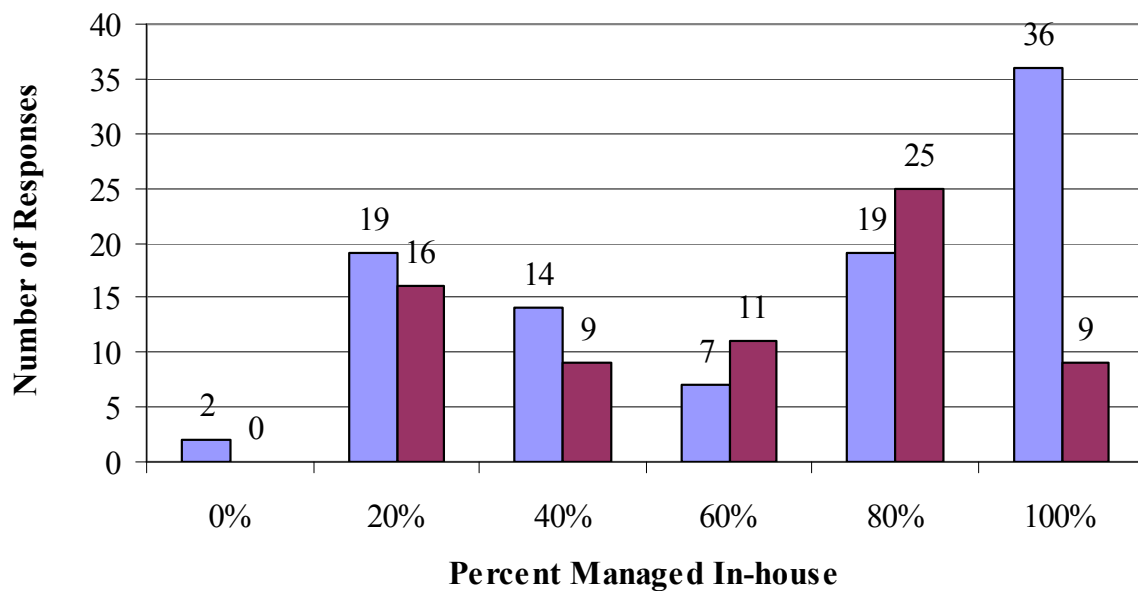
#### 7.2.5 Question 8

Question 8 of the survey instrument was used to determine the amount of outsourcing done by the respondent's organization. Respondents were asked to provide the percentage of the management of the construction process they perform in-house and the percentage that they outsource.

A total of 97 responses were recorded for question 8 from the respondents from the public sector. The largest number of public respondents, 36, reported managing the entire (100 percent) construction process in-house. On average, public respondents reported managing 66.8 percent ( $2*0+19*20+14*40+7*60+19*80+36*100/97$ ) of the construction process in-house. The average percentage was calculated by multiplying the number of responses for

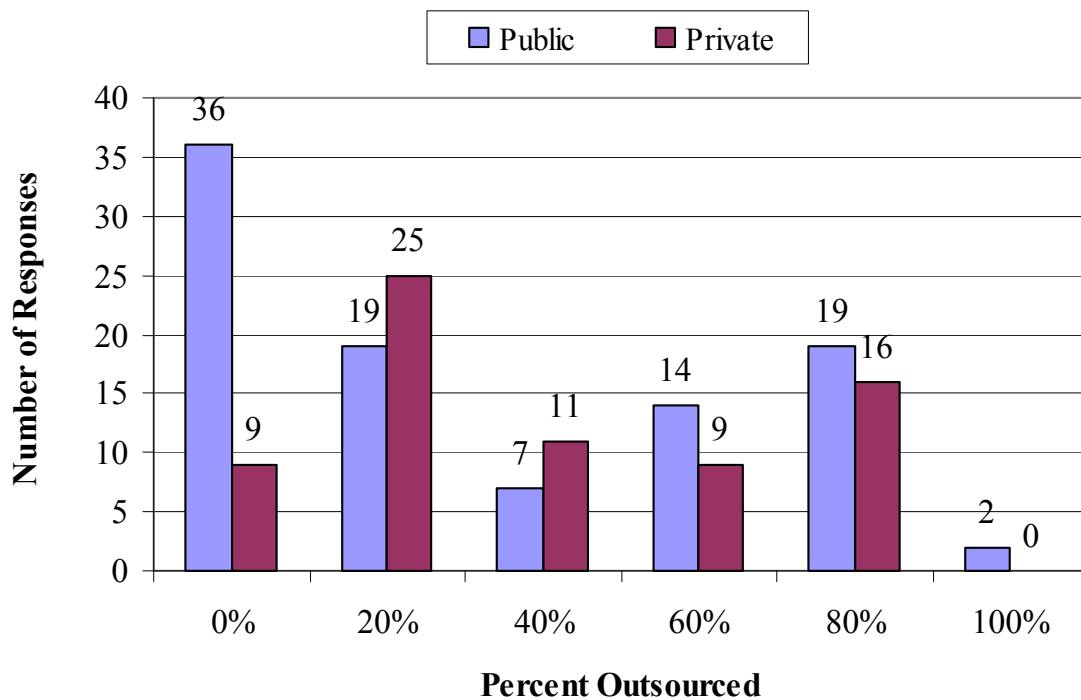
each answer choice by the percentage of each answer choice and then summing the total. The total was then divided by the total number of responses for question 8.

A total of 70 responses were recorded for question 8 from the respondents from the private sector. The largest number of private respondents, 25, reported managing 80 percent of their construction program in-house. The average percentage of the construction process managed in-house by the private sector respondents was found to be 60.6 percent ( $(0*0+16*20+9*40+11*60+25*80+9*100)/70$ ). The average percentage was calculated using the same methodology used to calculate the average percentage for the public sector respondents. Figure 7.8 presents the responses for the percentage of the management of the construction process the public and private sector performs in-house. Figure 7.9 presents the responses for the percentage of outsourcing within the management of the construction process for the public and private sector.



**Figure 7.8: Public and Private Sector Responses for Percent of Program Outsourced (Question 8)**





**Figure 7.9: Public and Private Sector Responses for Percent of Program Outsourced (Question 8)**

#### 7.2.6 Question 9

Question 9 of the survey instrument was used to determine which respondents were using a program management approach. Respondents were given a definition for program management and then asked to respond to whether or not they were using an approach similar to the one in the definition. The answer choices provided for question 9 are given in Table 7.15.

**Table 7.15: Answer Choices for Question 9**

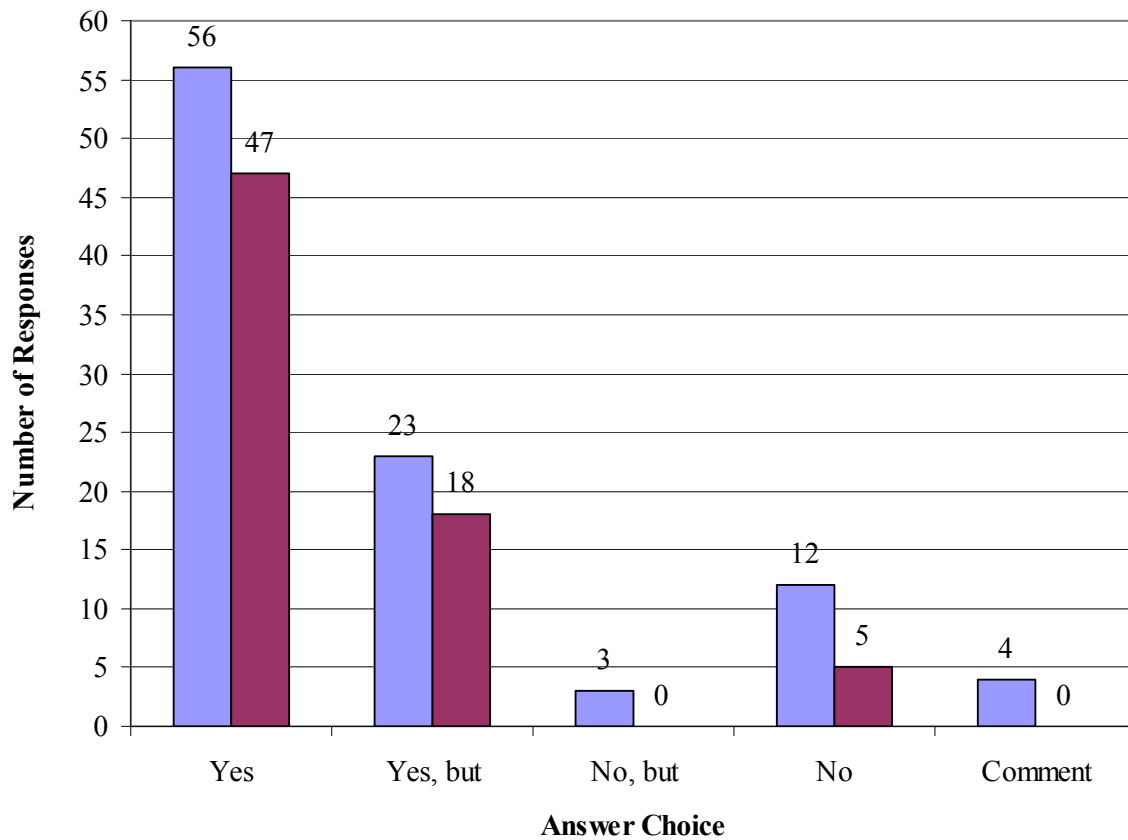
No.	Answer Choice
1	Yes, we are currently using program management for our construction needs.
2	Yes, but the way we approach it is different from the definition given.
3	No, but we plan to adopt an approach like this.
4	No, we are not currently using program management for our construction needs.
5	Comment

A total of 98 responses were recorded from those respondents within the public sector. A majority of the public sector respondents, 57.1 percent (56/98), reported using a program management approach similar to the definition given. A total of 80.6 percent (56+23/98) of the public respondents reported using a program management approach. Of the public sector respondents, four selected the answer choice number 5 or 'comment.' The comments provided by these respondents are presented in Section 6.9 and are repeated below.

- Are interested in moving that direction, but government bureaucracy continues to resist.
- For a portion of our work (a major transportation initiative).
- No, but we have in the past and will when workload increases.
- We are using program mgmt. on a defined number of projects related to one another but are not using it uniformly across our enterprise.

A total of 70 responses for question 9 were recorded from those respondents within the private sector. A majority of the private sector respondents, 67.1 percent (47/70), reported using a program management approach similar to the definition given. A total of 92.9 percent (47+18/70) of private respondents reported using a program management approach.

More private sector respondents (12.3 percent more) reported using a program management approach than those from the public sector. Also, a larger majority of the private sector respondents reported using a program management approach similar to the definition given. Figure 7.10 provides the results to question 9 for both the public and private responses.



**Figure 7.10: Public and Private Sector Respondents Using Program Management (Question 9)**

#### 7.2.7 Question 10

Question 10 of the survey instrument was used to determine the different functions the respondents of the survey felt should be performed by a program manager. Respondents were asked to select from a list of functions that they felt should be performed by a program manager.

A total of 99 responses to question 10 were recorded by respondents from the public sector. The function of construction oversight was selected most often by the public sector respondents. A minority of the public sector respondents selected the functions of procuring program financing, acquisition of real-estate, and operations and maintenance.

A total of 71 responses to question 10 were recorded by respondents from the private sector. The function of construction oversight was selected most often by the private sector respondents. A minority of the private sector respondents selected procuring program financing, acquisition of real-estate, and operations and maintenance.

The public and private sectors are in agreement with the functions that should be performed by a program manager. The largest percentage of public and private sector respondents felt that construction oversight, design oversight, pre-design planning and procurement oversight were all functions that should be performed by a program manager. A larger percentage of private sector respondents selected the previous functions than did the public sector respondents (showing more confidence in what is expected of a program manager). Also, the lowest percentage of public and private sector respondents felt that procuring program financing, acquisition of real-estate, and operations and maintenance should be performed by a program manager. The main difference in the functions selected by the public and private sector respondents was with construction performance. Only 65.7 percent of the public sector respondents selected construction performance as opposed to the 77.5 percent of the private sector respondents that selected construction performance. Table 7.16 presents the results of question 10 by the public and private sector respondents.

**Table 7.16: Program Management Functions for Public and Private Sector Respondents (Question 10)**

<b>Function</b>	<b>Percentage of Public Respondents*</b>	<b>Percentage of Private Respondents**</b>
Construction oversight	89.9%	93.0%
Design oversight	83.8%	87.3%
Pre-Design planning	82.8%	85.9%
Procurement oversight	77.8%	85.9%
Post-construction services	76.8%	77.5%
Construction performance	65.7%	77.5%
Design performance	61.6%	62.0%
Procuring program financing	35.4%	36.6%
Acquisition of real-estate	30.3%	21.1%
Operations and Maintenance	17.2%	18.3%

\*This number is calculated using the total number of public responses (99)

\*\*This number is calculated using the total number of private responses (71)

### 7.2.8 Question 11

Question 11 was presented in two parts, 11a and 11b. Both parts of question 11 refer to the pre-design phase. The results for the analysis of the public and private response to parts a. and b. of question 11 are presented in the following the sections.

#### *7.2.8.1 Question 11a*

Question 11a was directed at determining the amount of outsourcing occurring within the pre-design phase of the construction process. The results to question 11a were separated by the public and private sector respondents. Of the 168 responses to question 11a, 98 were from the public sector and 70 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 31, reported that they outsourced between 1 percent and 24 percent of their pre-design activities. The lowest number of public sector respondents, 5, reported that they outsourced 100 percent (all pre-design activities).

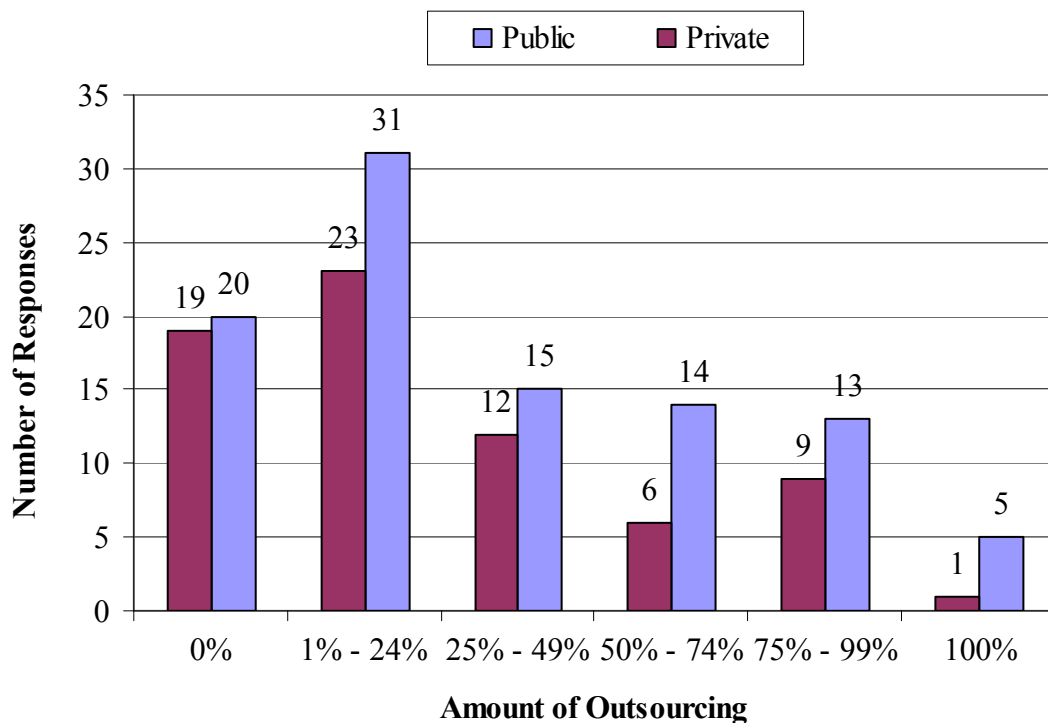
The largest number of private sector respondents, 23, reported that they outsourced between 1 and 24 percent of their pre-design activities. The lowest number of private sector respondents, 1, reported that they outsourced 100 percent of all pre-design activities. Figure 7.11 presents the results of the public and private sector responses to question 11a.

The average amount of outsourcing that occurred within the pre-design phase was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing for the pre-design phase for the public and private sector is provided in Section 6.11.1. The same methodology for calculating the average amount of outsourcing is used for the analysis of questions 11 through 17. The average amount of outsourcing that occurred within the pre-design phase for the public sector was found to be 35.1 percent. The average amount of outsourcing that occurred within the pre-design phase for the private sector was found to be 28.4 percent.

Similar responses to question 11a were received from the public and private sectors. The average amount of outsourcing that occurred in the pre-design phase for both the public and private sectors was similar with the public sector outsourcing 6.4 percent (35.1-28.4) more of the pre-design phase than the private sector. The largest number of respondents in both sectors reported outsourcing between 1 percent and 24 percent of the pre-design phase of the construction process. The percentage of respondents was similar as well, with 31.6 percent (31/98) of the public sector respondents and 32.9 percent (23/70) of the private sector respondents reporting outsourcing between 1 and 24 percent of the pre-design phase. The smallest number of respondents in both sectors reported outsourcing 100 percent of pre-design activities. The public sector however had a higher percentage with 5.1 percent (5/98), as opposed to the private sector that had only 1.4 percent (1/70), report outsourcing 100 percent of the pre-design activity.

The amount of respondents that performed all of the activities associated with the pre-design phase in-house can be determined by the number of respondents who selected outsourcing 0 percent of the pre-design phase. The number of public sector respondents who selected

outsourcing 0 percent was 20.4 percent (20/98). The number of private sector respondents who selected outsourcing 0 percent was 27.1 percent (19/70). Firms within both the public and private sector appear to be outsourcing a wide variety of the percentage of activities associated with the pre-design phase. A review of the average amount of outsourcing shows that most of the activities associated with the pre-design phase are performed in-house as opposed to outsourced.



**Figure 7.11: Outsourcing of the Pre-Design Phase by Public and Private Sector (Question 11a)**

#### 7.2.8.2 Question 11b

Question 11b was directed at determining how the pre-design phase services were procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the pre-design phase. The answer choices for question 11b are presented in Table 7.17. The responses for question 11b were segregated by responses from

the public sector and responses from the private sector. Of the 167 responses to question 11b, 98 were from the public sector and 69 were from the private sector.

Of the 98 responses from the public sector, the largest number of respondents, 32, selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project.” The smallest number of public sector respondents, 5, selected answer choice 4 or “Always use the same service provider.”

Of the 69 responses from the private sector, the largest number of respondents, 36, selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project.” The 36 respondents that selected answer choice 2 represent a majority or 52.2 percent (36/69) of the private sector respondents. The smallest number of private sector respondents, 1, selected answer choice 4 or “Always use the same service provider.” The results of the public and private sector responses to question 11b are presented in Figure 7.12.

The responses to question 11b were varied for the public and private sector respondents. While the highest number of respondents in each sector selected answer choice 2 the percentages were different. The percentage of public sector respondents that selected answer choice 2 was 32.6 percent (32/98) as opposed to the 52.2 percent of respondents that selected answer choice 2 from the private sector. Also, a large difference in the respondents that selected answer choice 1 or “Always select a different service provider for each project,” existed between the public and private sector respondents. A total of 25, or 25.5 percent (25/98) of the public respondents selected answer choice 1 as opposed to the 5 respondents, 7.2 percent (5/69), from the private sector that selected answer choice 1.

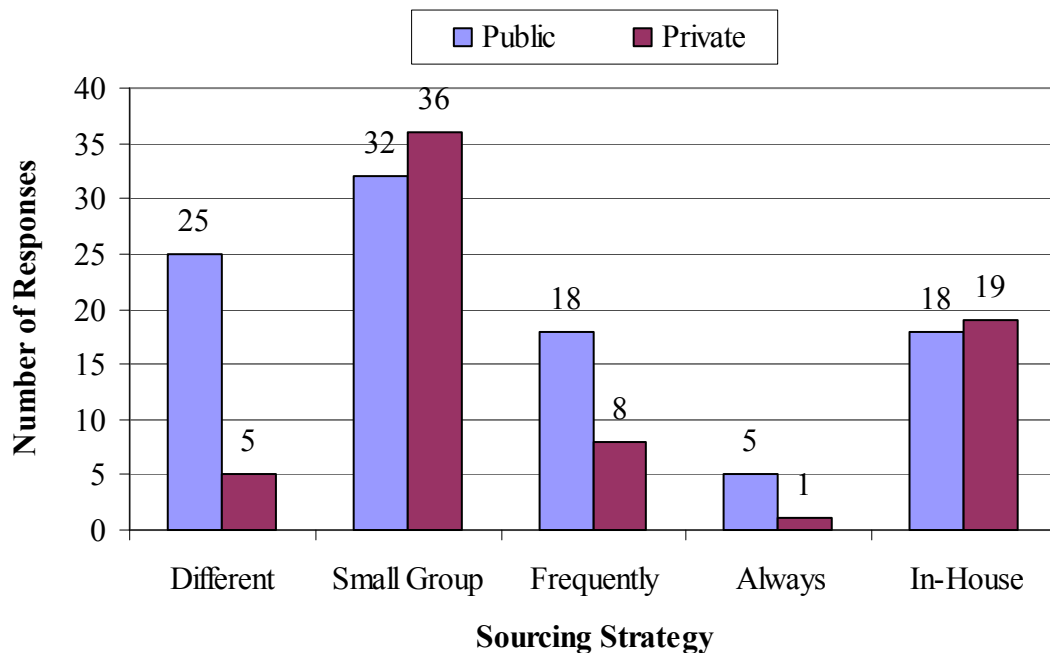
An overview of the response totals for the public and private sector to question 11b confirms the fact the public sector reports using a larger number of service providers to perform the activities related to the pre-design phase of their construction program. Also, a greater



percentage of private sector respondents, 9.1 percent (27.5-18.4), performed all of the activities associated with the pre-design phase in-house rather than outsource.

**Table 7.17: Answer Choices for Question 11b**

No.	Answer Choice
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 11a)



**Figure 7.12: Sourcing Strategy Used in the Pre-Design Phase by Public and Private Sector Respondents (Question 11b)**

#### 7.2.9 Question 12

Question 12 was presented in two parts, 12a and 12b. Both parts of question 12 refer to the oversight of design service. The results for the analysis of the public and private response to parts a. and b. of question 12 are presented in the following the sections.

#### *7.2.9.1 Question 12a*

Question 12a was directed at determining the amount of outsourcing occurring for the oversight of design services. The results to question 12a were separated by the public and private sector respondents. Of the 168 responses to question 12a, 98 were from the public sector and 70 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 42, reported that they outsourced none, 0 percent, of the oversight of design services. The lowest number of public sector respondents, 6, reported that they outsourced 100 percent of all activities related to the oversight of design services.

The largest number of private sector respondents, 20, reported that they outsourced none, 0 percent, of the oversight of design services. The lowest number of private sector respondents, 3, reported that they outsourced 100 percent of all activities related to the oversight of design services. Figure 7.13 presents the results of the public and private responses to question 12a.

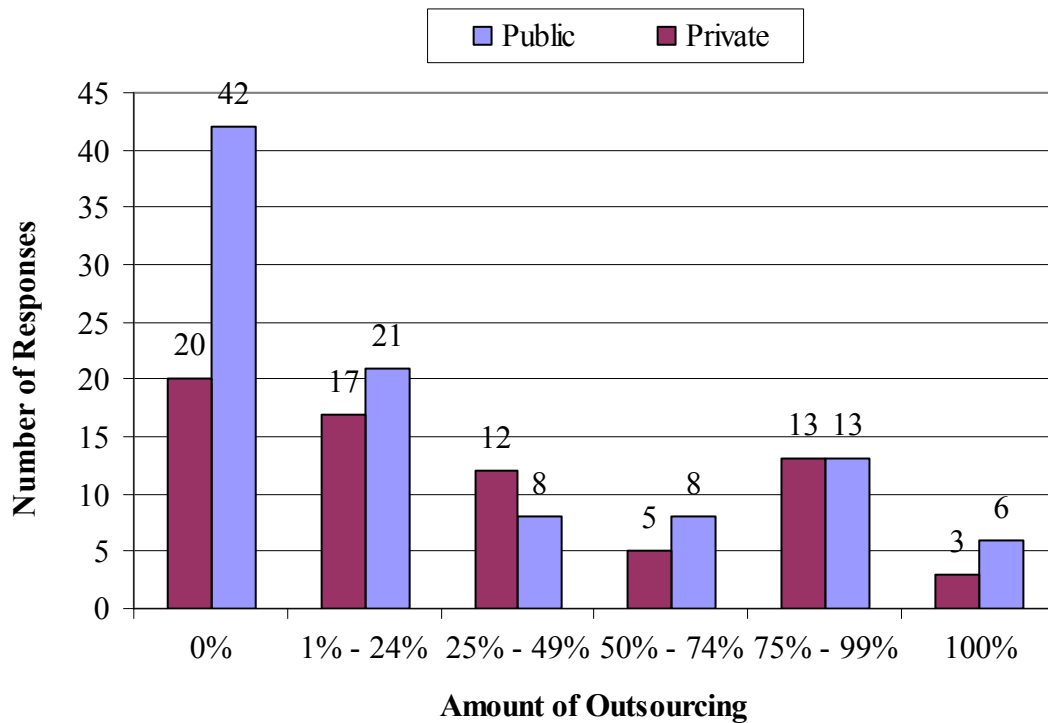
The average amount of outsourcing for the oversight of design services was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing for the oversight of design services for the public and private sector is provided in Section 6.11.1. The average amount of outsourcing that occurred within the oversight of design services for the public sector was found to be 28.4 percent. The average amount of outsourcing that occurred within the oversight of design services for the private sector was found to be 34.2 percent.

The amount of outsourcing occurring within the activities related to the oversight of design services was found to be similar between both the public and private sectors. The average amount of outsourcing that occurred in the oversight of design services for both the public and private sectors was similar with the public sector outsourcing 5.8 percent (28.4-34.2) less

of the oversight of design services than the private sector. The largest number of respondents in both sectors reported outsourcing 0 percent of the oversight of design services. The percentage of respondents varied however, with 42.9 percent (42/98) of the public sector respondents and 28.6 percent (20/70) of the private sector respondents reporting outsourcing 0 percent of the oversight of design services. The smallest number of respondents in both sectors reported outsourcing 100 percent of the oversight of design services. The public sector however had a higher percentage with 6.1 percent (6/98) as opposed to the private sector that had only 4.3 percent (3/70) report outsourcing 100 percent of the oversight of design services.

The percentage difference in the number of respondents who selected outsourcing 0 percent of the oversight of design services also represented the highest percentage difference for the responses to question 12a from the public and private sector respondents. Overall the responses to question 12a were similar between the public and private sector with the private sector outsourcing slightly more of the oversight of design services than the public sector.

The amount of respondents that performed all of the oversight of design services in-house can be determined by the number of respondents who selected outsourcing 0 percent of the oversight of design services. The number of public sector respondents who selected outsourcing 0 percent was 42.9 percent (42/98). The number of private sector respondents who selected outsourcing 0 percent was 28.6 percent (20/70). The sourcing of the oversight of design services is varied. While some firms appear to be performing all of the oversight of design in-house, especially within the public sector, others are outsourcing portions or all of the oversight of design services.



**Figure 7.13: Outsourcing of the Oversight of Design for the Public and Private Sector (Question 12a)**

#### 7.2.9.2 Question 12b

Question 12b was directed at determining how the oversight of design function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the oversight of design services. The answer choices for question 12b are presented in Table 7.18. The responses for question 12b were segregated by responses from the public sector and responses from the private sector. Of the 168 responses to question 12b, 98 were from the public sector and 70 were from the private sector.

Of the 98 responses from the public sector, the largest number of respondents, 43, selected answer choice 5 or “N/A (Please select this option if you chose 0% for question 12a).” The reason for the large number of respondents selecting answer choice 5 was the large number of respondents who reported outsourcing 0 percent of the oversight of design in question 12a. The second highest total of respondents, 21, selected answer choice 2 or “Consistently select

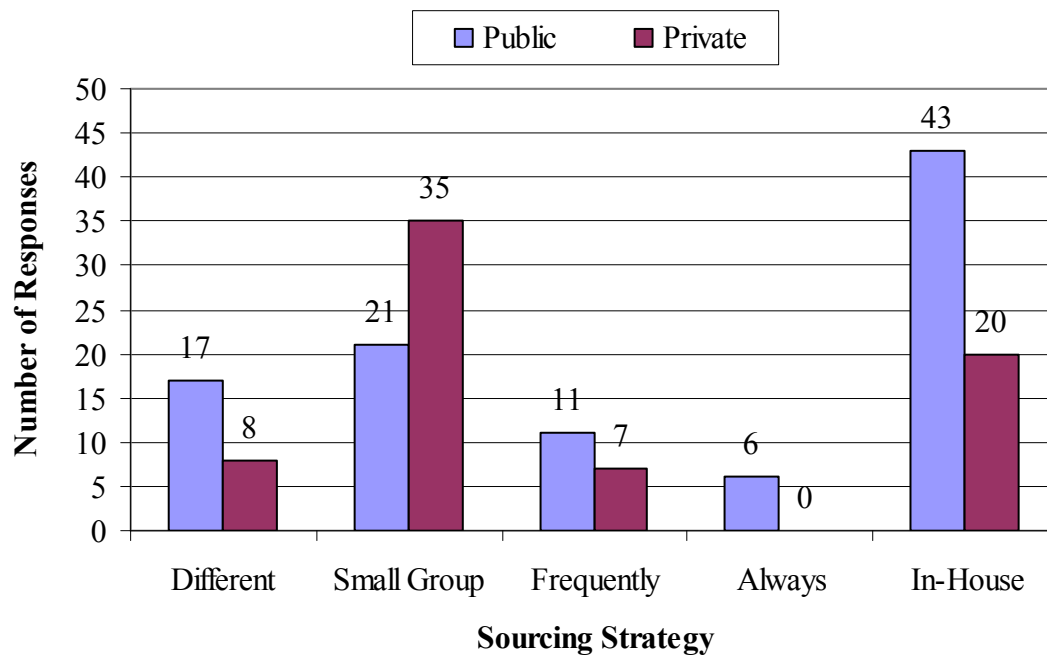
from a small group (4 or less) of firms to oversee design services for each project.” The smallest number of public sector respondents, 6, selected answer choice 4 or “Always use the same firm to oversee design services.”

Of the 70 responses from the private sector, the largest number of respondents, 35, selected answer choice 2 or “Consistently select from a small group (4 or less) of firms to oversee design services for each project.” None of the private sector respondents selected answer choice 4 or “Always use the same firm to oversee design services.” The results of the public and private sector responses to question 12b are presented in Figure 7.14.

The responses to question 12b were varied for the public and private sector respondents. The answer choice with the largest number of responses varied for the public and private sectors. However the largest amount of respondents from the public sector selected answer choice 5 which is predicated on their selection of answer choice 1 on question 12a. The next highest number of public sector respondents selected answer choice 2. Answer choice 2 was the received the highest number of responses from the private sector. The percentage of the total respondents, who selected answer choice 2, however was different. The percentage of public sector respondents that selected answer choice was 21.4 percent (21/98) as opposed to the 50.0 percent (35/70) of respondents that selected answer choice 2 from the private sector.

**Table 7.18: Answer Choices for Question 12b**

<b>No.</b>	<b>Answer Choice</b>
1	Always select a different firm to oversee design services for each project
2	Consistently select from a small group (4 or less) of firms to oversee design services for each project
3	Frequently use the same firm to oversee design services
4	Always use the same firm to oversee design services
5	N/A (Please select this option if you chose 0% for question 12a)



**Figure 7.14: Sourcing Strategy Used in the Oversight of Design by Public and Private Sector Respondents (Question 12b)**

#### 7.2.10 Question 13

Question 13 was presented in two parts, 13a and 13b. Both parts of question 13 refer to the performance of design services. The results for the analysis of the public and private responses to parts a. and b. of question 13 are presented in the following the sections.

##### *7.2.10.1 Question 13a*

Question 13a was directed at determining the amount of outsourcing occurring for the performance of design services. The results to question 13a were separated by the public and private sector respondents. Of the 167 responses to question 13a, 98 were from the public sector and 69 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 41, reported that they outsourced between 75 and 99 percent of the performance of design services. The lowest

number of public sector respondents, 3, reported that they outsourced 0 percent of the performance of design services.

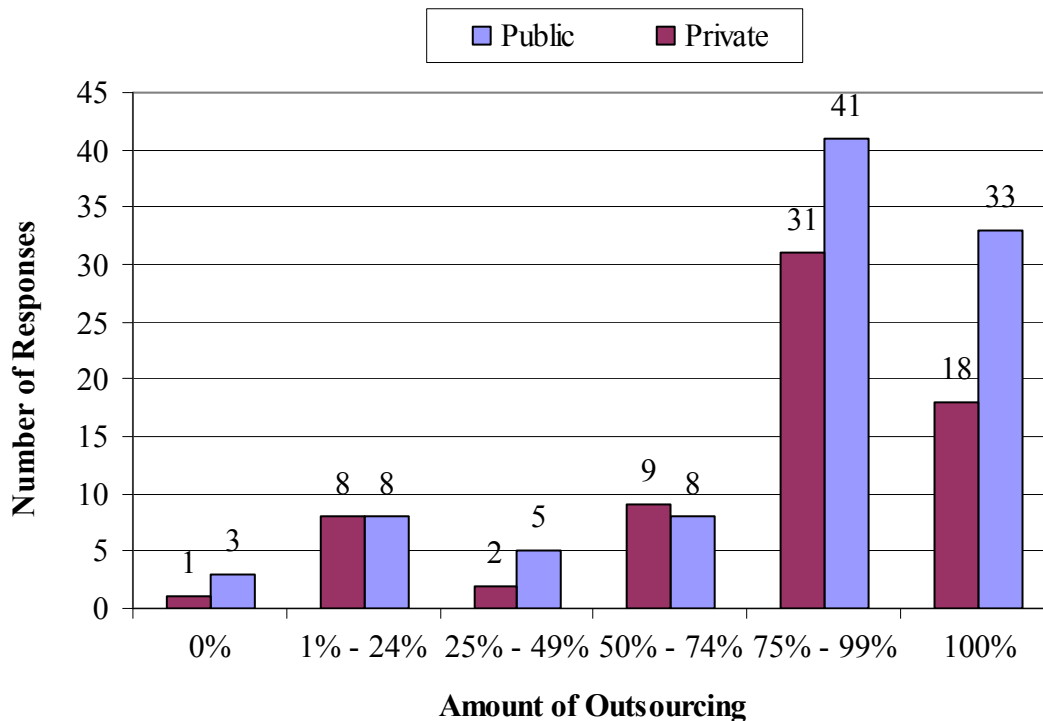
The largest number of private sector respondents, 31, reported that they outsourced between 75 and 99 percent of the performance of design services. The lowest number of private sector respondents, 1, reported that they outsourced 0 percent of all activities related to the performance of design services. Figure 7.15 presents the results of the public and private responses to question 13a.

The average amount of outsourcing for the performance of design services was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing for the performance of design services for the public and private sector is provided in Section 6.11.1. The average amount of outsourcing that occurred within the performance of design services for the public sector was found to be 78.0 percent. The average amount of outsourcing that occurred within the performance of design services for the private sector was found to be 75.8 percent.

The amount of outsourcing occurring within the performance of design services was similar with the public sector outsourcing 2.2 percent (78.0-75.8) more of the performance of design services than the private sector. The largest number of respondents in both sectors reported outsourcing between 75 and 99 percent of the performance of design services. The percentage of respondents was similar as well, with 41.8 percent (41/98) of the public sector respondents and 44.9 percent (31/69) of the private sector respondents reporting outsourcing between 75 and 99 percent of the performance of design services. The smallest number of respondents in both sectors reported outsourcing 0 percent of the performance of design services.

The amount of respondents that performed all of the performance of design services in-house can be determined by the number of respondents who selected outsourcing 0 percent of the performance of design services. The number of public sector respondents who selected

outsourcing 0 percent was 3.1 percent (3/98). The number of private sector respondents who selected outsourcing 0 percent was 1.4 percent (1/70). It is evident that whether an organization is public or private the majority of design services are outsourced rather than performed in-house.



**Figure 7.15: Outsourcing of the Performance of Design by Public and Private Sector Respondents (Question 13a)**

#### 7.2.10.2 Question 13b

Question 13b was directed at determining how the performance of design function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the performance of design services. The answer choices for question 13b are presented in Table 7.19. The responses for question 13b were segregated by responses from the public sector and responses from the private sector. Of the 167 responses to question 13b, 98 were from the public sector and 69 were from the private sector.



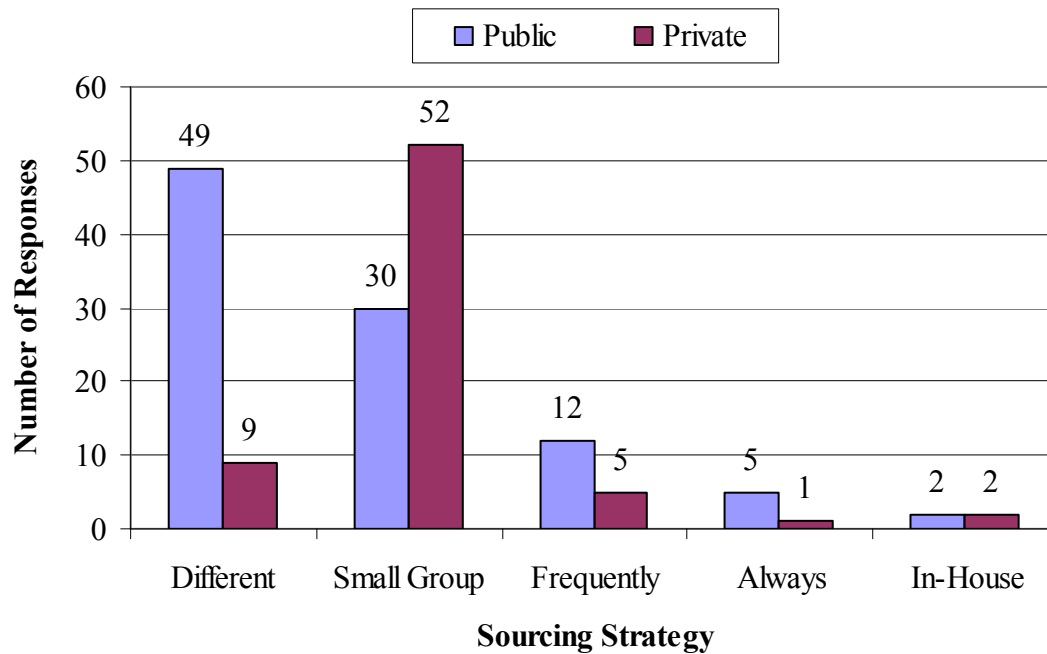
Of the 98 responses from the public sector, the largest number of respondents, 49, selected answer choice 1 or “Always select a different design firm for each project.” The lowest number of public sector respondents, 2, selected answer choice 5 or “N/A (Please select this option if you chose 0% for question 13a).”

Of the 69 responses from the private sector, the largest number of respondents, 52, selected answer choice 2 or “Consistently select from a small group (4 or less) of design firms to for each project.” The 52 respondents who selected answer choice 2 represent a 75.4 percent (52/69) majority of the private sector responses. Only 1 of the private sector respondents selected answer choice 4 or “Always use the same design firm.” The results of the public and private sector responses to question 13b are presented in Figure 7.16.

The responses to question 13b were varied for the public and private sector respondents. While 50.0 percent (49/98) of the public sector reported always selecting a different design firm for each project, 75 percent of the private sector respondents reported selecting from a small group of design firms for each project. Due to the procurement limitations of the public respondents selecting from a small group of design firms is difficult. However, 30 respondents or 30.6 percent (30/98) reported being able to select from a small number of firms when procuring design services. It is unknown if a large number of public sector respondents reported selecting from a small group of service providers because they were using a qualifications based approach or simply because the availability of bidders was low. An overview of the response totals for the public and private sector to question 13b confirms the fact that the public sector reports using a larger number of service providers to perform the activities related to the pre-design phase of their construction program than the private sector.

**Table 7.19: Answer Choices for Question 13b**

No.	Answer Choice
1	Always select a different design firm for each project
2	Consistently select from a small group (4 or less) of design firms for each project
3	Frequently use the same design firm
4	Always use the same design firm
5	N/A (Please select this option if you chose 0% for question 13a)



**Figure 7.16: Sourcing Strategy Used in the Performance of Design by Public and Private Sector Respondents (Question 13b)**

#### 7.2.11 Question 14

Question 14 was presented in two parts, 14a and 14b. Both parts of question 14 refer to the oversight of construction services. The results for the analysis of the public and private responses to parts a. and b. of question 14 are presented in the following the sections.

#### *7.2.11.1 Question 14a*

Question 14a was directed at determining the amount of outsourcing occurring for the oversight of construction services. The results to question 14a were separated by the public and private sector respondents. Of the 168 responses to question 14a, 98 were from the public sector and 70 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 30, reported that they outsourced 0 percent or none of the oversight of construction services. The lowest number of public sector respondents, 4, reported that they outsourced 100 percent or all of the oversight of construction services.

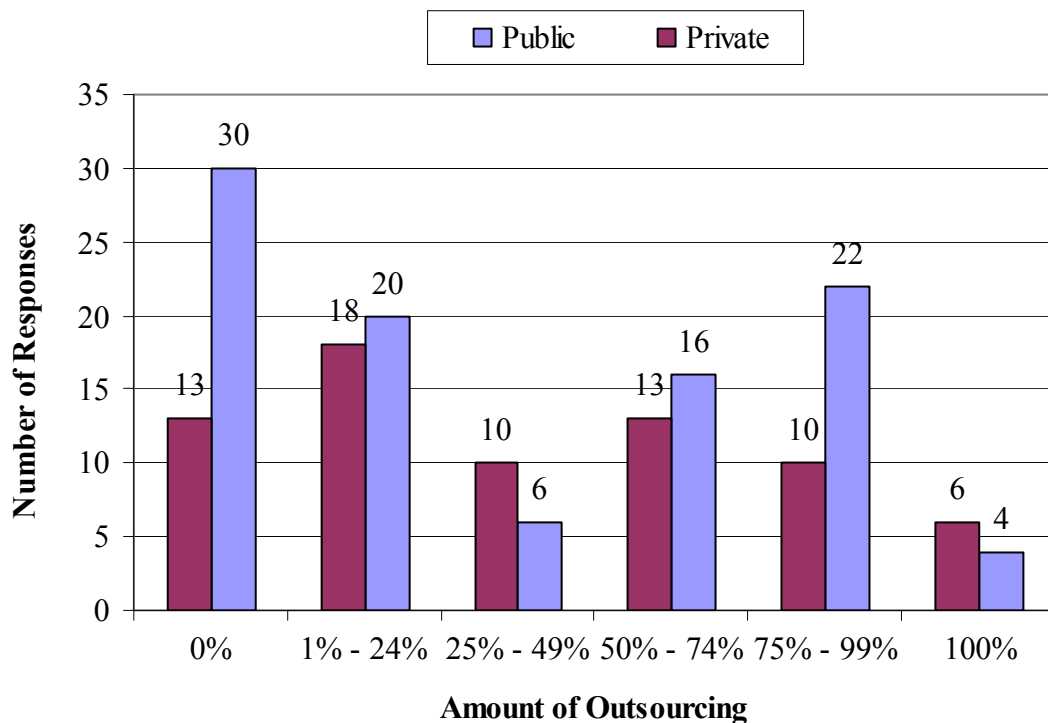
For the private sector, the largest number of respondents, 18, reported that they outsourced between 1 and 24 percent of the oversight of construction services. The lowest number of private sector respondents, 6, reported that they outsourced 100 percent of all activities related to the oversight of construction services. Figure 7.17 presents the results of the public and private responses to question 14a.

The average amount of outsourcing for the oversight of construction services was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing for the oversight of construction services for the public and private sector is provided in Section 6.11.1. The average amount of outsourcing that occurred within the oversight of construction services for the public sector was found to be 38.6 percent. The average amount of outsourcing that occurred within the oversight of construction services for the private sector was found to be 41.0 percent.

The amount of outsourcing occurring within the oversight of construction services was similar with the public sector outsourcing 2.4 percent (41.0-38.6) more of the oversight of construction services than the private sector. The answer choice with the largest number of responses for the public sector varied from that of the private sector. The second highest

number of respondents within the private sector however, selected outsourcing 0 percent of the oversight of construction which agreed with the largest number of respondents within the public sector. The smallest number of respondents in both sectors was the same (100 percent).

The amount of respondents that performed all of the oversight of construction in-house can be determined by the number of respondents who selected outsourcing 0 percent. A large number of public firms (30) are performing all of the work related to the oversight of construction in-house compared to the number of private sector firms (13) who are performing all of the oversight of construction in-house.



**Figure 7.17: Outsourcing of the Oversight of Construction by Public Sector Respondents (Question 14a)**

#### *7.2.11.2 Question 14b*

Question 14b was directed at determining how the oversight of construction function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the oversight of construction services. The answer choices for question 14b are presented in Table 7.20. The responses for question 14b were segregated by responses from the public sector and responses from the private sector. Of the 165 responses to question 14b, 97 were from the public sector and 68 were from the private sector.

Of the 97 responses from the public sector, the largest number of respondents, 29, selected answer choice 2 or “Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project.” The lowest number of public sector respondents, 4, selected answer choice 4 or “Always use the same firm to provide oversight of construction.”

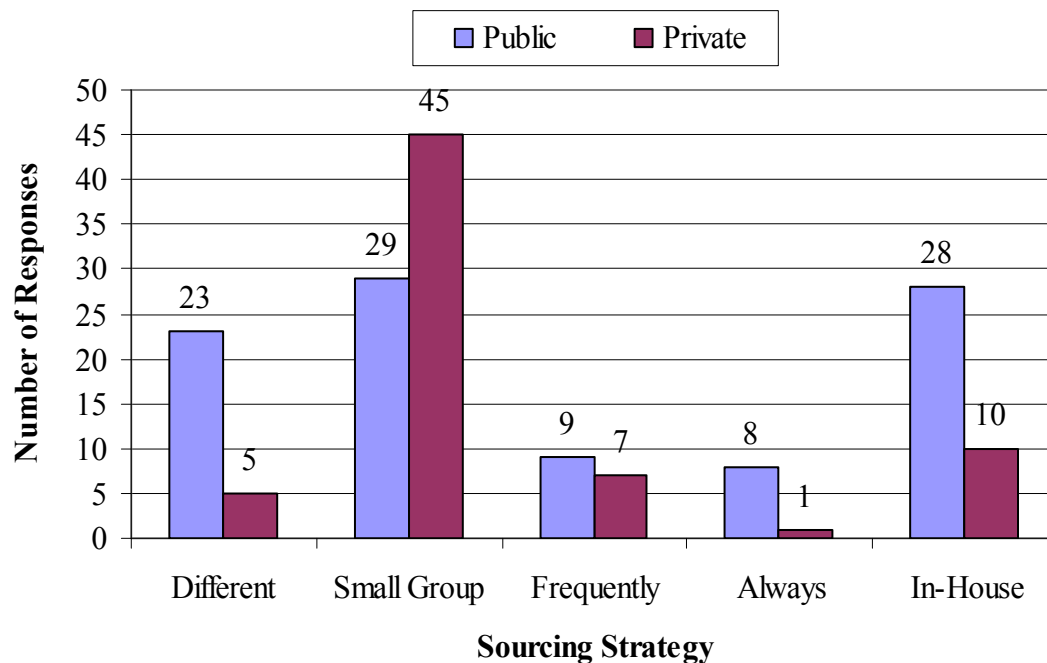
Of the 68 responses from the private sector, the largest number of respondents, 45, selected answer choice 2 or “Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project.” The 45 respondents who selected answer choice 2 represent a 66.2 percent (45/68) majority of the private sector responses. Only 1 of the private sector respondents selected answer choice 4 or “Always use the same firm to provide oversight of construction.” The results of the public and private sector responses to question 14b are presented in Figure 7.18.

The responses to question 14b were varied for the public and private sector respondents. While the largest number of respondents from both the public and private sector selected answer choice 2 the percentage of respondents varied greatly. Only 29.6 percent (29/98) of the public sector respondents reported selecting from a small group of service providers, as opposed to the 66.2 percent of the private sector respondents who reported selecting from a small group of firms for the oversight of construction. An overview of the response totals for the public and private sector to question 14b confirms the fact the public sector reports using

a larger number of service providers to perform the activities related to the oversight of construction than the private sector. Also, respondents from within the private sector typically have a small group of service providers they use when selecting a firm for the oversight of construction services, while the public sector procures services for the oversight of construction in many different ways.

**Table 7.20: Answer Choices for Question 14b**

No.	Answer Choice
1	Always select a different firm to provide oversight of construction for each project
2	Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project
3	Frequently use the same firm to provide oversight of construction
4	Always use the same firm to provide oversight of construction
5	N/A (Please select this option if you chose 0% for question 14a)



**Figure 7.18: Sourcing Strategy Used in the Oversight of Construction by Public Sector Respondents (Question 14b)**

### 7.2.12 Question 15

Question 15 was presented in two parts, 15a and 15b. Both parts of question 15 refer to the performance of construction. The results for the analysis of the public and private responses to parts a. and b. of question 15 are presented in the following the sections.

#### *7.2.12.1 Question 15a*

Question 15a was directed at determining the amount of outsourcing occurring with the performance of construction. The results to question 15a were separated by the public and private sector respondents. Of the 168 responses to question 15a, 98 were from the public sector and 70 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 48, reported that they outsourced 100 percent or all of the performance of construction. The lowest number of public sector respondents, 3, reported that they outsourced between 25 and 49 percent of the oversight of construction services.

The largest number of private sector respondents, 28, reported that they outsourced 100 percent of the performance of construction. The lowest number of private sector respondents, 3, reported that they outsourced 0 percent of all activities related to the performance of construction. Figure 7.19 presents the results of the public and private responses to question 15a.

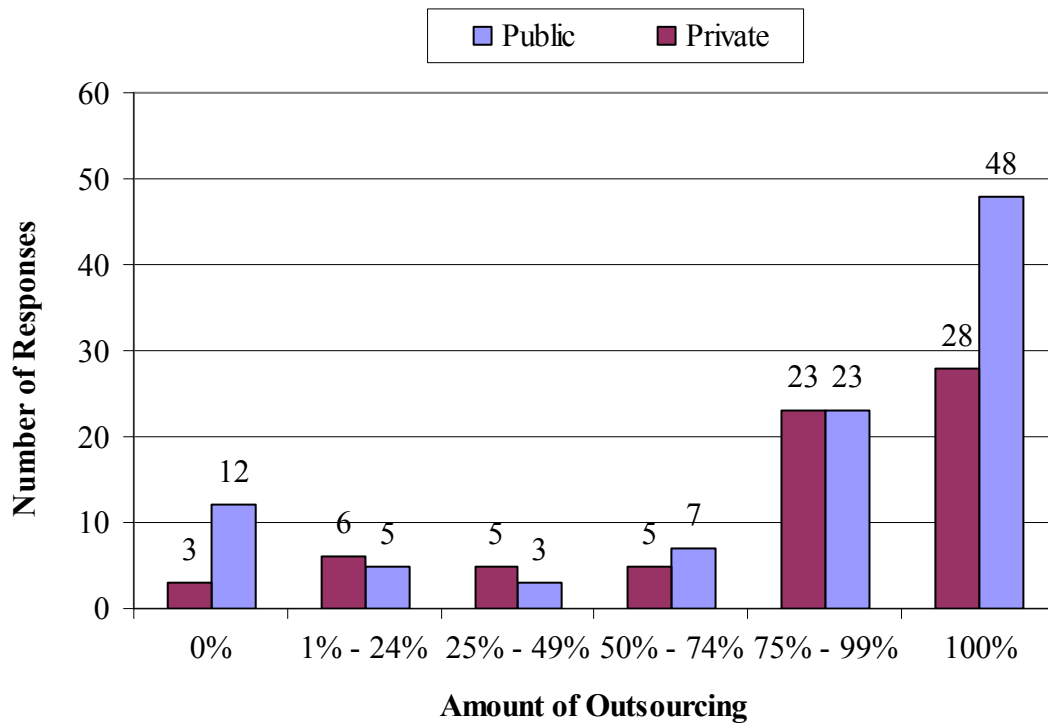
The average amount of outsourcing for the performance of construction was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing for the oversight of construction services for the public and private sector is provided in Section 6.11.1. The average amount of outsourcing that occurred within the performance of construction for the public sector was found to be 75.6 percent. The

average amount of outsourcing that occurred within the performance of construction for the private sector was found to be 76.8 percent.

The amount of outsourcing occurring within the performance of construction was similar between both the public and private sectors. The average amount of outsourcing that occurred in the performance of construction for both the public and private sectors was similar with the public sector outsourcing 1.2 percent (76.8-75.6) less of the performance of construction than the private sector. The highest number of respondents in both sectors reported outsourcing all or 100 percent of the performance of construction.

The amount of respondents that performed all of the performance of construction in-house can be determined by the number of respondents who selected outsourcing 0 percent. The number of public sector respondents who selected outsourcing 0 percent was 12.2 percent (12/98). The number of private sector respondents who selected outsourcing 0 percent was 4.3 percent (3/70). A large number of firms, whether public or private, are outsourcing the majority of work related to the performance of construction, as is evident by the high average amount of outsourcing totals, and the low number of firms that are performing all of the performance of construction in-house. The public sector does however have a larger percentage of firms that are performing all of the performance of construction in-house.





**Figure 7.19: Outsourcing of the Performance of Construction by Public and Private Sector Respondents (Question 15a)**

#### 7.2.12.2 Question 15b

Question 15b was directed at determining how the performance of construction function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the performance of construction. The answer choices for question 15b are provided in Table 7.21. The responses for question 15b were segregated by responses from the public sector and responses from the private sector. Of the 165 responses to question 15b, 95 were from the public sector and 70 were from the private sector.

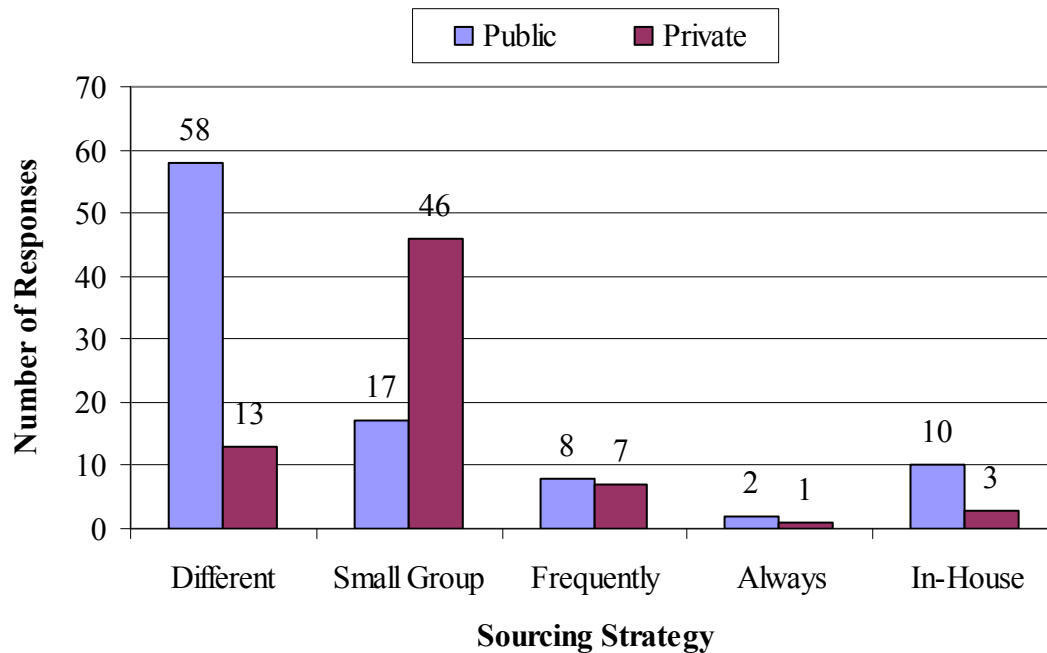
Of the 95 responses from the public sector, the largest number of respondents, 58, selected answer choice 1 or “Always select a different construction firm for each project.” The 58 respondents who selected answer choice 1 represent a 61.1 percent (58/95) majority of the public sector respondents. The lowest number of public sector respondents, 2, selected answer choice 4 or “Always use the same construction firm.”

Of the 70 responses from the private sector, the largest number of respondents, 46, selected answer choice 2 or “Consistently select from a small group (4 or less) of construction firms for each project.” The 46 respondents who selected answer choice 2 represent a 65.7 percent (46/70) majority of the private sector responses. Only 1 of the private sector respondents selected answer choice 4 or “Always use the same construction firm.” The results of the public and private sector responses to question 15b are presented in Figure 7.20.

The responses to question 15b were varied for the public and private sector respondents. The largest number of respondents from each sector differed. A majority of the respondents in the public sector reported always selecting a different construction firm for each project while a majority of respondents in the private sector reported selecting from a small group of construction firms for each project. An overview of the response totals for the public and private sector to question 15b confirms the fact the public sector reports using a larger number of service providers to perform the activities related to the performance of construction than the private sector.

**Table 7.21: Answer Choices for Question 15b**

<b>No.</b>	<b>Answer Choice</b>
1	Always select a different construction firm for each project
2	Consistently select from a small group (4 or less) of construction firms for each project
3	Frequently use the same construction firm
4	Always use the same construction firm
5	N/A (Please select this option if you chose 0% for question 15a)



**Figure 7.20: Sourcing Strategy Used in the Performance of Construction by Public and Private Sector Respondents (Question 15b)**

#### 7.2.13 Question 16

Question 16 was presented in two parts, 16a and 16b. Both parts of question 16 refer to activation phase. The results for the analysis of the public and private responses to parts a. and b. of question 16 are presented in the following the sections.

##### *7.2.13.1 Question 16a*

Question 16a was directed at determining the amount of outsourcing occurring within the activation phase. The results to question 16a were separated by the public and private sector respondents. Of the 167 responses to question 16a, 98 were from the public sector and 69 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 37, reported that they outsourced 0 percent or none of the activities related to the activation phase. The lowest

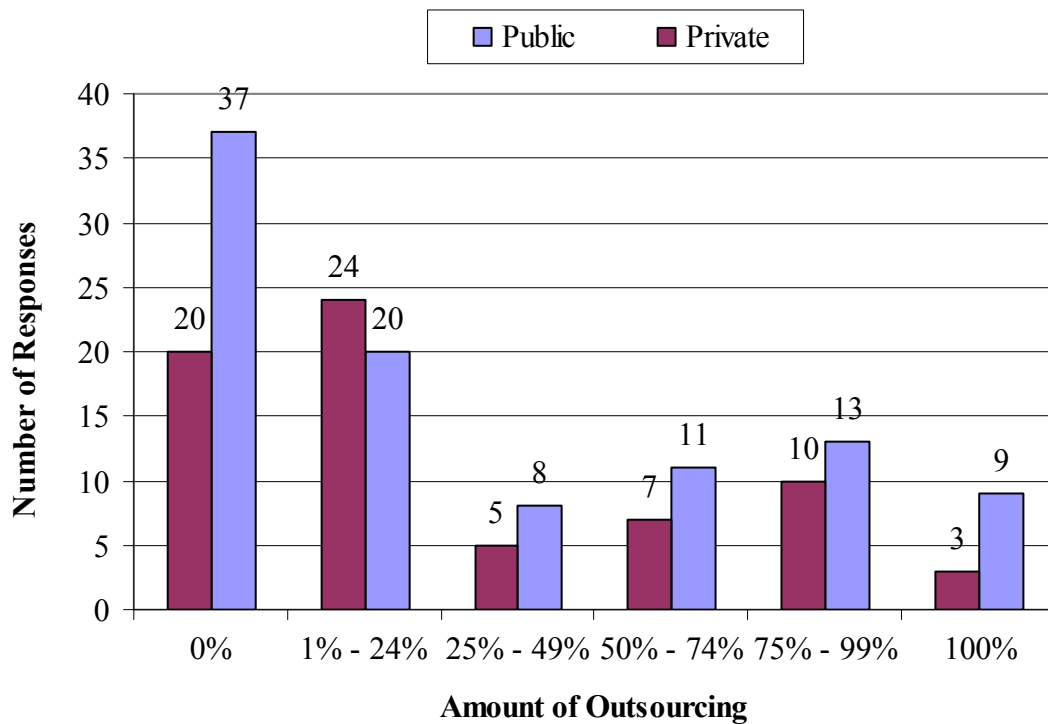
number of public sector respondents, 8, reported that they outsourced between 25 and 49 percent of the activities related to the activation phase.

The largest number of private sector respondents, 24, reported that they outsourced between 1 and 24 percent of the activation phase. The lowest number of private sector respondents, 3, reported that they outsourced 100 percent of all activities related to the activation phase. Figure 7.21 presents the results of the public and private responses to question 16a.

The average amount of outsourcing for the activation phase was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing of the activation phase for the public and private sector is presented in Section 6.11.1. The average amount of outsourcing that occurred within the activation phase as reported by the public sector was found to be 33.3 percent. The average amount of outsourcing that occurred within the activation phase as reported by the private sector was found to be 30.3 percent.

The amount of outsourcing occurring within the activation phase was similar with the public sector outsourcing 3.0 percent (33.3-30.3) more of the activation phase than the private sector. The highest number of respondents in the private sector selected outsourcing none of the activation phase as opposed to the highest number of respondents in the private sector that outsourced at least a portion, or between 1 and 24 percent, of the activation phase.

The amount of respondents that performed all of the activation phase in-house can be determined by the number of respondents who selected outsourcing 0 percent. The number of public sector respondents who selected outsourcing 0 percent was 37.8 percent (37/98). The number of private sector respondents who selected outsourcing 0 percent was 30.0 percent (20/69). While private firms appear to be outsourcing at least some portion of the activation phase of the construction process, it is evident that throughout the industry firms are tending to perform most of the work related to the activation phase in-house.



**Figure 7.21: Outsourcing of the Activation Phase by Public and Private Sector Respondents (Question 16a)**

#### 7.2.13.2 Question 16b

Question 16b was directed at determining how the activation function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing the activation phase. The answer choices for question 16b are provided in Table 7.22. The responses for question 16b were segregated by responses from the public sector and responses from the private sector. Of the 160 responses to question 16b, 94 were from the public sector and 66 were from the private sector.

Of the 94 responses from the public sector, the largest number of respondents, 34, selected answer choice 5 or “N/A (Please select this option if you chose 0% for question 16a),” meaning that any activity related to the activation phase was performed in-house. The lowest

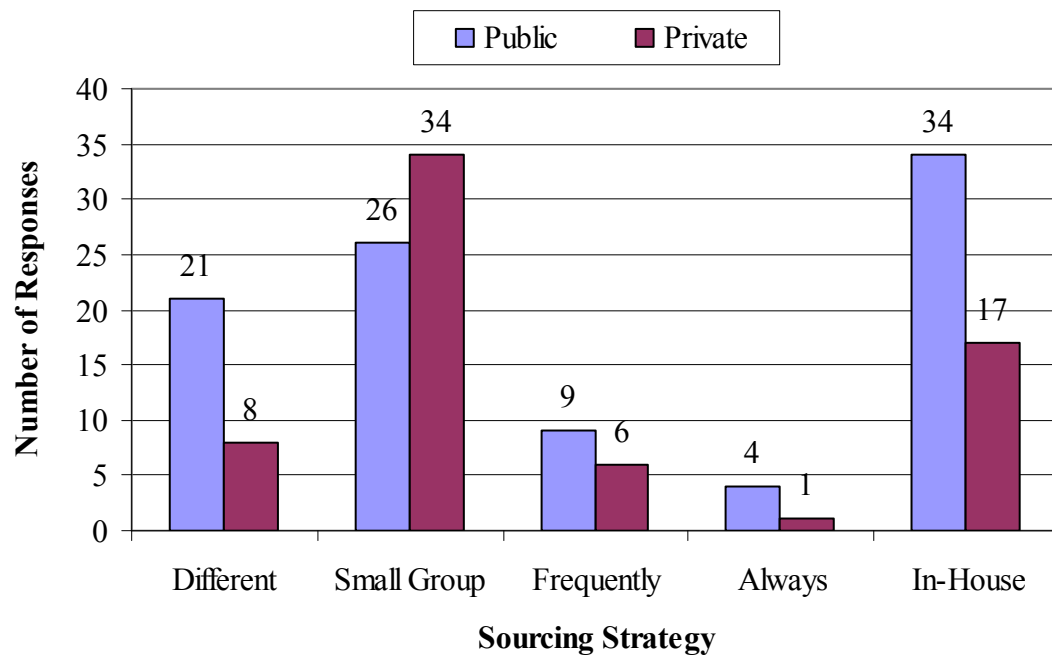
number of public sector respondents, 4, selected answer choice 4 or “Always use the same service provider.”

Of the 66 responses from the private sector, the largest number of respondents, 34, selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project.” The 34 respondents who selected answer choice 2 represent a 51.5 percent (34/66) majority of the private sector responses. Only 1 of the private sector respondents selected answer choice 4 or “Always use the same service provider.” The results of the public and private sector responses to question 16b are presented in Figure 7.22.

The responses to question 16b were varied for the public and private sector respondents. A majority of the respondents in the public sector reported performing most of the work associated with the activation phase in-house while a majority of respondents in the private sector reported selecting from a small group of outside service providers for each project. Of the public firms that did outsource activities related to the activation phase, the highest total of respondents, 26, were those that selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project” which is equivalent to the highest number of private sector respondents. An overview of the response totals for the public and private sector to question 16b confirms the fact the public sector and private sector do a large amount of the work associated with the activation phase in-house, but when they do outsource they typically select from a small group of service providers to perform the work.

**Table 7.22: Answer Choices for Question 16b**

No.	Answer Choice
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 16a)



**Figure 7.22: Sourcing Strategy Used in the Activation Phase by Public and Private Sector Respondents (Question 16b)**

#### 7.2.14 Question 17

Question 17 was presented in two parts, 17a and 17b. Both parts of question 17 refer to operations and maintenance of a constructed facility. The results for the analysis of the public and private responses to parts a. and b. of question 17 are presented in the following sections.

##### *7.2.14.1 Question 17a*

Question 17a was directed at determining the amount of outsourcing occurring within the activities related to operations and maintenance. The results to question 17a were separated by the public and private sector respondents. Of the 168 responses to question 17a, 98 were from the public sector and 70 were from the private sector.

Using the segregated results, an analysis of the public and private sector responses was performed. The largest number of public sector respondents, 36, reported that they outsourced 0 percent or none of the activities related to operations and maintenance. A total of only 15 public sector respondents reported outsourcing 50 percent or more of all operations and maintenance activities.

The largest number of private sector respondents, 27, reported that they outsourced between 1 and 24 percent of operations and maintenance activities. The lowest number of private sector respondents, 3, reported that they outsourced 100 percent of all operations and maintenance activities. Figure 7.23 presents the results of the public and private responses to question 17a.

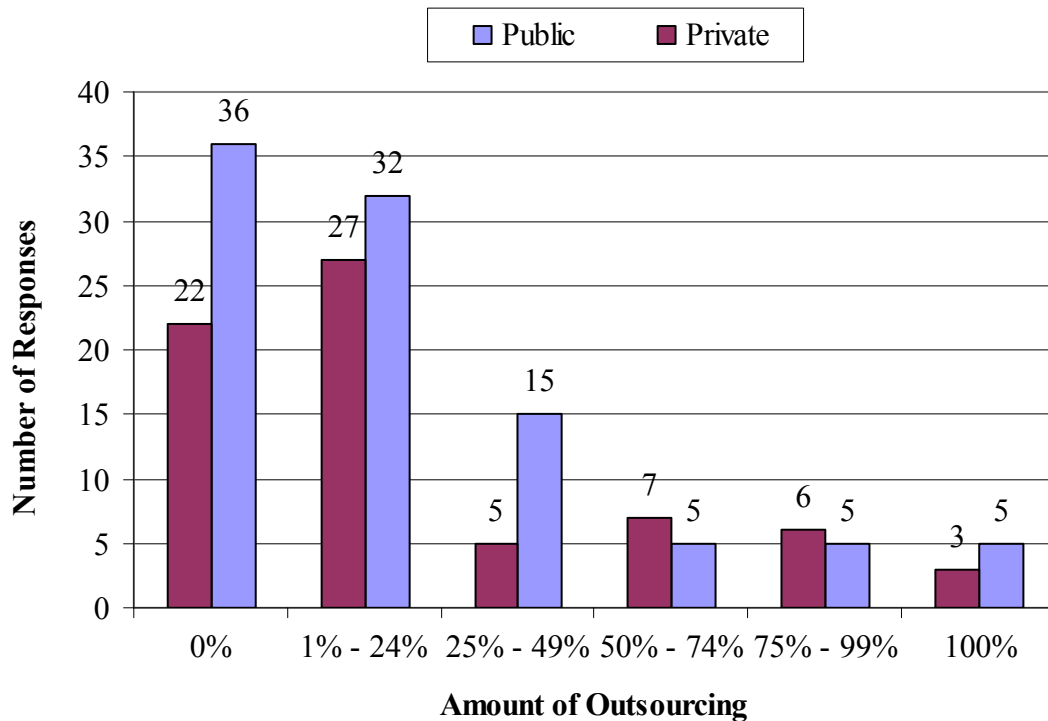
The average amount of outsourcing for operations and maintenance activities was calculated for the public and private sector responses. The methodology used to calculate the average amount of outsourcing of the operations and maintenance activity for the public and private sector is provided in Section 6.11.1. The average amount of outsourcing that occurred within operations and maintenance activities as reported by the public sector was found to be 22.5 percent. The average amount of outsourcing that occurred within operations and maintenance activities as reported by the private sector was found to be 25.4 percent.

The amount of outsourcing occurring within the operations and maintenance activities of the constructed facilities was similar with the public sector outsourcing 2.9 percent (25.4-22.5) less of the activation phase than the private sector. The highest number of respondents in the private sector selected outsourcing none of the operations and maintenance activity as opposed to the highest number of respondents in the private sector that outsourced at least a portion, or between 1 and 24 percent, of the operations and maintenance activity.

The amount of respondents that performed all operations and maintenance activities in-house can be determined by the number of respondents who selected outsourcing 0 percent. The number of public sector respondents who selected outsourcing 0 percent was 36.7 percent



(36/98). The number of private sector respondents who selected outsourcing 0 percent was 31.4 percent (22/70). A review of the segregated public and private analysis shows that while private firms appear to be outsourcing at least some portion of operations and maintenance activity, it is evident that throughout the industry firms are tending to perform most of the work related to operations and maintenance in-house.



**Figure 7.23: Outsourcing of Operations and Maintenance by Public and Private Sector Respondents (Question 17a)**

#### 7.2.14.2 Question 17b

Question 17b was directed at determining how the operations and maintenance function was procured. Respondents were asked to give the approximate number of service providers they selected from when outsourcing their operations and maintenance activities. The answer choices for question 17b are provided in Table 7.23. The responses for question 17b were segregated by responses from the public sector and responses from the private sector. Of the

164 responses to question 17b, 98 were from the public sector and 66 were from the private sector.

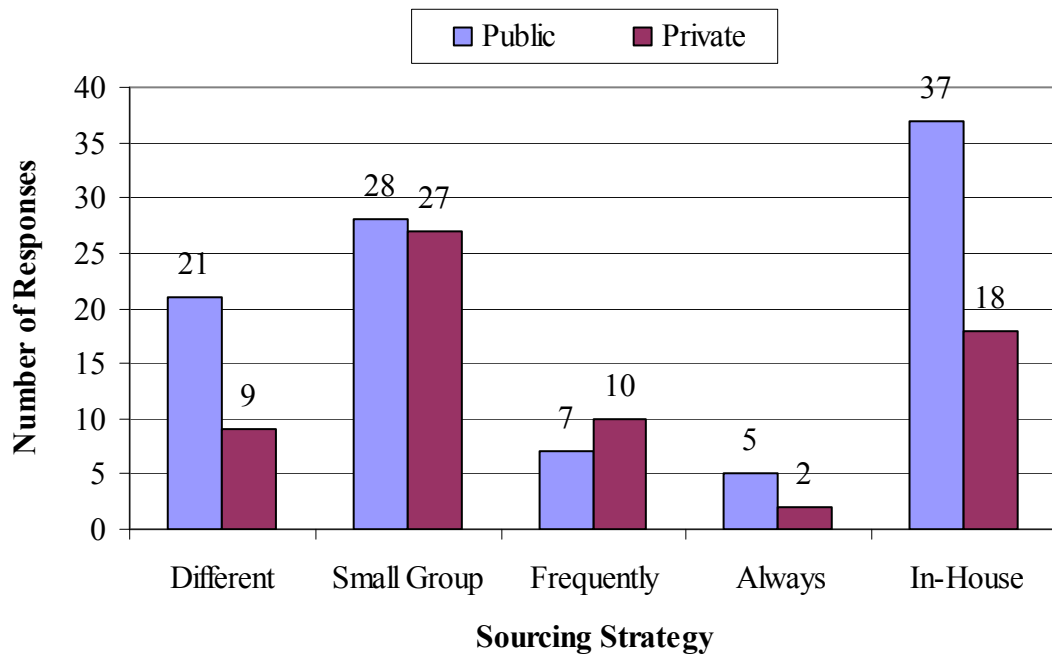
Of the 98 responses from the public sector, the largest number of respondents, 37, selected answer choice 5 or “N/A (Please select this option if you chose 0% for question 17a),” meaning that any activity related to operations and maintenance was performed in-house. The lowest number of public sector respondents, 5, selected answer choice 4 or “Always use the same service provider.”

Of the 66 responses from the private sector, the largest number of respondents, 27, selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project.” Only 2 of the private sector respondents selected answer choice 4 or “Always use the same service provider.” The results of the public and private sector responses to question 17b are presented in Figure 7.24.

The responses to question 17b were varied for the public and private sector respondents. The largest number of respondents from each sector differed. A large number of the respondents in the public sector reported performing most of the work associated with the operations and maintenance activity in-house while a majority of respondents in the private sector reported selecting from a small group of outside service providers for each project. Of the public firms that did outsource operations and maintenance activities, the highest total of respondents, 28, were those that selected answer choice 2 or “Consistently select from a small group (4 or less) of service providers for each project” which is equivalent to the highest number of private sector respondents. An overview of the response totals for the public and private sector to question 17b confirms the fact the public sector and private sector do a large amount of the work associated with operations and maintenance activity in-house, but when they do outsource they typically select from a small group of service providers to perform the work.

**Table 7.23: Answer Choices for Question 17b**

No.	Answer Choice
1	Always select a different service provider for each project
2	Consistently select from a small group (4 or less) of service providers for each project
3	Frequently use the same service provider
4	Always use the same service provider
5	N/A (Please select this option if you chose 0% for question 17a)



**Figure 7.24: Sourcing Strategy Used for Operations and Maintenance by Public Sector Respondents (Question 17b)**

#### 7.2.15 Question 18

Question 18 was an open ended question asking respondents to estimate the percentage of total construction spend they spent on the management of construction. The responses to question 18 were segregated by the public sector respondents and the private sector respondents. An average management costs was calculated for both the public sector respondents and for the private sector respondents.

Due to the high variability in the responses to question 18, two methodologies were undertaken to calculate the average management costs of the public and private sector respondents. The first methodology was very similar to the one undertaken in the results section of this thesis for calculating the average management costs for all the respondents. The second methodology involved the removal of responses that fell outside of one standard deviation from the mean.

The average management costs for both the public and private sector were first calculated using the same methodology presented in Section 6.18 of this thesis. All responses that were removed based on the methodology in Section 6.18 were also removed for the analysis undertaken for the public and private sector respondents. All responses that were modified based on the methodology in Section 6.18 were also modified in exactly the same format for the analysis of the public and private sector responses presented in this section.

Following the modification and removal of responses, a total of 154 responses were used in the analysis of the public and private responses to question 18. The average management cost for the public sector, which included 93 respondents, was found to be 10.2 percent of the total construction spend. The average management cost for the private sector, which included 61 respondents, was found to be 13.8 percent of the total construction spend. The survey data shows that the public sector is spending 3.6 percent less of their total construction spend on the management of the construction process than the private sector.

#### 7.2.16 Question 19

Question 19 was an open ended question directed at determining the costs for hiring an external program manager. The responses to question 19 were segregated by the public sector respondents and the private sector respondents. An average cost for hiring an external program manager was calculated for both the public sector respondents and for the private sector respondents. The average cost for hiring an external program manager for both the public and private sector was calculated using the same methodology presented in Section 6.19 of this thesis. All responses that were removed based on the methodology in Section

6.19 were also removed for the analysis undertaken for the public and private sector respondents. All responses that were modified based on the methodology in Section 6.19 were also modified in exactly the same format for the analysis of the public and private sector responses presented in this section.

Following the modification and removal of responses, a total of 58 responses were used in the analysis of the public and private responses to question 19. The survey data shows that the public sector is paying a smaller fee for the services of an external program manager. The average cost of hiring an external program manager for the public sector, which included a total of 34 respondents, was found to be 5.4 percent of the total program value. The average cost of hiring an external program manager for the private sector, which included 24 respondents, was found to be 6.8 percent of the total program value.

#### 7.2.17 Question 20

Question 20 was used to determine the type of firm typically used by owners to manage their construction program. Respondents were given the option of choosing from the types of firms listed in Table 7.24. Respondents were also provided with the option of selecting internal staff. Of the 97 responses to question 20, 49 were from the public sector and 48 were from the private sector.

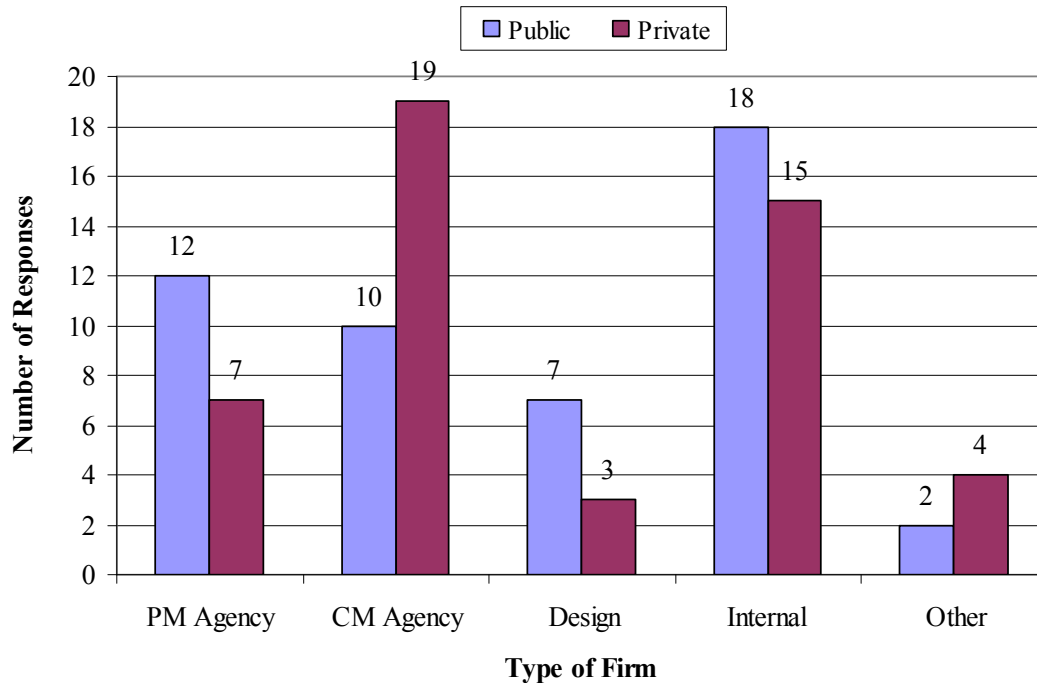
The highest percentage of public sector respondents, 36.7 percent (18/49), selected answer choice 4 or “internal staff.” The highest number of private sector respondents, 39.6 percent (19/48), chose answer choice 2 or “construction management firm (agency).” Figure 7.25 provides the number of respondents that selected each answer choice within the public and private sector.

A review of the responses to question 20 by the public and private sector respondents confirms the fact that the private sector respondents are more apt to use a construction management firm to manage their construction program as opposed to the public sector respondents that are more apt to use a program management firm to manage their

construction program. Despite the differences in responses to question 20, a large number of both public and private sector respondents used internal staff to manage their construction programs.

**Table 7.24: Answer choices for Question 20**

No.	Answer Choice
1	Program Management Firm (Agency)
2	Construction Management Firm (Agency)
3	Design Firm
4	Internal Staff
5	Other



**Figure 7.25: Firms Used Most Often to Manage a Public and Private Respondent's Construction Program (Question 20)**

### 7.2.18 Question 21

Question 21 was directed at determining the factors most often considered in hiring an external program manager. Respondents were asked to rate a series of different factors on a scale of 0 to 100 percent with 0 percent meaning the factor was never considered and 100 percent meaning the factor was strongly considered. The responses to question 21 were segregated by the public and private sector respondents. Of the 90 responses to question 21, 48 are from the public sector and 42 are from the private sector.

The top three highest rated factors considered in hiring an external program manager were the same for both the public sector respondents and the private sector respondents. The top three highest rated factors included:

- Experience with similar projects/programs
- Projects and programs consistently delivered on time
- Individual lead program manager

The lowest rated factors differed between the public and private sector respondents. The public sector respondents reported that issues related to costs were some of the least considered factors in hiring an external program manager. The issues related to costs rated the lowest by the public sector respondents included:

- Savings in construction costs
- Greater economies of scale/efficiencies/integration
- Savings in design costs

The private sector respondents also rated “Greater economies of scale/efficiencies/integration” and “Savings in design costs” as some of the least considered factors when hiring an external program manager. The public and private sector respondents differed in the importance they placed on construction costs. The public sector respondents rated savings in construction costs as one of the lowest factors considered in hiring an

external program manager. Public sector respondents reported considering savings in construction costs only 68.4 percent of the time. The private sector respondents felt that savings in construction costs should be considered 78.4 percent of the time.

A large variation existed between the public and private sector respondents in their consideration of the safety record of an external program manager. The public sector respondents rated “Safety record” as one of the least factors considered when selecting an external program manger. Public sector respondents considered the safety record of an external program manager only 64.2 percent during the hiring process. Private sector respondents rated “Safety Record” as one of the factors most often considered when selecting a program manager. Private sector respondents considered the safety record of an external program 84.5 percent of the time during the hiring process. This variation in the importance placed on safety record is likely due to the fact many of the public sector respondents can not be sued. Each function and its rating are presented in Table 7.25 for both the public and private sector.

**Table 7.25: Functions Considered by Public and Private Sector Respondents for Hiring a Program Manager**

<b>Function</b>	<b>Public</b>	<b>Private</b>
Experience with similar projects/programs	85.1%	87.4%
Projects and programs consistently delivered on time	82.6%	85.7%
Individual lead program manager	81.3%	84.9%
Past experience with your organization	76.4%	74.2%
Program controls	74.3%	81.0%
Depth on the bench	72.2%	76.2%
Technical approach	71.9%	74.6%
Savings in construction costs	68.4%	78.6%
Greater economies of scale/efficiencies/integration	65.2%	73.8%
Safety record	64.2%	84.5%
Savings in design costs	63.2%	71.4%



### 7.2.19 Question 22

Question 22 was used to determine the organizational model used most often when hiring an external program manager. Respondents were given a list of answer choices that included several different organizational models and an ‘other’ selection. The answer choices provided for question 22 are given in Table 7.26.

**Table 7.26: Answer Choices for Question 22**

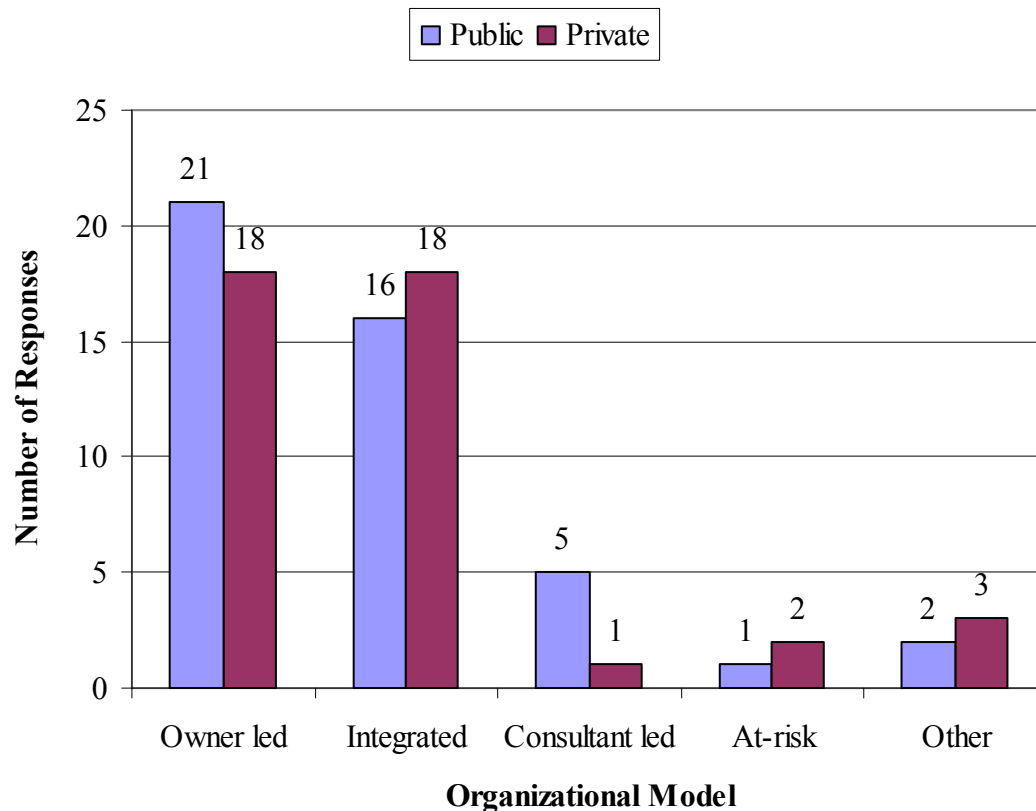
No.	Answer Choice
1	Owner led, with program management firm providing staff support
2	Integrated owner and program management team
3	Program management consultant led
4	Program management at-risk
5	Other

A total of 87 responses were recorded for question 22, of which 45 came from the public sector and 42 came from the private sector. The highest percentage of public sector respondents, 46.7 percent (21/45), reported using an organizational model that was owner led, with the program management firm providing staff support. The lowest percentage of public sector respondents, 2.2 percent (1/45), reported using a program management at-risk model.

Within the private sector, the two answer choices most often selected received an equivalent number of responses, 18 and were 1 or “Owner led, with program management firm providing staff support” and 2 or “Integrated owner and program management team.” The lowest percentage of private sector respondents, 2.4 percent (1/42), selected answer choice 3 or “Program management consultant lead.”

The number of respondents for each answer choice for the public and private sector are presented in Figure 7.26. As is evident from the figures and the analysis of question 22 a large majority of owners whether public or private are using either an owner led or an

integrated approach to program management. Very few of the respondents used a model in which the program management firm led.



**Figure 7.26: Organizational Models Used in Hiring an External Program Manager by Public and Private Sector Respondents (Question 22)**

### 7.3 Additional Analysis

Additional analysis was performed on the results of the public sector versus private sector analysis. Comparisons of the responses to questions 3 and 4, 7 and 8, and 11 through 17 were included in the additional analysis. The following sections detail the additional analysis performed on the public and private responses.

### 7.3.1 Average Project Size (Questions 3 and 4)

Further review of the number of projects started each year and the amount of construction spending provides insight into the average project size or cost. The average project size was found by dividing the average annual construction spending by respondent from the average number of projects started per year. The average annual construction spending value was calculated previously in Section 7.2.3 and the average number of projects started per year was calculated in Section 7.2.2. The average project size, rounded to the nearest hundred thousand, was found to be \$2.6 million (261/102) and \$3.0 million (693/228) for the public and private sectors respectively.

### 7.3.2 Internal Capabilities vs. Percent Managed In-House (Questions 7 and 8)

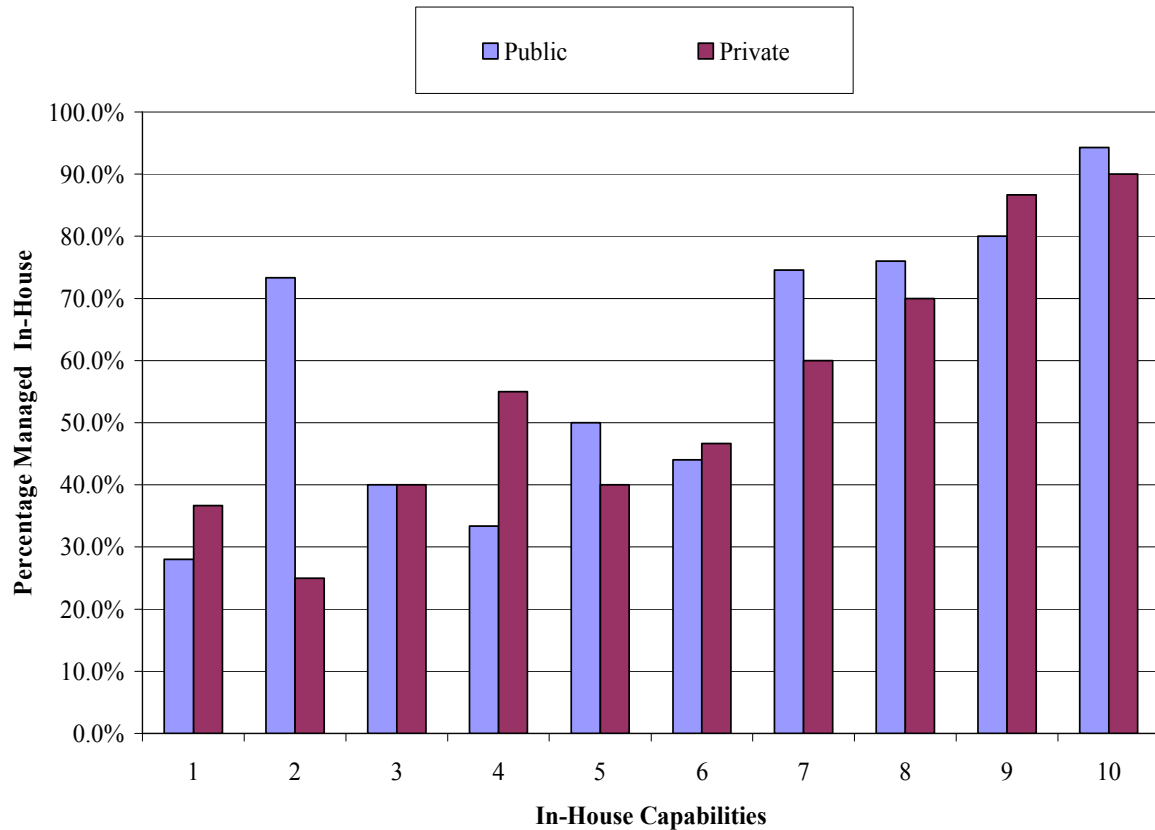
In order to gain a better understanding of how much of the management of the construction process was performed in-house based on the capabilities of a construction program, the responses to questions 7 and 8 were compared. The responses to question 7 were used to determine the internal capabilities of a construction program. These responses were a rating given to the internal capabilities of a respondent's organization by the respondent. Thus the ratings in question 7 were merely the perception of the internal capabilities of the organization by the respondent. The responses to question 8 were used to determine the percentage of the management of construction that the respondent's organization actually performed in-house. By comparing the results of questions 7 and 8 one can gain an understanding of the perception the respondents had of the internal capabilities of their construction programs to the reality of how much work was handled internally.

The expected results of a comparison of question 7 and question 8 would be that the respondents that rated their internal capabilities the highest would be performing more work internally and the firms that rated their internal capabilities the lowest would be performing the least amount of work in-house. The results of the comparison of responses to questions 7 and 8 support the idea that the greater an organizations internal capabilities the more work that is managed in-house. The public sector respondents who rated the internal capabilities

of their organization's construction program a 10 performed an average of 94.3 percent of the management of the construction process in-house. The private sector respondents who rated the internal capabilities of their organization's construction program a 10 performed an average of 90.0 percent of the management of construction in-house.

The results of the comparison of responses to questions 7 and 8 also support the idea that the lower a programs rating the less work performed in-house. The public sector respondents, who rated the internal capabilities of their organization's construction program the lowest, or 1, performed an average of 28.0 percent of the management of the construction process in-house. The private sector respondents who rated the internal capabilities of their organization's construction program the lowest, or, 1 performed an average of 36.7 percent of the management of the construction process in-house.

Figure 7.27 provides the average percentage of the construction process managed in-house compared to the internal capability ratings for both the public and private sector. Figure 7.27 does appear to trend upwards for both the public and private and sector. It can be seen from Figure 7.27 that as the internal capability rating given to the construction program increases so does the amount of work that is managed in-house.



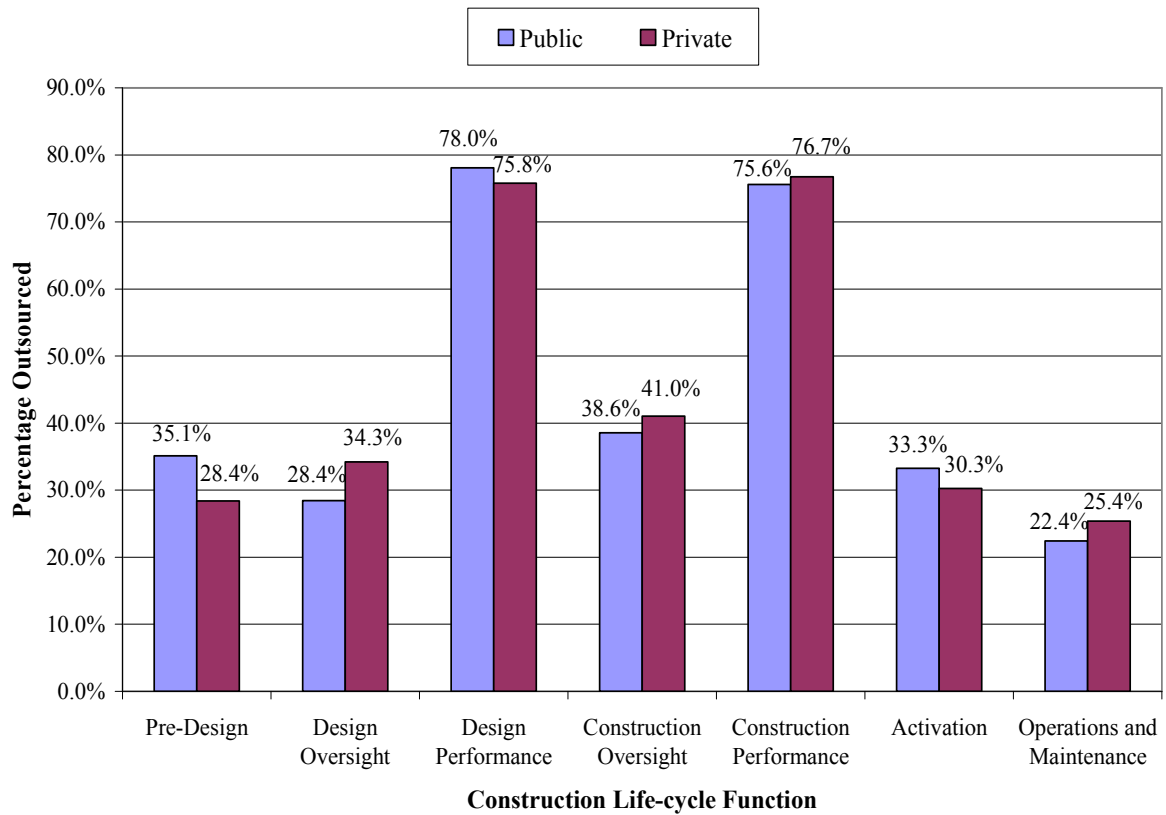
**Figure 7.27: In-House Capabilities of a Construction Program vs. Percent Managed In-House**

### 7.3.3 Average Amount of Outsourcing (Questions 11a – 17a)

The average outsourcing numbers for both the public and private sectors were compared to gain a better understanding of the outsourcing occurring throughout the construction life-cycle. As is evident from the average amount of outsourcing totals, the performance of design and the performance of construction are the most heavily outsourced. All other activities were outsourced less frequently with the average outsourcing for each typically being between 30 and 40 percent. Table 7.28 provides the average amount of outsourcing totals for both the public and private sector respondents. The average outsourcing totals are derived from the totals given in the previous sections for questions 11a through 17a. The overall average or roll up function is also given. It is interesting to note that the overall average amount of outsourcing by the public and private sector was the exactly the same. Figure 7.28 is also provided to give a visual representation of the average outsourcing data.

**Table 7.27: Average Percent Outsourced for each Phase**

Phase	Percent Outsourced	
	Public	Private
Pre-Design	35.1%	28.4%
Oversight of Design	28.4%	34.3%
Design Performance	78.0%	75.8%
Oversight of Construction	38.6%	41.0%
Construction Performance	75.6%	76.7%
Program Activation	33.3%	30.3%
Operations and Maintenance	22.4%	25.4%
Average	44.5%	44.5%

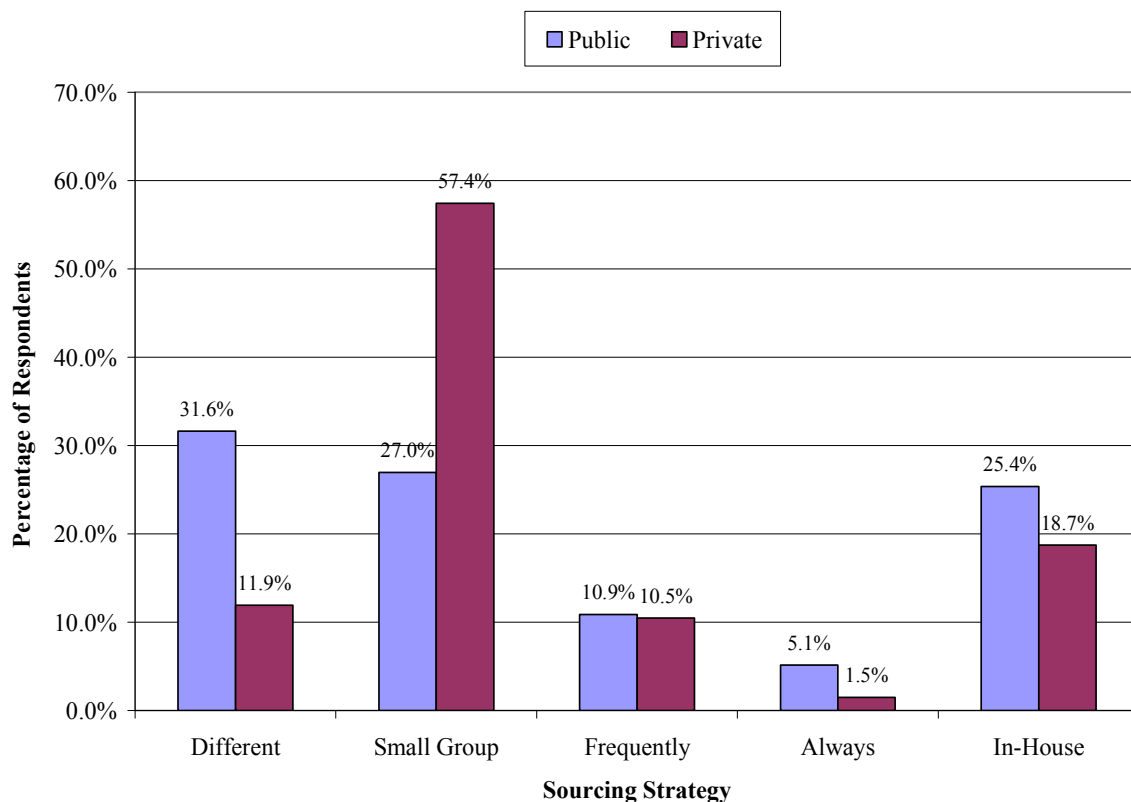


**Figure 7.28: Average Amount of Outsourcing throughout the Construction Life-cycle**

#### 7.3.4 Sourcing Strategy (Questions 11b – 17b)

In order to better understand how the public and private sectors were sourcing their construction programs, an average percentage of responses to each sourcing question, sub-question b of questions 11 through 17, was determined. The average percentage of responses was calculated by first calculating the average percentage of responses to each sub-question. The average percentage of responses to each sub-question was then averaged amongst all the percentage of responses for questions 11b through 17b in order to compute the total average percentage of responses to the sourcing questions

As is evident from the average percentage of responses, the public sector respondents tended to use multiple sourcing strategies while the private sector was focused more on selecting from a small group of service providers. The average percentage of responses to each sourcing question is presented in Figure 7.29.



**Figure 7.29: Average Service Providers Used throughout the Construction Process**

## **8.0 PANEL DISCUSSION**

In addition to this thesis, the results of the survey were compiled in another document created by FMI and CMAA that presented the conclusions drawn from the survey results [Bridgers 2006]. This document was then given to each of the attendees of the CMAA National Conference and Trade Show held in Tampa, FL on October 15-17, 2006. The results of the survey were presented at the CMAA National Conference on Tuesday, October 17 and a panel discussion followed the presentation of the survey results. This chapter presents the results of the panel discussion.

### **8.1 Introduction**

The panel discussion occurred during the general session on the third day of the 2006 CMAA National Conference. The session was open to all attendees of the conference. The preceding presentation of the results of the survey required approximately 30 minutes and the panel discussion followed immediately thereafter and lasted approximately 45 minutes. The panel consisted of four panel members and a moderator. The members of the panel were all owners of construction and were all participants in the survey. The information about each panel member is provided below in Section 8.2. The moderator for the panel was Mark Bridgers, a senior consultant with FMI.

The panel discussion followed a question and answer format in which the moderator posed questions to specific panel members. Panel members were then given the opportunity to respond to questions asked by the moderator. Occasionally the moderator would ask the panel member a follow up question based on their response to the previous question. Panel members also had the opportunity to interject comments following another panel member's response if they felt it to be necessary. A short question and answer session followed the panel discussion during which audience members were given the opportunity to pose questions to the panel. Due to time constraints, only three audience members were able to participate. Each of the audience members did not, however, ask a specific question of the



panel, but instead used the opportunity to comment on the issues discussed during the panel discussion. The comments made by the audience members are not included herein.

## **8.2 Participants**

The participants in the panel consisted of four owners of construction of which all had participated in the FMI/CMAA Seventh Annual Survey of Owners. The following provides the background of each of the panel members and a short description of the organization for which they work.

### 8.2.1 Michael R. Adams, P.E. PMP

Michael R. Adams is the Chief Engineer/Director of Engineering for the Port of Tacoma in Tacoma, Washington. The Port of Tacoma is defined as a state agency that operates as an independent municipal corporation. The port comprises 2400 acres comprised of shipping terminals, warehouses, and distributing and manufacturing facilities.

Mr. Adams holds a Bachelor of Science degree in Civil Engineering from Purdue University and a Master of Science in Engineering Management from Boston University. He is a Registered Professional Engineer in Virginia and Washington. Before coming to the Port of Tacoma, Mr. Adams worked for Parsons Brinkerhoff Construction Services.

### 8.2.2 Michael W. Heaton, PE, CCM

Michael W. Heaton joined the United States Department of Veterans Affairs in 1978 where he currently holds the title of project manager. The United States Department of Veterans Affairs is a division of the United States federal government that provides healthcare, burial and other services to America's veterans and their families. The Department of Veterans Affairs is the second largest Federal Department.

Mr. Heaton holds a Bachelor of Science degree in Civil Engineering from the University of Washington. He is a Licensed Professional Engineer in the State of Washington, and a Certified Construction Manager.

#### 8.2.3 Michael W. Regan

Michael W. Regan oversees the “on-site” capital construction program for the D.C. Water and Sewer Authority. The D.C. Water and Sewer Authority is defined as a semiautonomous regional entity. The authority provides retail water and wastewater services to residential and commercial customers in the District of Colombia and the surrounding areas.

Mr. Regan holds a Bachelor of Science degree in Engineering and Environmental Sciences from Notre Dame and also an MBA from Monmouth University. Mr. Regan is a Certified Construction Manager. Before joining the D.C. Water and Sewer authority, Mr. Regan worked for Hanifin Associates in New Jersey on a broad range of construction management projects and claims consulting.

#### 8.2.4 Charles G. Hardy, CCM

Charles G. Hardy is the Deputy Director for the Office of Property Development of the General Services Administration. Mr. Hardy is based out of Chicago, IL and works within the Great Lakes Region. The General Services Administration of the United States Government works as a quasi-landlord for the federal government, providing meeting, office, and other space to the federal workforce. The General Services Administration also incorporates the federal acquisition and procurement force that offers equipment, supplies, telecommunications, and integrated information technology solutions to customer agencies.

### **8.3 Discussion**

The panel discussion provided feedback on the survey results from the four participants that were introduced above. These participants provided their feedback during the open forum format of the panel discussion and also in the written format to the panel discussion

questionnaire that was provided to them prior to the panel discussion. The results of the panel discussion, and those of the responses to the panel discussion questionnaire, are provided in the following sections.

### 8.3.1 Panel Discussion

The panel discussion followed a question and answer format and the results from the discussion are presented in a similar format. The questions are given first followed by a series of bulleted comments that represent the responses from the panel participants. The responses to each question have been paraphrased by the author and are not direct quotes of the panel discussion participants. Identification of the panel member that made each statement is not provided.

#### *8.3.1.1 Question 1*

Where do you see confusion in the construction industry with respect to program management as a management technique? Is the definition used in the survey an accurate definition of program management? If not, what would you change?

- It is a good definition. It certainly is an accurate definition in the general sense. However, my organization has 3 major capital programs and with over 152 medical facilities and cemeteries. The concept of program management changes within each of the major capital programs. Also, at what level are we using the term program management? Is it meant to refer to all of the organization's construction activity, each of the three major capital programs, or each specific project? The question is what is a program? Confusion exists in what we define a program to be, whether that is one project or the program of all 152 facilities in our case.
- It is an excellent definition for program management services, but confusion does exist within the construction industry.
- Program management should not be used as a door to offer more services.

- There is confusion as to what level we should set the program. Where do we lose efficiencies because the program is too large and where do we not maximize our efficiencies because the program is too small?
- The use of the word standardization is too strong of a word to be used in the definition of program management because every project or program is unique and you must adjust. The same methods do not always work. Synchronization is a better word.
- I agree with the definition. Also, I have experienced cases where service providers will try and sell you anything you will buy and they use program management as the vehicle in which to provide these services.

#### *8.3.1.2 Question 2*

Have you seen an increased use of external program managers within the industry in recent years? Where and how were they applied?

- Our firm is looking to acquire some staff augmentation. This is primarily due to the difficulty in finding good people. We have to outsource in order to get good people.
- We have seen a significant increase in the size of our program over the last 3 years. Because of this increase in the size of the program we have seen some staffing changes, but we still look to perform most activities in house. Recently we started to allow the use of construction managers.
- We have begun to outsource a good amount of our project execution activities
- Outsourcing a large majority of our work. We outsource projects individually.

#### *8.3.1.3 Question 3*

In your experience has concentrating your outsourcing with fewer service providers or performing the work in-house had an affect on the management cost of your construction program? If so, was it positive or negative?

- Performance is key in reducing the number of service providers used. Obviously any owner wants to use the best performing service providers. It is difficult to acquire services based on performance because we are a government organization that is restricted by the Federal Acquisition Regulation (FAR) requirements and other regulations. We still will always try to use a small number of strong performing service providers.
- For those within the industry who do not have the capabilities to manage a construction program, such as school districts, then outsourcing makes sense. Organizations with the ability to manage their construction programs should continue to do so and should not look to outsourcing as a solution.
- We have established strategic contracts with design firms, providing them with an indefinite quantity of work. These contracts have worked well and we are expecting to do the same with construction management firms.
- We attempt to establish strong relationships with service providers who are known for being good to the owner. It is up to the owner to establish these relationships. If you treat people fairly as an owner, you can obtain tremendous performance from your service providers.
- The owner has to establish relationships. Usually the owner's representative establishes the relationships. So specific people within each organization may be better at establishing these relationships and may have a better reputation with certain service providers. This makes it difficult to establish strong relationships with all of our service providers because we have a large diverse staff of construction managers and many are older employees. Also, I do believe that the owner has to be honest with the contractor in order to improve their working relationship.

#### *8.3.1.4 Question 4*

What education, training, or other efforts do you believe are necessary to build greater clarity in the definition and use of program management?

- The educational system does not teach collaboration. The idea of collaboration is something that should be pushed into the educational institutions.
- We need to move to leveraging the combined intellectual capabilities of all parties involved in the construction process.
- Currently in construction contracts mandate relationships. This should not be the case. People should establish these relationships.
- There needs to be greater knowledge of the industry and what it is program and construction managers do.
- Managing and developing a team is not taught, it is forced by contracts. How to manage and develop a team is a skill set that needs to be developed in college.
- Organizations like the Construction Managers Association of America have the ability to take the lead on education within the industry.

#### *8.3.1.5 Question 5*

What functions would you expect or do expect an external program management service provider to perform?

- Many firms that are selling me program management services send a marketer. I want to see the project or program manager selling the service. I want to interact with the person who is going to be directly responsible for the project or program.
- Many firms will try and sell me general services without asking me about my program and my needs.
- We are not seeing any innovation in the services being offered.

#### 8.3.2 Completed Questionnaires

Along with answering the questions in the open forum used during the panel discussion, the participants were also provided with the panel discussion questions beforehand. The respondents were asked to formulate answers to these questions and return their completed questionnaires to the moderator of the panel discussion. Three of the four participants in the

survey completed parts of the questionnaire prior to the panel discussion. Their answers to the completed questionnaire are included in the following sections. The names of the panel members have again been removed, but the answers have been taken verbatim from the respondents completed questionnaires.

#### *8.3.2.1 Question 1*

Where do you see confusion in the construction industry in regards to program management as a management technique? Is the definition used in the survey an accurate definition of program management? If not, what would you change?

- I don't believe there is confusion in the concept, only in the execution. Some firms view program management as a "door opener" to more lucrative design contracts, not as the end product.
- The definition is accurate at the Port of Tacoma.
- The definition in the survey is an accurate theoretical definition, but the actual application of Program Management varies so much from owner to owner that it is almost impossible to give a "working" definition based on "what's out there."

#### *8.3.2.2 Question 2*

Have you seen an increased use of external program managers within the industry in recent years? Where and how were they applied?

- We have seen an increased use of external program managers at Tacoma over the last two years. I believe it's due to the current construction boom in the Northwest and the scarcity of qualified individuals.
- We currently have about 25% of our projects managed by non-Port employees.
- I have no real knowledge of a general trend one way or the other, but my assumption would be that it is on the rise, and still evolutionary for many Owners. My assumption is based on the notion, perceived or real, that Program Management is an appropriate response to the complexity of the construction industry and the

increasing exposure to legal concerns with capital improvement projects. As these factors continue to grow in relevance, and as project costs continue to grow, then the capital improvement programs may start crossing the “threshold” for many owners, past which they believe Program Management is worth the cost.

#### *8.3.2.3 Question 3*

In your experience has concentrating your outsourcing with fewer service providers or performing the work in-house had an affect on the management cost of your construction program? If so, was it positive or negative?

- Successful Program Management is based on relationships. The more the owners (and their program managers) consistently do the right things in managing projects, (i.e. not being a “stinky client” see ENR editorial from Oct 2006, 400 largest Contractors issue), the better their relationship and reputation will be in both the consultant and contractor community. For example, we had a recent project where the ‘outsourced’ PM managed the project to completion, on-time, and on-budget with no problems at close out. A second project was bid about six months later with the announcement that the same PM would be in charge. The low bidder on the second project was the same contractor as on the first project. They also left about \$500k on the table for a \$12 million project. During the post bid analysis, when asked why were they so much lower, the response was “We knew Jim was going to be in charge and we knew he would be fair and the Port would back him up, hence we came in with a lower than normal contingency.” In this case, while the PM costs were higher, the overall project cost was significantly lower.
- It takes time and successful projects to develop relationships. Performing the work “in-house” or with the same “outsourced” PMs allows that relationship to develop and grow in the consultant/contractor community and will result in lower project costs. It’s also a lot more fun.



- We do use a small group of providers in our outsourced services (PM and CM). Just based on the familiarity with our goals from a process standpoint as well as our administrative operations, I think that's a benefit to us.

#### 8.3.2.4 Question 4

What education, training, or other efforts do you believe are necessary to build greater clarity in the definition and use of program management?

- Program Management is another tool for use by owners. Education of the consulting community will probably result in the opportunity for that consultant to help an owner see the benefits and take advantage. The same for Construction Management. I'm not aware of any "off-shoring" issues.
- Education
  - Teach Collaboration and Teamwork
  - Encourage combined problem solving
  - Financial Side...it is all about the asset
- Training
  - Leadership
  - Technology
- Other
  - Owner Leadership
  - Integrated Project Structure
  - Open Information Sharing
  - Technology

#### 8.3.2.5 Question 5

What functions would you expect or do you expect an external program management service provider to perform?

- An external program manager provides an extension to our staff and performs the

same functions as employees with the exception of presentations to our elected Commission. Our experience has been that after a few months at work, it is very difficult to tell the employees from the consultant program manager. As such, we interview and “hire” the program managers in a very similar manner to how we hire regular employees. We pose only three questions: (1) Can they do the job? (2) Will they do the job? And (3) Will they fit in with everyone else? Because of their role as a Port representative, it’s key that they learn and then act in accordance with our “culture.”

- Ideally, external program managers would spear-head the entire process from meetings with the Owner to establish needs, and to developing concepts for a capital program, that extends through design, procurement, construction, and close-out. My experience is that a consultant is going to perform as many services as you will let them! Realistically, owners sometimes set the parameters (and limits) for the program manager’s services. At DCWASA, our “Program Management” movement arrived in 1996, after Construction Management was already in place since the 1980’s. In the interest of keeping CM separate, and managing the cost and duration of the “Engineering Program Management Consultant (EPMC)” contracts, we limited the scope of their services to concept development, design, and procurement. Their involvement remained during construction, but with no actual relationship or authority over the CM process. This is just an example of how the evolution of PM is sometimes subject to the evolution of the Owner’s management concepts, and can prevent the real “theoretical” application of Program Management.

#### **8.4 Summary**

The panel discussion provided some key insights into the results of the survey and also helped to shed some light on the problems associated with the understanding of program management and its use. Three main concepts that were discussed during the panel discussion are as follows:

- Clarification of the definition and use of program management

- Establishing relationships with the service providers used in a construction program
- Education of the industry on the topic of program management

By providing both feedback to the panel discussion questionnaire and participating in the panel discussion, the participants provided their experience with the use of program management from an owners perspective. The following sections summarize the conclusions drawn from the results of the feedback to the questionnaire and the panel discussion.

#### 8.4.1 Definition and Use of Program Management

All the participants in the panel accepted the definition used for program management in the survey instrument. Many agreed that it was an acceptable definition, however some of the participants felt that it was a difficult concept to define and that while the definition was good it was extremely general. Because of the diversity of projects within the construction industry it is difficult to create a succinct definition for any of management techniques used within construction management. The current definition by CMAA for construction management, another management technique in construction, is also very general in nature. The definition for construction management provided by CMAA reads as follows, “Construction Management is a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost and quality” [CMAA 2006].

The panel tended more to focus on the issue that the understanding of program management within the construction industry was not its definition but instead the focus was on the services offered within program management and on the size of a construction program. Service providers are using the concept of program management to be able to try and sell the owner a broader range of services that they may or may not be able to provide. Standardization as to what services a program manager should provide needs to exist and question 10 of the survey addressed this issue. The results of question 10 can be found in Section 6.10. A majority of the respondents to question 10 of the survey instrument felt that the following services should be offered by a program manager:

- Construction oversight
- Design oversight
- Pre-design planning
- Procurement oversight
- Post-construction services
- Construction performance
- Design performance

The services presented above should be provided by anyone offering program management considering each was selected by an overwhelming majority of the survey respondents. A deviation from the services provided above (or additional services offered such as land acquisition and operations and maintenance) should be something the owner asks for and not something the program management service provider is trying to sell.

Along with the services offered by program managers, the panel discussion participants also had an issue with the size of a construction program. The issue arose as to what should be considered a program. Questions such as: how large is a program, how large should it be, and is it one project or multiple projects all arose during the course of the discussion. The issue of what constitutes a construction program was also discussed at the program management focus group meeting described in Section 5.1.1.2. A consensus was reached at the program management focus group meeting that a construction program is typically multiple projects, or one very large project with multiple phases. In the end the conclusion reached by the panel discussion was in line with that of the one reached by the focus group on what constitutes a construction program.

#### 8.4.2 Relationships with Service Providers

The panel participants addressed the issue of creating relationships with service providers even though this was not specifically addressed in one of the questions presented to the panel. Question 3, which read as follows, “In your experience has concentrating your

outsourcing with fewer service providers or performing the work in-house had an affect on the management cost of your construction program? If so, was it positive or negative,” prompted the panel to begin a discussion of how the relationship between the service provider and the owner can improve efficiency and reduce cost.

Many on the panel felt that it was the owner’s responsibility to establish the relationships with specific service providers, and that this relationship would strengthen on the basis of quality work by the service provider and fair treatment of the service provider by the owner. Also, the panel felt that reducing the number of service providers allowed for them to have a better knowledge of the owner’s goals, operations and processes. This improved knowledge would allow for the service provider to be more productive and produce the expected outcome.

Another issue addressed by the panel on the idea of establishing relationships with service providers was that of how these relationships are formed. Many of the panel participants felt that the industry has traditionally utilized contracts to establish the relationships between all parties involved with the construction process. But in doing so the contractual relationships that are established between all parties within the construction process have typically lead to adverse relationships. Many on the panel felt that better collaboration within the industry was needed and that the current contractual relationships that are typically used are the source of the problem. Panel members felt that the owner is responsible for establishing the relationships with their service providers.

#### 8.4.3 Education of the Industry

The education of the construction industry on the concept of program management was another topic addressed during the panel discussion. The participants in the panel already expressed concerns with the use of program management, the size of a construction program, and collaboration within the construction industry. The issues of concern by the panel were also issues that many of the participants felt should be addressed by educating the industry. The teaching of collaboration and how to build and manage a team were two issues that the

panel felt should be taught by educational institutions. Many felt that those entering the industry lacked this important skill set that was needed to be a successful construction or program manager. The panel also felt that organizations such as CMAA also have the ability to educate the industry on the misconceptions of program management.

## **9.0 DISCUSSION**

The survey respondents to the FMI/CMAA Seventh Annual Survey of Owners well represented the non-residential construction owner population within the United States. Combined, the respondents accounted for 13 percent of the annual construction spending that occurred in non-residential construction in the United States and reported starting an estimated 26,000 projects annually. The respondents to the survey came from a diversified group of market sectors and company classifications. Due to the diversification and size of the survey population, the results and subsequent conclusions of the FMI/CMAA Seventh Annual Survey of Owners provides a broad representation of program management and its use within the United States non-residential construction industry.

The results of all responses to the survey were presented in Section 6.0. A breakdown of these results by public and private firms was presented in Section 7.0. After a review of the results from the survey a series of conclusions were drawn. The conclusions are presented by topic. The topics included are related to program management and were addressed within the survey. These topics include:

- Program management definitions
- Construction program size
- Internal capabilities and performance of work in-house
- Outsourcing
- Sourcing strategy
- Management costs
- Program management fees
- Hiring an external program manager

The diversification of the survey respondents was used to perform further analysis of the survey data by segregating the data based on certain demographic criteria. The conclusions drawn from the analysis of the survey data based on the demographic factors of each respondent are included within in each topic and are not separated from the conclusions

drawn from the overall results of the survey. The conclusions to the FMI/CMAA Seventh Annual Survey of Owners are presented in the following sections.

### **9.1 Program Management Definition**

Program management has many meanings throughout the construction industry and because of the lack of standardization, applying a definition to program management is difficult. The definition of program management created for use in the survey instrument was a modification of the original definition of program management given by CMAA. The modification to the definition was completed and agreed upon by all members of the program management focus group (the focus group is discussed in Section 5.1.1.2). The definition used in the survey was also accepted by all members of the panel discussion. The definition read as follows:

*Program management* is the unified management of a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management principles are used to integrate the different facets of the construction process - planning, design, procurement, construction, and activation - for the purpose of providing standardized technical and management expertise on each project.

The definition presented above is an acceptable definition for program management as is evident by its suitability to both the focus group and the panel. However, it has some deficiencies.

The deficiencies primarily relate to the broadness of the definition and the size of a construction program. The definition does not explain in detail the roles and responsibilities of a program manager it simply lists the facets of the construction process for which the program manager is involved. Also, the definition poorly defines at what level a program should be set (or how many projects compose a construction program). It only states that a program is made up of one or more projects. If one project can be considered a program then



how big does that project need to be? Parameters should be set as to the size of one project or the number of other projects needed to define a construction program. While a more detailed definition may need to be developed, this may not eliminate the confusion associated with program management.

In order to aid in not only defining program management, but also in defining the role of the program manager, it is helpful to focus on the functions that a program manager should be performing. It is important for both the owner and the program management service provider to be assured of the services being offered through a program management relationship. A list of functions that should be performed by a program manager as selected by the survey respondents is presented below. The list is presented in order of importance indicated by survey results (see Table 6.14) and not by construction sequence. The list includes the percentage of respondents, in parenthesis, that felt the function should be performed by a program manager.

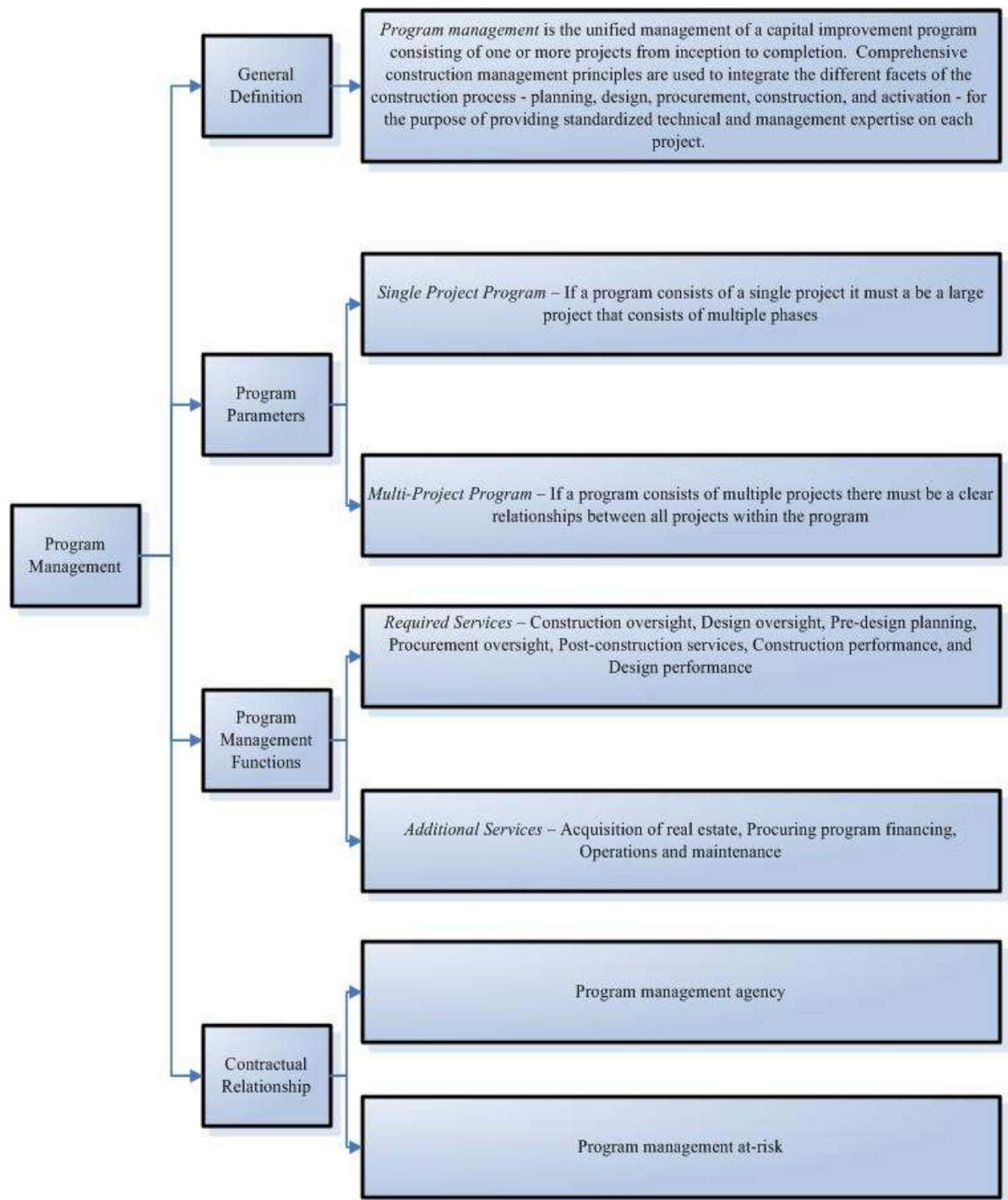
- Construction oversight (92.3%)
- Design oversight (86.3%)
- Pre-design planning (85.1%)
- Procurement oversight (82.1%)
- Post-construction services (78.0%)
- Construction performance (71.4%)
- Design performance (62.5%)

Three other functions to be performed by a program manager were only considered to be required by a minimal number of the survey respondents. These functions are:

- Procuring program financing (36.3%)
- Acquisition of real-estate (26.8%)
- Operations and maintenance (17.9%)

Procuring program financing and acquisition of real-estate are both classical front-end services and are typically performed internally by the construction owner. Operations and maintenance is a back-end service and is also typically performed internally by the construction owner. While each of these functions is performed internally a majority of the time, it is still possible for the services to be a part of those offered by a program manager. However, the owner should request these services.

Overall, defining program management concerns four attributes. The definition proposed in this thesis has been proven to be a broad general definition of program management but it alone is not sufficient in defining program management. Along with the definition, a series of parameters on what level to set a construction program should be developed, a list of functions to be performed by a program manager should be included, and the contractual relationship should be identified. The multifaceted definition of program management proposed herein is presented in Figure 9.1, and should be considered by the construction industry as an aid in reducing the different applications associated with program management services. This definition should be used in place of other definitions that exist within the construction industry including those by CMAA and other professional organizations.



**Figure 9.1: Multifaceted Definition of Program Management**

## **9.2 Construction Program Size**

Questions were asked within the survey instrument that were directed at determining the size of a construction program based on both the number of projects started each year and either the amount of money spent on construction or the annual construction spend. The following sections provide a discussion on the results of the questions related to the size of a construction program.

### **9.2.1 Number of Projects**

A majority of the construction programs that responded to the survey (90 respondents = 54 percent) performed between 6 and 50 projects per year (see Figure 6.2). The largest programs (by number of projects annually) within this survey were found to be publicly traded stock corporations that also perform more than one billion dollars in construction annually.

Eight percent (14 respondents) of the respondents to the survey reported performing more than 500 projects per year. Of the 14 respondents that reported performing more than 500 projects per year, 10 of these respondents also reported an annual construction spend of over 1 billion dollars. One explanation for the large number of projects is the type of firm performing this construction. Of the 14 respondents that reported performing more than 500 projects per year, 9 of these respondents also classified their firm as a publicly traded stock corporation.

### **9.2.2 Construction Spend**

A majority of the construction programs that responded to the survey (98 respondents = 58 percent) reported spending between \$25 and \$500 million on construction annually (see Figure 6.3). No trends in the demographic characteristics of the construction programs that spend between \$25 and \$500 million were found in this survey.

The largest construction programs by amount of annual construction spend are publicly traded stock corporations who perform work within the energy and manufacturing market sectors. These respondents perform projects related to energy generation and distribution or large processing and manufacturing facilities including automotive manufacturing plants. Of the 21 respondents (12.4 percent) that reported an annual construction spend of over one billion dollars per year, 15 classified their firm as a publicly traded stock corporation. Also 14 of the 21 respondents reported working within the energy or manufacturing market sectors or both.

### 9.2.3 Public and Private Owners

A comparison of the public and private respondents to the survey revealed a large differential in program size both in number of projects started each year and in annual construction spend. The private sector respondents typically performed far more projects per year than the public sector respondents. The public sector had an average of 102 projects started each year per respondent while the private sector had an average of 228 projects (2.2 times that of the public sector) started each year per respondent (see Tables 7.11 and 7.12).

The differential in program size based on annual construction spend was also great. The public sector respondents spent an average of \$261 million annually on construction as opposed to the \$693 million (2.7 times that of the public sector) spent on average by private sector respondents (see Tables 7.13 and 7.14).

The percentage make up of total annual construction spend by the public and private sector for the survey was found to be 73 percent private and 27 percent public. Considering that the split of public and private construction within the United States is approximately 80 percent private and 20 percent public, the public and private differentials determined from the survey are closely in-line with industry statistics.

The average project size however for the public and private sectors was similar. The average project size, rounded to the nearest hundred thousand, was found to be \$2.6 million

(\$261/102) and \$3.0 million (\$693/228) for the public and private sectors respectively. The agreement was due in part to the correlation in the amount of projects performed and the annual construction spend.

### **9.3 Internal Capabilities and Performance of Work In-House**

The organizations responding to the survey appeared to be using the capabilities of their construction programs appropriately. Respondents to the survey instrument who reported their construction program as having strong internal capabilities also reported performing a large majority of the management of their construction in-house. The organizations that reported having weak internal capabilities also reported outsourcing a large majority of the management of construction.

This appeared to be true for both the public and the private sector respondents. However, a series of outliers were evident in the public sector respondents in which the respondents reported having weak internal capabilities, but still performed a large majority of the management of construction in-house (see Figure 7.27).

A further review of the outliers from the public sector revealed that only three respondents from the public sector rated the internal capabilities of their construction program as weak. Of these three respondents, one respondent reported performing 80 percent of the management of construction in-house and one respondent reported performing 100 percent of the management of construction in-house (see public response totals for a capability rating of 2 in Figure 7.27).

A comparison of the demographic data for the two respondents showed no similarities (see survey data for respondents 94 and 163 in Section 12.3). It is possible that both respondents misunderstood either the question, and thus their responses were affected. However, it is also possible that because both of the respondents are public organizations, they are forced, by certain laws or regulations, to perform a large percentage of the management of

construction in-house. Due to budget constraints and possibly poor management, these organizations do not have the staff to handle the large work load adequately.

While firms responded to the survey as having the internal capability to perform all of the management of construction in-house, some still outsourced at least a small portion of the management of construction. Of the firms that rated their internal capabilities the highest, the average amount of outsourcing was still about 10 percent. On the opposite end of the spectrum were the firms that reported having minimal internal capabilities. Of the firms that rated their internal capabilities the lowest, the average amount of outsourcing was still about 70 percent. So while some firms have the capability to perform all of the management of their construction in-house, they still outsource a small portion of the work, and while some firms who do not have the capability to manage any portion of the construction process they still perform a portion of the work in-house, some a great deal.

## **9.4 Outsourcing**

Outsourcing was used in all phases and activities within the construction life-cycle that were addressed in the survey. The conclusions related to outsourcing within construction are presented in the following sections.

### **9.4.1 General Outsourcing Data**

Three particular functions within the construction life-cycle are of interest because of the amount of outsourcing reported for each function. These functions are:

- Design performance
- Construction performance
- Operations and Maintenance

Industry perception and past research (including that presented within this paper) have shown that the performance activities are heavily outsourced because of the tremendous amount of

resources, both in people and assets. They are also clearly defined and delineated activities whose responsibilities can be made clear. The survey results confirmed that the performance of design and the performance of construction were by far the most heavily outsourced of the activities and phases surveyed (see Figure 7.28). For a corporation or organization whose main business is not construction it is difficult to internally maintain the staff and resources needed to perform design and construction services in-house. While the outsourcing of the activities associated with the performance of design and construction was close to 75 percent, the outsourcing of all other activities ranged from 30 to 40 percent.

The outsourcing of operations and maintenance activities was the lowest at just below 30 percent. Most organizations are choosing to perform the large majority of the maintenance and operations activities in-house. While some firms do outsource a small portion of this activity, it is more than likely that they use an external firm to handle their janitorial services and nothing else. This conclusion is supported by the Arditi and Nawakorawit study which stated that, “The staffs used in cleaning the interior and the exterior are mostly obtained by full outsourcing” [Arditi and Nawakorawit 1999].

There is room for increased outsourcing (see Figure 7.28) within the activities related to the management of construction. These include

- Pre-Design
- Design oversight
- Construction oversight
- Activation

As construction becomes more specialized and complicated, and the cost for an internal construction management staff increases as a result, the outsourcing of pre-design, design oversight, construction oversight, and activation will more than likely increase. Service providers, especially construction managers, will begin to market themselves as specialized firms with both the ability to work within specific market sectors (such as energy, education,



healthcare), and the ability to perform specific functions throughout the construction life-cycle including each function discussed within this thesis.

#### 9.4.2 Public and Private Owners

An analysis of the outsourcing data collected in the survey was also performed by segregating the respondents as either a public or private organization. Reviewing the overall outsourcing totals for each activity addressed in the survey, minimal differences were found in the amount of outsourcing performed by the public and private sector (see Figure 7.28). Regulations such as the Federal Acquisition Regulation (FAR) make it difficult for public organizations to outsource management and other value added services in which a fixed price is difficult to ascertain. The public sector however performs nearly the same percentage of outsourcing activity related to the management of construction as does the private sector. The public sector performs more of the pre-design and activation activity through outsourcing than does the private sector.

#### 9.4.3 Outsourcing Trends

The CCIS study [Gibson et al. 2001] on outsourcing that was discussed in Section 4.1.1 reported the average outsourcing rate of pre-project planning and design over the period of 1994 to 1998 to be 20 percent and 80 percent respectively. Considering the outsourcing data obtained in this survey in 2006 it appears that the outsourcing of design may have decreased slightly, by 2.9 percent (80.0 – 77.1). However, a 2.9 percent decrease is more than likely not statistically significant. The outsourcing of pre-project planning, or the pre-design phase as it is referred to in this survey, increased considerably from only 20.0 percent between 1994 and 1998 to 32.3 percent in 2006.

A comparison of the CREM study [Bon & Luck 1999] (Section 4.1.2) does not support this conclusion however. The CREM data showed a decrease in the management functions performed in-house by corporate real estate managers. Table 9.1 compares the outsourcing data of this thesis and of the CREM study.

**Table 9.1: CREM Study Outsourcing Rates**

<b>Function</b>	<b>CREM Study</b>	<b>Thesis</b>	<b>Difference</b>
<b>Design Management</b>	50.5%	30.9%	-19.6%
<b>Construction Management</b>	42.3%	39.6%	-2.7%
<b>Maintenance Management</b>	44.2%	23.7%	-20.5%

The CMAA/FMI survey found less outsourcing in all categories. The reader should note however that the data contained within the CREM study was questionable due to the lower response rate. Due to the conflicting results from the CCIS study and the CREM study, it is difficult to draw definitive conclusions about outsourcing within the construction industry over the past ten years.

## **9.5 Sourcing Strategy**

The strategies employed when procuring or hiring a service provider are essential in obtaining a fair price, good quality for the owner, and certainty that the needed services are obtained. This section discusses the conclusions determined from the research on the sourcing strategy employed by the survey respondents.

### 9.5.1 Number of Service Providers

The sourcing strategies employed by all respondents varied widely. For most of the construction functions studied in this thesis, the largest group of respondents consistently reported selecting from a small group of service providers (see Figures 6.8, 6.10, 6.12, 6.14, 6.18, and 6.20). The one function that varied from this trend was the performance of construction. For the performance of construction, the largest group of respondents reported selecting from multiple service providers when sourcing the performance of construction (see Figure 6.16). It should be noted that multiple service providers means more than four. No further conclusions about the number of service providers beyond being greater than four can be drawn.

### 9.5.2 Contract Type

Considering the different types of procurement techniques employed at each stage within the construction process the results that were obtained were to be expected. Management services are typically acquired through a negotiated contract that includes a percentage fee-based structure. It is typical in a negotiated contract that the number of service providers the owner is selecting from is very limited.

The performance of design occurs typically through a percentage fee contract as well and thus the selection of a design firm follows the same sourcing strategy as those employed for the acquiring management services.

The performance of construction has historically been acquired through a low-bid contract and this contract structure still dominates many market segments. In a low-bid contract arrangement, the typical criteria for selection of a service provider is price. In this environment a large number of service providers typically vie for the same project creating a selection pool larger than the ones used to select service providers for fee based contract structures.

### 9.5.3 Public and Private Owners

When the data was segregated by public and private organizations some significant trends were observed. The organizations that were classified as public used multiple sourcing strategies. The two sourcing strategies used most often by public firms were to always select a different service provider and to select from a small group of service providers (see Figure 7.29).

The number of public respondents who reported selecting from a small group of service providers is consistent with the idea that the public organizations appear to be changing over the years away from the idea of taking multiple bids for every phase of the construction process and moving towards establishing relationships with at least a limited number of

service providers (see response totals for selecting from a small group, frequently selecting the same service provider, and always using the same service provider for the public sector in Figure 7.29). It has been a perception within the construction industry that heavily regulated public construction owners have relied on multiple bids to procure construction services while private construction owners have been more progressive in developing relationships and alternate project delivery methods and management techniques. While this is true, the survey data supports the idea that the public sector is beginning to utilize the advantages of using the same service provider from project to project to the overall management costs of their construction program.

The organizations that classified themselves as private employed the sourcing strategy of selecting from a small group of service providers a majority of the time. Considering the restrictions placed on the public respondents, the results are in line with industry perceptions. The private sector is taking advantage of greater restrictive freedom in staffing the different phases of construction by narrowing their selections down to a small group of service providers.

What is interesting to note though is that neither the private nor the public firms appear to developing strong relationships with a single service provider. In recent years within the construction industry there has been a movement to establish what are labeled strategic alliances. As was noted in Section 4.2.3, researchers have even stated that strategic alliances will be necessary in the management of construction programs [Holt et al. 2000]. While the depth of the relationships between the owner and service provider is difficult to ascertain with the data from the survey, it can be reasonably assumed that if an owner always uses the same service provider that a strategic relationship has been developed and quite possibly a strategic alliance.

The findings of this survey do not support this conclusion. The data from the survey does not support the idea that owners are pushing more for strategic relationships and strategic alliances. Only 1.5 percent of the time a private organization used the same service provider

to staff the different phases and activities within the construction process (see response totals for private in Figure 7.29). Public firms appear to be more accustomed to trying to establish these strategic relationships, by always using the same service provider by reporting using the same service provider more often, 3.6 percent (5.1 – 1.5) than the public sector (see response totals for public in Figure 7.29). However, this difference is likely statistically insignificant.

## **9.6 Management Costs**

A significant difference in the management cost of the construction process existed between the public and private organizations taking part in the survey. The management cost for those in the private sector was 3.6 percent greater than for those in the public sector.

Considering that the difference in the amount of outsourcing performed by public and private firms is minimal, little or no impact on the difference in management cost of a construction program would be attributed to the amount of outsourcing (see Figure 7.28). However, given the fact that the difference in how programs are staffed is considerable (see Figure 7.29), it is possible that an impact on the management costs of a construction program might be attributed to how the functions within the program are procured.

Other factors that might cause the differences in management cost should also be considered. One possible reason is lower wages in the public sector for internal construction management staff as opposed to the more competitive private sector. Several other factors to consider include:

- The public sector is incorrectly estimating their true costs and thus they are underreporting their overall management costs.
- The difference in management costs may also be simply a willingness of the private sector to spend more on the management of the construction process.

## **9.7 Program Management Fees**

The average fee for hiring an external program manager was found to be 6.0 percent of the total program costs. A review of the private and public fee data indicates a large difference in the fees paid for an external program manager. The private sector reported an average fee of 6.8 percent when hiring an external program manager as opposed to 5.4 percent reported by the public sector respondents. The higher fees reported by the private sector respondents possibly resulted from the legal limits on the fees for the public sector.

The issue of higher program management fees, however, could be due to a lack of standardization throughout the construction industry. The functions that are performed by a program manager differ greatly throughout the construction industry. Without knowing the exact functions associated with each fee reported, it is difficult to determine whether or not the fees are reasonable. The difference in fee totals found in this thesis conveys the fact that it is difficult to determine an appropriate fee for program management services when the services offered under the umbrella of program management are not standardized. Owners within the construction industry struggle with the same issue. Without a standardized definition for program management and an agreed upon set of functions to be performed by a program manager it is difficult for owners to determine if they are getting a fair price when procuring program management services.

## **9.8 Hiring an External Program Manager**

When an owner seeks to procure the services of an outside firm to operate their construction program, they are in essence procuring program management services. When procuring program management services an owner must consider several issues. Two of the main issues, the fee and the functions a program manager should perform, were discussed previously in this chapter. Several other factors are to be considered and these include:

- The type of firm providing the program management services
- The criteria for selecting a specific program manager

- The organizational model or relationship between the owner and the service provider

#### 9.8.1 Type of Firm

When not using internal staff to manage their construction program, respondents used a construction management firm most often the survey indicates (see Figure 6.21). The second most frequent choice for help was through the use of a program management firm. Program management should be considered to be a different service than construction management and owners should look to firms with experience in managing the entire construction program. Those firms who specialize in construction management, but have experiences only on construction projects rather than construction programs, may not be capable of managing a construction program.

Of the public and private respondents to the survey, the public respondents appear to be more progressive in their use of program management firms to manage their construction programs as opposed to using construction management firms (see Figure 7.25). Private respondents, on the other hand, are still more likely to use a construction management firm to manage their construction program. Perhaps this may be accounted for through historical relationships private owners have established over the years with construction firms. Such private owners anticipate that those construction firms who have successfully met their needs over many years can evolve to providing a new service in a satisfactory manner. However, this may not be the case.

#### 9.8.2 Selection Criteria

When undertaking the hiring process of an external program manager, the criteria used for selecting the right service provider is extremely important. The criteria considered most often in selecting a program management service provider, as indicated by the survey respondents (see Table 6.35), were:

- Experience with similar projects and programs

- Projects and programs consistently delivered on time
- Individual lead program manager

None of the factors considered most often were related to cost. In fact the lowest rated criteria or factors considered when selecting a program management service provider were those related to cost. By low ratings of the factors related to cost, this demonstrates that owners see program management as a value added service and not a cost of commodity service (Procuring construction as a cost of commodity is when an owner focuses on the finished product and overall cost instead of the services offered.).

The criteria or factors most often considered by the public and private sector respondents followed the same general trends as those for the entire survey population. The rating of one factor did however differ greatly between public and private respondents with respect to hiring. The public sector considered safety or the safety record of the service provider to be far less important than did the private sector respondents (see Table 7.25). The issue of safety is extremely important within the construction industry overall when considering the ethical and legal issues related to managing a safe construction program. Also, it is widely considered that a safer construction program is a more cost effective construction program, especially when considering workers compensation insurance and fines and lost time due to injuries or death.

Because of the importance placed on safety in today's construction industry, the fact that the public sector does not consider the safety record of the program management service provider as important as other factors is somewhat perplexing. However, the legal environment associated with public and private construction should be considered. Many public organizations cannot be sued, while private organizations must constantly be wary of the threat of lawsuits. Without the threat of lawsuits related to the safety of the construction program, public construction owners may place more importance on other criteria when hiring an external program manager.



### 9.8.3 Organizational Model

An owner should also consider the relationship or organizational model that will be established between themselves and the external program manager. Two organizational models are by far the most commonly used within the construction industry: owner led with program manager providing staff support and an integrated owner and program management team (see Figure 6.22). Both of these models allow the owner to retain control of their construction program. Very few owners are willing to relinquish control of their construction program through a program management consultant led relationship or a program management at-risk relationship.

It is also important to note that only 1.8 percent (3/170) of the respondents to the survey reported using a program management at-risk model (see Figure 6.22). An at-risk contractual relationship is rarely seen when hiring an external program manager and it is heavily disputed as to whether or not a true at-risk relationship can even exist and still be defined as program management. Program management is considered by many within the industry to be a management technique and not a delivery method. Program management at-risk is a delivery method and not a management technique. However, the fact that some of the respondents did report using a program management at-risk relationship demonstrates that some within the construction industry believe that a program management at-risk model is possible and are using it in practice.

Finally, when the survey results were segregated by the public and private respondents, it appeared that the majority of respondents in both sectors were using an owner led with program manager providing staff support or an integrated owner and program management team. However, 8.7 percent (11.1 – 2.4) more of the public sector respondents reported using a program management consultant led relationship than the private sector. In a program management consultant led relationship, the construction owner relinquishes control of their construction program. The higher number of public sector responses may have been related to cost. The public sector may have felt that handing over the control of the program to a consultant was less expensive than having internal staff retain control.

## 9.9 Conclusions

A discussion of the findings of this thesis is presented in detail in the previous sections. A list of the conclusions extracted from the discussion presented previously is given in bulleted form below. The conclusions are numbered. The number relates the conclusion with the corresponding reference in Chapter 10.0. The summarized conclusions are as follows:

1. A multifaceted definition for program management that included the general definition, the program functions, the program parameters, and the contractual relationships was determined from the research of this thesis.
2. The typical construction program for this survey performs between 6 and 50 projects per year and spends between \$5 and \$500 million on construction annually. The largest construction programs by number of projects started per year and annual construction spend are typically publicly traded stock corporations.
3. The average private sector construction program for this survey performs far more projects per year and spends more on construction per year than does the average public sector construction program. The amount spent on construction per year by the public and private sectors was consistent with national averages. The average project size, however, for the public and private sectors was similar.
4. The respondents to the survey appeared to be using the internal capabilities of their construction programs appropriately, but the private sector appeared to be using their capabilities more appropriately than the public sector.
5. Even though many firms rated their construction programs as having the ability to manage the entire construction process, on average they still outsourced ten percent of the management of the construction process. On the other hand the firms that rated their construction programs as having a minimal ability to manage the construction process, still on average performed 30 percent of the management of the construction process in-house.
6. The performance of design and construction were by far the most heavily outsourced of the functions and phases surveyed. The outsourcing of all other functions and phases ranged from 30 to 40 percent.

7. Due to the conflicting results from the CCIS study and the CREM study, it is difficult to draw trends about outsourcing within the construction industry over the past ten years.
8. The largest group of respondents to the survey consistently reported selecting from a small group of service providers to staff the phases or activities within the construction process. The public sector respondents used multiple sourcing strategies while the private sector typically selected from a small group of service providers when sourcing the phases of construction.
9. Few construction owners appeared to be moving towards establishing strategic relationships with their service providers.
10. There is a significant difference in the management cost of the construction process, with the private sector spending a larger percentage on the management of the construction process than the public sector.
11. The average fee for hiring an external program manager was 6.0 percent. The private sector reported paying a higher average fee for hiring an external program manager than the public sector.
12. A construction management firm was used most often to manage a construction program. The public sector respondents appear to be more progressive in their use of program management firms to manage their construction programs.
13. The criteria considered most often when hiring an external program manager related to past experience with similar projects and programs. The criteria considered the least by the survey respondents was related to cost. By low ratings of the factors related to cost, this demonstrates that owners see program management as a value added service and not a cost of commodity service.
14. The two organizational models most typically used when incorporating an external program manager are: owner-led with the program manager providing staff support and an integrated owner and program management team. It appears, however, that there is a disagreement on the possible contractual relationships of program management, especially with respect to the concept of program management at-risk.

## **10.0 RECOMMENDATIONS**

Several recommendations to the construction industry were developed from the findings of this research. In addition, due to the broad range of conclusions developed from the high-level analysis, additional detailed analysis of the survey results is feasible. The recommendations based on the research within this thesis are divided into two categories: recommendations for practical applications and recommendations for further research. To aid the reader, the number of the conclusion that corresponds to each recommendation is given in parenthesis following the recommendation. Occasionally, multiple numbers associating a recommendation to multiple conclusions are given separated by commas. This will aid the reader in linking the conclusions to the recommendations.

### **10.1 Recommendations for Practical Applications**

It is apparent that currently within the construction industry there are many concepts on what specifically is program management. Clarification of the concept is important for its future use.

Construction should work to develop standardization within the industry as to a clear understanding of the concept of program management, and professional organizations within the construction industry should assist in this endeavor. The Construction Management Association of America has positioned itself as the leading organization for both construction managers and program managers. The main responsibility of the task of standardizing the use of program management as a management technique within the construction industry could fall to CMAA or it could fall to the Construction Industry Institute (CII) who has extensive experience in such a study (1).

A multifaceted definition for program management was developed from the research in this thesis and that definition should be used in standardizing program management. The definition created from this research should replace previous definitions provided by CMAA and other organizations. The role of a program manager should be clearly

defined as well. It is important for owners and service providers in the construction industry to have clarity on the services being offered under the umbrella of program management (1).

Beyond simply defining program management, an extensive manual that covers all aspects of the concept of program management should be developed. This manual should be similar to the one developed by CII for materials management. Materials management was a topic within construction that was not clearly defined similar to program management. CII developed a valuable manual to aid in the understanding, implementation, and use of materials management. A manual for program management would be of similar value to the industry. This manual can then be used as an aid in teaching the concept of program management to university students obtaining a degree in construction engineering or management.

By teaching and standardizing the services provided by a program manager, the public will be more apt to accept program management as a management technique for use in construction. It has historically been difficult to push the public sector in the direction of new and innovative management and project delivery methods, but if the service is clearly understood and defined it will remove some of the apprehension behind procuring program management services.

The research data appears to show that the use of strategic alliances does not appear to be occurring at the rate the industry perceives. By creating strategic alliances with those service providers who perform quality and efficient work, owners are able to reduce overall management and performance costs. The construction industry is looking for owners to take the lead in establishing improved relationships between all parties of the construction process, including the forming of strategic alliances. Improved collaboration is needed within the construction industry and strategic alliances may be one answer, but the industry needs to increase the use of these strategic relationships (9).

The private sector appears to have the internal capabilities of their construction program more in line with the amount of work they are handling than does the public sector. The public sector respondents who are performing more work internally than have the capability to do so should turn to outsourcing (4). However, due to the regulations placed on the public sector, the ability to outsource the necessary portion of their work may be difficult. The public sector should allow concessions for construction programs that receive inadequate funding or have inadequate resources. These construction programs should be allowed to outsource the work they are not able to perform in-house.

Of importance for the future of program management, especially the hiring of an external program manager, will be certification. While certification exists for construction managers through CMAA, certifying program managers should be considered as well. Construction managers may have the closest skill set needed to manage a construction program, but it is imperative for firms with this ability to designate themselves as program managers. The designation should not be subjective either. Program managers should be certified and their certification should be backed by a professional organization such as CMAA or CII (12).

## **10.2 Recommendations for Future Research**

There is a possibility for future research on not only the data set from the survey responses but also on the conclusions drawn from the data set. A necessary continuance of the current study would be to repeat it in five years. The FMI/CMAA Seventh Annual Survey of Owners represents the initial survey on the subject of program management. The survey was designed to benchmark the characteristics of program management, both the internal management of a construction program and the hiring of an external program manager. This was the primary contribution of the research.

In order to observe the trends of program management within the construction industry, it is necessary to repeat the survey, or at least some of the content, again. The areas of outsourcing and sourcing strategy contained within the survey instrument, or questions 8

and 11 through 17, are important concepts that should be included in a follow-up survey (6). Also, considering the difficulty in drawing trends from the past surveys it is important to attempt to execute a survey with respondents that have similar demographic characteristics. Finally, the questions should be similar and the definitions of each phase and activity should be kept the same to again assure that clear trends can be drawn from this study and any future studies (7).

The data set obtained from the survey is extremely large and further analysis can be applied. It is possible that future graduate students would benefit from the use of the data set for work on their own thesis. The data should be reviewed and analyzed by future graduate students as long as the students do not jeopardize the confidentiality of the survey respondents.

Also, the survey, while it reviewed many of the major activities and phases within the construction process, did not review the procurement phase, although procurement was covered in the literature review. Focusing on both the procurement of materials and equipment and also on the services required throughout a construction program would provide a beneficial study for the construction industry. The depth that is required for such analysis would be considerable in and of itself and may require a separate survey.

Finally, the potential for improvement with the survey is evident as well. Considering the minimal research performed on program management at the time of the survey, many of the survey questions were created as a high level analysis of program management. With the information obtained from the survey, further areas of research on the concept of program management are evident. Some of the possibilities for more detailed future research and analysis are included in the following bulleted list.

- Further study of the demographic characteristics of the survey respondents can be performed to determine any trends in the data set. The thesis reviewed survey responses by public and private firms. Other demographic characteristics that can be

used to segregate the responses are number of projects started per year and annual construction spending.

- Determine the functions that should be performed by a program manager along with the appropriate fee basis for each function (1, 10).
- A group of respondents to the survey reported starting an extremely large number of projects each year within their construction program. The ability for a construction program to manage and staff such a large number of projects each year should be studied. Also the type of projects that large programs typically perform including renovation, new construction, and maintenance should also be studied to determine differences (2).
- Further study of the amount of work performed in-house compared to the internal capabilities of the construction program should be considered. The findings of this study that some firms are forced to perform more work than they appear to be capable of should be reviewed (4, 5).
- Further research on the affects of regulations on public sector work and on their ability to outsource is necessary. How the FAR requirements and other regulations might play a role in the responses received to questions 11a through 17a of the survey would be of interest. Such a regulations study should also be applied to the responses on sourcing strategy or questions 11b through 17b (6, 8).
- The trend of creating strategic alliances with service providers does not appear to be occurring often as many within the industry perceive it to be. Why that trend does not appear to be occurring should be studied further (9).
- Minimal research exists on program management fees. The fee data obtained from the survey should be analyzed further. Factors causing a difference in fees should be analyzed and documented. Project complexity, services offered, and project size are among those factors that should be further explained (11).
- One of the areas for future research in the realm of hiring an external program manager is comparing the success rate of construction programs managed by an external program manager to the hiring techniques used to procure the external program manager (13).



- Further research is also needed on program management at-risk. Specifically, the contractual relationships that exist between the owners who reported using a program management at-risk model and the program management service provider (14).

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## **12.0 APPENDIX**

## **12.1 Survey Drafts**

The following sections contain the survey drafts of the FMI/CMAA Seventh Annual Survey of Owners. The drafts went through a series of corrections from professionals within the construction industry and research specialist. The drafts are presented here to provide the reader with a resource when reviewing Section 5.0 of this thesis.

### 12.1.1 Preliminary Survey Draft

The following section provides a copy of the preliminary survey draft. The draft included a series of demographic questions, questions on the five phases of construction, and the series of questions developed by the program management focus group.

#### **Demographics**

**Name:**

**Title:**

**Organization:**

**Email:**

**Address:**

**City:**

**State:**

**Zip:**

#### **1. Which of the following best describes your organization?**

- ☐ Private/closely held
- ☐ Public stock corporation
- ☐ Quasi-public
- ☐ Municipal
- ☐ State
- ☐ Federal

#### **2. What industry/market sector(s) do you work in? (Please select all that apply.)**

- ☐ Amusements and Recreation
- ☐ Churches/Houses of Worship
- ☐ Education
- ☐ Hospitals and Nursing Homes
- ☐ Hotels and Motels
- ☐ Industrial Buildings
- ☐ Private Office and Professional
- ☐ Public Safety, Administrative, and Other
- ☐ Stores and Other Mercantile
- ☐ Utilities
- ☐ Conservation and Development
- ☐ Highways and Streets
- ☐ Military Facilities

- ☐ Telecommunications
- ☐ Water Supply/Waste Water Facilities
- ☐ Other, please specify \_\_\_\_\_

**3. Number of construction projects your organization is involved with per year.**

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ >20
- ☐ We have few projects spread out over several years.

**4. Annual construction spending by your organization.**

- ☐ \$1-\$25M
- ☐ \$26-\$50M
- ☐ \$51-\$75M
- ☐ \$76-\$100M
- ☐ \$101-\$125M
- ☐ \$126-\$150M
- ☐ \$151-\$500M
- ☐ >\$500M

**Program Management Definition**

For the purpose of clarity regarding questions asked in this survey, the following definition for program management is provided. Please use the definition as a guideline when answering the questions in this survey.

Definition: *Program management* is the practice of professional construction management applied to a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction and activation - for the purpose of providing standardized technical and management expertise on each project.

**5. Are you currently using a program management approach (process) for your construction needs?**

- ☐ Yes
- ☐ No
- ☐ Yes, but the way we approach it is different from the definition given.
- ☐ No, but we plan to adopt an approach like this soon.
- ☐ Comment:



6. Please choose the top three concepts or concerns that should be part of a definition of program management.

- ☐ Represent owner interests
- ☐ Practice of professional construction management
- ☐ Capital improvement program
- ☐ Control of costs, schedules, staffing levels, quality
- ☐ Single-point responsibility
- ☐ Provide economies of scale
- ☐ Risk sharing
- ☐ Integration of all phases of the construction process
- ☐ Standardized technical expertise
- ☐ Standardized management expertise
- ☐ Planning oversight
- ☐ Design oversight
- ☐ Procurement oversight
- ☐ Construction management
- ☐ Post-construction services (Commissioning, activation, maintenance)
- ☐ All of the above

#### **Program Management and the Phases of Construction**

The following questions refer to the phases of construction and the activities performed by program managers within each phase as we have defined program management above.

*If you do not currently use a program management approach for your construction needs, please answer the questions according to what you would expect from program management for your organization.*

#### **Pre-Design Phase**

##### **7. Setting Up the Program Activity**

Setting up the program activity involves establishing the business arrangements of the program such as: organizational structure, office space, logistics, funding, reporting systems, information systems, project controls, safety, contract administration, quality assurance, public relations, program integration, and MBE (Minority Business Enterprise).

a. Do you use a standardized process to accomplish activities involved in setting up your program?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of activity involved with setting up your program is outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%

- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource the activities associated with setting up your program, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

### **8. Program Development Phase**

The program development phase includes classical front-end services of a proposed construction project such as: drafting the requirements definition, financial planning, program schedule, outreach activities, and planning execution.

a. Do you use a standardized process for program development activities?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of your program development activities are outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

### **9. Program Management During Planning**

Program management during planning addresses the critical process of taking the conceptual program requirements initially established in the program development stage and defining executable elements of work. The major items of consideration during this phase are scope and project definition, regulatory concerns, and program and project phasing.

a. Do you use a standardized process for program management during planning?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of program management during planning is outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%

☐ 0%

c. If you outsource program management during the planning phase, do you

☐ Use a different service provider for each project

☐ Use a single service provider for multiple projects

## **Design Phase**

### **10. Management of Design Services**

The management of design services involves establishing a process to select the individual design firm(s) for design phase services of the construction program; managing the design schedule; creating the design packages for a construction program.

a. Do you use a standardized process to manage design services?

☐ Yes

☐ Yes, we have a process, but it is not very standardized.

☐ No, we adjust the process to fit the needs of each project.

☐ Not Applicable

b. What percentage of management of design phase services is outsourced.

☐ 100%

☐ 75% - 99%

☐ 50% - 74%

☐ 25% - 49%

☐ 1% - 24%

☐ 0%

c. If you outsource management of design phase services, do you:

☐ Use a different service provider for each project

☐ Use a single service provider for multiple projects

### **11. Performance of Design Services**

Performance of design services involves the development of the design for each phase of the program.

a. Do you use a standardized process to perform design services?

☐ Yes

☐ Yes, we have a process, but it is not very standardized.

☐ No, we adjust the process to fit the needs of each project.

☐ Not Applicable

b. What percentage of this activity is outsourced?

☐ 100%

☐ 75% - 99%

☐ 50% - 74%

- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource design services, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **Procurement Phase**

### **12. Procurement Phase**

The procurement phase of construction bridges the time between the completion of the design and the start of construction. Typically, it includes, bid advertising, questions and answers, bidding, addenda issue, bid review, and contract award on competitively bid projects.

a. Do you use a standardized process to perform this activity?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of this activity is outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource the activities of the procurement phase, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **Construction**

### **13. Management of Construction**

The management of the construction processes typically includes logistics planning, schedule monitoring, change management, quality assurance and control, and facility commissioning.

a. Do you use a standardized process for construction management activities?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of construction management services is outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource construction management services, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

#### **14. Construction Performance or General Contractor**

Construction performance and general contracting involve the responsibility of schedule and cost performance for the construction phase.

a. Do you use a standardized process for construction performance activities?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of construction performance activity is outsourced.

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource construction performance activities, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

#### **Post-Construction**

#### **15. Program Activation**

Program activation is the process whereby the owner prepares to use a new facility or facilities. The goals of activation are: ensuring that tenant spaces are prepared and occupancy is achieved in a timely and efficient manner; ensuring that the intended level of services is achieved from the outset, and providing a seamless and transparent move from contractor completion to full operation.

a. Do you use a standardized process for program activation activities?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of your program activation activities are outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource program activation activities, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **16. Operations and Maintenance Implementation**

Operations and maintenance implementation involves developing the scope of work, the schedule, training operations and maintenance staff, and hiring the staff for the operations and maintenance procedures.

a. Do you use a standardized process for operations and maintenance implementation?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. What percentage of operations and maintenance implementation is outsourced?

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource operations and maintenance implementation activities, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **17. Operations and Maintenance Performance**

Operations and maintenance performance involves performing the operations and maintenance work on the facility.

a. Do you use a standardized process to perform operations and maintenance activities?

- ☐ Yes
- ☐ Yes, we have a process, but it is not very standardized
- ☐ No, we adjust the process to fit the needs of each project
- ☐ Not Applicable

b. What percentage of operations and maintenance activities are outsourced.

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

c. If you outsource operations and maintenance activities, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

### Costs of a Program Manager

**18. What is the average cost/fee that you pay or would expect to pay for obtaining program management services expressed as a percentage of annual construction value?**

Cost/Fee: \_\_\_\_\_%

Percent of cost to outside consultant(s): \_\_\_\_\_%

Percent of cost by internal program manager(s): \_\_\_\_\_%

### Selection of a Program Manager

**19. Please rank the following factors as they affect your selection of a program management firm, (scale: 1 = Not a Factor, and 5 = Strongly Considered):**

a. Individual lead program manager	1	2	3	4	5
b. Program controls	1	2	3	4	5
d. Experience w/similar projects/programs	1	2	3	4	5
d. Depth on the bench	1	2	3	4	5
e. Past experience with the firm	1	2	3	4	5

**20. Who manages the majority of your construction programs?**

- ☐ Program Management Firm (Agency)
- ☐ Construction Management Firm (Agency)

- ☐ General Contractor/ Construction Management Firm (at-Risk)
- ☐ Design Firm
- ☐ Internal Staff

### Organization of Program Management

**21. Indicate which of the following organizational models you use/prefer for program management:**

- ☐ Owner led, with program management firm providing staff support
- ☐ Integrated owner and program management team
- ☐ Program management consultant led
- ☐ Program management at risk

**23. Is it important to co-locate the owner and program management team?**

- ☐ Yes
- ☐ No
- ☐ No, not if they can communicate well by other means

**21. As the owner, how would you rank your organization on its capabilities and resources to manage a major program in-house? (Scale 1-10)**

Poorly qualified, requires outsourcing of entire program		Highly qualified staff with the ability to manage the entire program
1		10

Rank: \_\_\_\_\_

**24. What do you see as the best way in the future to meet your construction needs for building or construction programs?**

- ☐ Managing the entire program in-house
- ☐ Procuring a program management consultant to support program management of our entire construction program
- ☐ Procuring program/construction managers on a project by project basis
- ☐ Outsourcing our entire construction program
- ☐ Hiring individual consultants for specific tasks as needed.

**25. When outsourcing program management, what is the primary benefit you expect? Please select only one answer from the following:**



- ☐ Less expensive than program management provided by in-house employees
- ☐ Outsourcing program management provides resource leveling of staff peaks and valleys
- ☐ The ability to select specialized expertise as needed
- ☐ Outsourcing program management provides more depth on the bench
- ☐ Other: \_\_\_\_\_

**26. If you perform part or all of your program management in house, do you seek to:**

- ☐ Control intellectual property
- ☐ Build specialized expertise
- ☐ Save on the cost of program management
- ☐ Other reason: \_\_\_\_\_

**27. What is the most important change you want to see in the construction industry in the next five years?**

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### 12.1.2 Preliminary Survey Draft Comments

The following bulleted items are the comments made by the focus group members on the first survey draft. These comments were used to help create a revised draft of the survey which was labeled draft 2.

- I concur with the comment about the definition and the confusion between program management and construction management. The industry considers program and construction management to be different. Our definition equates them. At the risk of opening (or re-opening) the can, I feel we need to regroup to create a viable definition of program management.
- I agree with the comment regarding question 6. Moreover, in my mind most of the choices are valid and I think most responders will have a difficult time limiting their choices to 3. So, I might rephrase the question to ask them to identify any that they feel are not valid concepts for program management.
- Also with regard to question 6 - We previously had a question that I thought concisely described the potential benefits of program management and asked the responder to choose/rank them (question 1.5 on my email dated 3/23/06). This is largely omitted in favor of this question 6, which to me is less clear and concise.
- Questions 7 - 17 - I really don't understand these and how they help us to understand program management, but I think that is because I don't fully understand Chuck's views. I am ok with retaining the questions. However, I would like to see questions on (1) do you use your outside program manager to do design, or only design management, and (2) do you use your outside program manager to do construction management?
- Question 8 - why isn't there an 8c comparable to 7c?
- Question 19 on selection of program manager - do we want to add technical approach? Seems to me that the proposed technical approach is often a key selection criteria. I think we forgot that in earlier versions of this question.
- Question 25 re benefits of outsourcing program management. I think we are leaving out a key benefit - achieving economies of scale/efficiencies/integration.

- Question 26 - I am not sure that all responders will understand what "controlling intellectual property" means as a reason to do PgM in-house.
- I think we should add to the definition.
  - It says: Definition: Program management is the practice of professional construction management applied to a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction and activation - for the purpose of providing standardized technical and management expertise on each project.
  - I think we should add that Program Management may be practiced by employees of the owner or be outsourced to companies that provide that service.
- Then when we ask how much they pay for Program Management, we need to ask them to combine their in-house program management costs with their out-sourced costs-or the costs will be all over the map and we won't be able to make sense of them.
- Remember, our research indicates that most serial builders do some stuff in house and outsource some. But everybody does it differently.
- I'm also troubled that we tend to confuse program management and construction management. We seem to say that program management is construction management in the definition. Then we ask if they use construction management in their program management activities.
- So I'm confused. Is there a difference between construction management and program management? If not, how do we clear this up?
- There is a lot of non-parallelism in the lists. A little more scrutiny with a good grammarian would be time well spent.
- Good job. On question #6, I would delete the option for "all of the above" - if we really want to know the top 3 functions in importance, the all answer makes it meaningless.

- Very good, very comprehensive. My only concern is that the survey may be too long. My experience with surveys is that the longer the survey the least likely you are to get participation.

The following bulleted items are the comments made by the research specialist on the preliminary survey draft. These comments along with comments by the program management focus group presented in the previous section were used to develop a revised survey draft labeled, draft 2.

- Demographics: Consider placing demographics questions at the end. The decision is based on their importance to the survey. If the questions are not that important, then placing them at the end will allow survey participants to answer more important questions before they quit the survey. You do not want participants to get burnt out on less important questions.
- Question 1
  - May need to add a selection for “other”. Note: completing a survey requires cognitive resources and the less cognitive resources you require the better the participant will perform. Better performance includes: answering more questions, answering questions truthfully and responsively, etc.
- Question 3
  - Break out 0 as a separate option
  - The option of “We have few projects spread out over several years” is confusing and should be removed
- Definition: In experience, participants do not always read the definition. For the online version of the survey the definition can be made a single page at the beginning of the survey with some type of prompt box requiring them click on an icon to move forward with the survey. For the paper version the definition needs to be made prominent so that the reader does not skim over it.
- Question 5
  - Different Yes and No’s. Some with explanations, some without.

- A modifier should be added for the first two yes and no.
- An example would be “No, and we have no plan to do it.”
- Also the questions should be in order of magnitude from Yes down to No. Meaning that “Yes, we are currently using a program management approach as described above” followed by “Yes, but the way we approach it is different from the definition given” all the way down to “No, and we have no plan to do it.”
- A reference should be made within the question to the definition of program management provided, such as “as described above.”
- Question 6
  - Should simply allow them check each one, instead of picking the top three.
  - “All of the above” should be removed.
- Questions 7-16
  - For the online version, might want to consider adding a skip pattern to where if participant selects “0%” for part b. then they are automatically routed around part c. to the next question.
  - For the written document, might want to consider adding a statement next to the choice “0%” that tells the participant to move to the next question if they select “0%”.
- Question 18
  - Do not leave this as an open ended question but rather come up with some parameters for the costs such as 2%-4% and use these as selections. Leaving the question open ended will make it difficult to sort through the data.
- Question 19
  - The word rank should be changed to rate.
  - Place the words “Not a Factor” physically above the number 1 so that there is no confusion and the reader will not miss how the rating system works.
  - Might want to consider a follow question that asks, “Are there other factors that were not listed that you strongly consider when you are selecting a program management firm”

- Question 20
  - Might want to add a selection for other
- Question 21
  - Might want to add a selection for other
- Question 22
  - The word important is an issue, look for a more descriptive term such as cost effective.
- Question 23
  - Change the word rank to rate.
  - Physically show the values of 1 through 10 and allow them to circle which one they feel is appropriate. By physically showing the values equally spaced this reinforces the idea that the distance between 1 and 2 is the same as 2 and 3 and so on.
- Question 26
  - Should consider adding a selection, “We do not perform any management of our construction program in-house.”
- Question 27
  - Look for another more descriptive term than important (i.e. most challenging)
- Add a big Thank You at the end.

### 12.1.3 Second Survey Draft

The following section provides a copy of the second survey draft. The draft was a revision of the preliminary survey draft presented in Section 12.1.2 of this appendix.

#### **Demographics**

**Name:**

**Title:**

**Organization:**

**Email:**

**Address:**

**City:**

**State:**

**Zip:**

#### **1. Which of the following best describes your organization?**

- ☐ Private/closely held
- ☐ Public stock corporation
- ☐ Quasi-public
- ☐ Municipal
- ☐ State
- ☐ Federal

#### **2. What industry/market sector(s) do you work in? (Please select all that apply.)**

- ☐ Amusements and Recreation
- ☐ Churches/Houses of Worship
- ☐ Education
- ☐ Hospitals and Nursing Homes
- ☐ Hotels and Motels
- ☐ Industrial Buildings
- ☐ Private Office and Professional
- ☐ Public Safety, Administrative, and Other
- ☐ Stores and Other Mercantile
- ☐ Utilities
- ☐ Conservation and Development
- ☐ Highways and Streets
- ☐ Military Facilities
- ☐ Telecommunications
- ☐ Water Supply/Waste Water Facilities
- ☐ Other, please specify \_\_\_\_\_

**3. Number of construction projects your organization is involved with per year.**

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ >20
- ☐ We have few projects spread out over several years.

**4. Annual construction spending by your organization.**

- ☐ \$1-\$25M
- ☐ \$26-\$50M
- ☐ \$51-\$75M
- ☐ \$76-\$100M
- ☐ \$101-\$125M
- ☐ \$126-\$150M
- ☐ \$151-\$500M
- ☐ >\$500M

**Definition**

For the purpose of clarity regarding questions asked in this survey, the following definition for program management is provided. Please use the definition as a guideline when answering the following questions.

Definition: *Program Management* is the practice of professional construction management applied to a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction and activation - for the purpose of providing standardized technical and management expertise on each project.

**5. Using the definition above, are you currently using a program management approach (process) for your construction needs?**

- ☐ Yes, we are currently using program management for our construction needs.
- ☐ Yes, but the way we approach it is different from the definition given.
- ☐ No, but we plan to adopt an approach like this soon.
- ☐ No, we are not currently using program management for our construction needs.
- ☐ Comment: \_\_\_\_\_

**6. Please choose the concepts or concerns that should be part of a definition of program management. (Check all that apply.)**

- ☐ Owner interest representation



- ☐ Practice of Professional Construction Management
- ☐ Capital Improvement Program
- ☐ Control of costs, schedules, staffing levels, quality
- ☐ Single-point responsibility
- ☐ Economies of scale
- ☐ Risk Sharing
- ☐ Integration of all phases of the construction process
- ☐ Standardized Technical Expertise
- ☐ Standardized Management Expertise
- ☐ Planning Oversight
- ☐ Design Oversight
- ☐ Procurement Oversight
- ☐ Construction Management
- ☐ Post Construction Services (Commissioning, activation, maintenance)

### **Program Management and the Phases of Construction**

The following questions refer to the phases of construction and the activities performed by program managers within each phase as we have defined program management above. *If you do not currently use a program management approach for your construction needs, please answer the questions according to what you would expect from program management for your organization.*

### **7. Pre-Design Phase**

- a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?
  - ☐ Yes, we have a standardized process
  - ☐ Yes, we have a process, but it is not very standardized.
  - ☐ No, we adjust the process to fit the needs of each project.
  - ☐ Not Applicable
- b. Estimate What percentage of this activity is outsourced?
  - ☐ 100%
  - ☐ 75%
  - ☐ 50%
  - ☐ 25%
  - ☐ 0%
- c. If you outsource the activities associated with setting up your program, do you:
  - ☐ Use a different service provider for each project
  - ☐ Use a single service provider for multiple projects

### **Design Phase**

## 8. Management of Design Services

The management of design services involves: establishing a process to select the individual design firm(s) to provide the design phase services for the construction program; managing the design schedule; creating the design packages for a construction program.

- a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?
- ☐ Yes, we have a standardized process
  - ☐ Yes, we have a process, but it is not very standardized.
  - ☐ No, we adjust the process to fit the needs of each project.
  - ☐ Not Applicable
- b. Estimate What percentage of this activity is outsourced?
- ☐ 100%
  - ☐ 75%
  - ☐ 50%
  - ☐ 25%
  - ☐ 0%
- c. If you outsource the activities associated with setting up your program, do you:
- ☐ Use a different service provider for each project
  - ☐ Use a single service provider for multiple projects

## 9. Performance of Design services

Performance of design services involves the development of the design for each phase of the program.

- a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?
- ☐ Yes, we have a standardized process
  - ☐ Yes, we have a process, but it is not very standardized.
  - ☐ No, we adjust the process to fit the needs of each project.
  - ☐ Not Applicable
- b. Estimate What percentage of this activity is outsourced?
- ☐ 100%
  - ☐ 75%
  - ☐ 50%
  - ☐ 25%
  - ☐ 0%
- c. If you outsource the activities associated with setting up your program, do you:
- ☐ Use a different service provider for each project
  - ☐ Use a single service provider for multiple projects

## **Procurement Phase**

### **10. Procurement Phase**

The procurement phase for construction bridges the time between the completion of the design and the start of construction. Typically it includes, bid advertising, questions and answers, bidding, addenda issue, bid review and contract award on competitively bid projects.

- a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?
- ☐ Yes, we have a standardized process
  - ☐ Yes, we have a process, but it is not very standardized.
  - ☐ No, we adjust the process to fit the needs of each project.
  - ☐ Not Applicable
- b. Estimate What percentage of this activity is outsourced?
- ☐ 100%
  - ☐ 75%
  - ☐ 50%
  - ☐ 25%
  - ☐ 0%
- c. If you outsource the activities associated with setting up your program, do you:
- ☐ Use a different service provider for each project
  - ☐ Use a single service provider for multiple projects

## **Construction**

### **11. Management of Construction**

The management of the construction processes typically includes logistics planning, schedule monitoring, change management, quality assurance and control, facility commissioning.

- a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?
- ☐ Yes, we have a standardized process
  - ☐ Yes, we have a process, but it is not very standardized.
  - ☐ No, we adjust the process to fit the needs of each project.
  - ☐ Not Applicable
- b. Estimate What percentage of this activity is outsourced?
- ☐ 100%
  - ☐ 75%
  - ☐ 50%
  - ☐ 25%
  - ☐ 0%

c. If you outsource the activities associated with setting up your program, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **12. Construction Performance or General Contractor**

Construction performance and general contracting involves the responsibility of schedule and costs performance for the construction phase of the construction processes.

a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?

- ☐ Yes, we have a standardized process
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. Estimate What percentage of this activity is outsourced?

- ☐ 100%
- ☐ 75%
- ☐ 50%
- ☐ 25%
- ☐ 0%

c. If you outsource the activities associated with setting up your program, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

## **Post-Construction**

### **13. Program Activation**

Program activation is the process whereby the owner prepares to use a new facility or facilities. The goals of activation are: ensuring that tenant spaces are prepared and occupancy is achieved in a timely and efficient manner; ensuring that the intended level of services is achieved from the outset, and providing a seamless and transparent move from contractor completion to full operation.

a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?

- ☐ Yes, we have a standardized process
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. Estimate What percentage of this activity is outsourced?

- ☐ 100%

- ☐ 75%
- ☐ 50%
- ☐ 25%
- ☐ 0%

c. If you outsource the activities associated with setting up your program, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

#### **14. Operations and Maintenance**

a. Do you use a standardized process to perform this activity or do you adjust the process to fit the needs of each project?

- ☐ Yes, we have a standardized process
- ☐ Yes, we have a process, but it is not very standardized.
- ☐ No, we adjust the process to fit the needs of each project.
- ☐ Not Applicable

b. Estimate What percentage of this activity is outsourced?

- ☐ 100%
- ☐ 75%
- ☐ 50%
- ☐ 25%
- ☐ 0%

c. If you outsource the activities associated with setting up your program, do you:

- ☐ Use a different service provider for each project
- ☐ Use a single service provider for multiple projects

#### **Costs of a Program Manager**

**15. What is the average cost/fee that you pay or *would expect to pay* for obtaining program management services expressed as a percentage of annual construction value? (Combine both in-house program management costs with outsourcing costs.)**

Cost/Fee: \_\_\_\_\_%

#### **Selection of a Program Manager**

**16. Rank the following factors in your selection of a program management firm (1 = Factor Not Considered, and 5 = Strongly Considered)**

	Not a Factor				Strongly Considered
a. Individual Lead Program Manager	1	2	3	4	5
b. Program Controls	1	2	3	4	5
d. Experience w/ Similar Projects/Programs	1	2	3	4	5
d. Depth on the Bench	1	2	3	4	5
e. Past Experience w/ a Firm	1	2	3	4	5

**17. Who manages the majority of your construction programs?**

- ☐ Program Management Firm (Agency)
- ☐ Construction Management Firm (Agency)
- ☐ General Contractor/ Construction Management Firm (At-Risk)
- ☐ Design Firm
- ☐ Internal Staff

**Organization of Program Management**

**18. Indicate which of the following organizational models you use/prefer for program management**

- ☐ Owner led, with program management firm providing staff support
- ☐ Integrated Owner and Program Management team
- ☐ Program Management Consultant led
- ☐ Program management at risk
- ☐ Other \_\_\_\_\_

**19. Is it important to co-locate the owner and program management team?**

- ☐ Yes
- ☐ No
- ☐ No, not if they can communicate well by other means

**20. How would you rank your (i.e. Owner) organization on its capabilities and resources to manage a major program in-house? (Scale 1-10, Circle your answer.)**

Poorly qualified,  
 requires outsourcing  
 of entire program

1                      2    3    4    5    6    7    8    9                      10  
 Highly qualified  
 staff with the ability  
 to manage the entire  
 program

**21. What do you see as the future for meeting your construction needs for your building or construction program?**

- ☐ Managing the entire program in-house
- ☐ Procuring a Program Management consultant to support program management of your entire construction program
- ☐ Procuring program/construction managers on a project by project basis
- ☐ Outsourcing your entire construction program
- ☐ Hiring individual consultants for specific tasks.

**22. When outsourcing program management, what is the primary benefit you expect?**

- ☐ It is less expensive than doing it with in-house employees
- ☐ Provides better resource leveling of staff peaks and valleys
- ☐ Can select specialized expertise
- ☐ Provides more depth on the bench
- ☐ Other

**23. If you perform part or all of your program management in house, do you seek to:**

- ☐ Control intellectual property (copyrights, patents, trade secrets, expertise, etc.)
- ☐ Build specialized expertise
- ☐ Save on the cost of program management
- ☐ We don't perform any program management in house
- ☐ Other reason: \_\_\_\_\_

**24. What is the most important change you want to see in the construction industry in the next five years?**

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#### 12.1.4 Third Survey Draft

The following section provides a copy of the third survey draft. The draft was a revision of the third survey draft presented in Section 12.1.3 of this appendix.

### **1. Demographics**

**Name:**

**Title:**

**Organization:**

**Email:**

**Address:**

**City:**

**State:**

**Zip:**

### **2. Which of the following best describes your organization?**

- ☐ Private/closely held
- ☐ Public stock corporation
- ☐ Quasi-public
- ☐ Municipal
- ☐ State
- ☐ Federal
- ☐ Other \_\_\_\_\_

### **3. What industry/market sector(s) do you work in? (Please select all that apply.)**

- ☐ Amusements and Recreation (i.e. Amusement parks, sports arenas, movie theaters)
- ☐ Churches/Houses of Worship (i.e. Churches, chapels, mosques, synagogues)
- ☐ Commercial (i.e. Supermarkets, restaurants, retail, warehouse)
- ☐ Conservation and Development (i.e. Dam/levee, dredging, breakwater/jetty)
- ☐ Education (i.e. K-12 and higher education)
- ☐ Highways and Streets (i.e. Pavement, lighting, bridge)
- ☐ Hospitals and Nursing Homes (i.e. Hospitals, nursing homes, medical buildings)
- ☐ Hotels and Motels
- ☐ Manufacturing (Including all buildings and structures at manufacturing sites)
- ☐ Military Facilities
- ☐ Private Office and Professional (Including State and federal office or court buildings)
- ☐ Power (i.e. electric, gas, petroleum)



- ☐ Public Safety, Administrative, and Other (i.e. Detention centers, police and fire stations)
- ☐ Telecommunications
- ☐ Water Supply/Waste Water Facilities (i.e. Plants, wells, lines, reservoirs)
- ☐ Other, please specify \_\_\_\_\_

**4. Number of construction projects your organization is involved with per year.**

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ >20
- ☐ We have few projects spread out over several years.

**5. Annual construction spending by your organization.**

- ☐ \$1-\$25M
- ☐ \$26-\$50M
- ☐ \$51-\$75M
- ☐ \$76-\$100M
- ☐ \$101-\$125M
- ☐ \$126-\$150M
- ☐ \$151-\$500M
- ☐ >\$500M

**6. As the owner, how would you rate your organization on its capabilities and resources to manage a major construction program in-house? (Circle your answer.)**

Insufficient number or experience of staff to manage the entire program		Sufficient staff with the ability to manage the entire program							
1	2	3	4	5	6	7	8	9	10

**7. What are the five most important changes you want to see construction industry owners make in the construction industry in the next five years?**

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**8. Please estimate what percentage of the management of your construction program is performed in-house and what percentage is outsourced. (Total between both in-house and outsourced should equal 100%)**

**Manage in-house:**

0%                      20%                      40%                      60%                      80%                      100%

**Outsource:**

0%                      20%                      40%                      60%                      80%                      100%

**Program Management Definition**

[Box this definition]

For the purpose of clarity regarding questions asked in this survey, the following definition for program management is provided. Please use the definition as a guideline when answering the questions in this survey.

**Definition:** *Program management* is the unified management of a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management principles are used to integrate the different facets of the construction process - planning, design, procurement, construction, and activation - for the purpose of providing standardized technical and management expertise on each project.

**8. Using the definition above, are you currently using a program management approach (process) for your construction needs?**

- ☐ Yes, we are currently using program management for our construction needs.
- ☐ Yes, but the way we approach it is different from the definition given.
- ☐ No, but we plan to adopt an approach like this
- ☐ No, we are not currently using program management for our construction needs.
- ☐ Comment: \_\_\_\_\_

**9. Please choose the functions that you feel should be performed by a program manager, regardless of whether or not you feel you are using program management. (Check all that apply.)**

- ☐ Acquisition of real-estate
- ☐ Procuring program financing
- ☐ Pre-Design planning (Developing the scope, project definition, program and project planning, financial planning, and program schedule)
- ☐ Design oversight
- ☐ Design performance

- ☐ Procurement oversight, (Bid advertising, questions and answers, bidding, addenda issue, bid review, and contract award)
- ☐ Construction oversight
- ☐ Construction performance
- ☐ Post-construction services (Commissioning, activation)
- ☐ Operations and Maintenance

### **Phases of Construction**

The following questions refer to the phases of construction and the activities necessary to execute facility construction.

#### **10. Performance of Pre-Design Services**

The performance of pre-design services includes setting up the business end of a construction program, classical front end services, and planning activities. Examples of classical front end services during the pre-design phase include requirements definition, financial planning, and program schedule. Examples of planning activities during the pre-design phase include scope and project definition and program and project planning.

10a. What percentage of activity involved with the pre-design phase of your program is outsourced? (As a percent of annual construction spending)

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

10b. If you outsource the activities associated with the pre-design phase of your program, do you:

- ☐ Always select a different service provider for each project
- ☐ Consistently select from a small group (4 or less) service providers for each project
- ☐ Frequently use the same service provider
- ☐ Always use the same service provider

### **Design Phase**

#### **11. Oversight of Design Services**

The oversight of design services involves establishing a process to select the individual design firm(s) for design phase services of the construction program; managing the design schedule; and creating the design packages for a construction program.

11a. What percentage of the oversight of design phase services is outsourced? (As a percent of annual construction spending)

- ☐ 100%

- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

11b. If you outsource the oversight of design phase services, do you:

- ☐ Always select a different firm to oversee design services for each project
- ☐ Consistently select from a small group (4 or less) of firms to oversee design services for each project
- ☐ Frequently use the same firm to oversee design services
- ☐ Always use the same firm to oversee design services

## **12. Performance of Design Services**

Performance of design services involves the development of the design for each phase or project within the program.

12a. What percentage of the performance of design services is outsourced? (As a percent of annual construction spending)

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

12b. If you outsource design services, do you:

- ☐ Always select a different design firm for each project
- ☐ Consistently select from a small group (4 or less) of design firms for each project
- ☐ Frequently use the same design firm
- ☐ Always use the same design firm

## **Construction**

### **13. Oversight of Construction**

The oversight of the construction process typically includes logistics planning, schedule monitoring, change management, quality assurance and control, and facility commissioning. The owner's representative or a construction manager working in the role of an agent typically performs this function.

13a. What percentage of the oversight of construction is outsourced? (As a percent of annual construction spending)

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%

- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

13b. If you outsource the oversight of construction, do you:

- ☐ Always select a different firm to provide oversight of construction for each project
- ☐ Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project
- ☐ Frequently use the same firm to provide oversight of construction
- ☐ Always use the same firm to provide oversight of construction

#### **14. Construction Performance**

Construction performance involves the responsibility of schedule and cost performance for the construction phase. This function is typically performed by a general contractor, construction manager at-risk, or through a multi-prime contract.

14a. What percentage of construction performance activity is outsourced. (As a percent of annual construction spending)

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

14b. If you outsource construction performance activities, do you:

- ☐ Always select a different construction firm for each project
- ☐ Consistently select from a small group (4 or less) of construction firms for each project
- ☐ Frequently use the same construction firm
- ☐ Always use the same construction firm

#### **Post-Construction**

#### **15. Management of Program Activation**

The management of program activation is the process whereby the owner prepares to use a new facility or facilities. The goals of activation are ensuring that facilities are prepared and occupancy is achieved in a timely and efficient manner; ensuring that the intended level of services is achieved from the outset, and providing a seamless and transparent move from contractor completion to full operation.

15a. What percentage of your program activation activities are outsourced? (As a percent of annual construction spending)

- ☐ 100%

- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

15b. If you outsource program activation activities, do you:

- ☐ Always select a different service provider to manage program activation for each project
- ☐ Consistently select from a small group (4 or less) of service providers to manage program activation for each project
- ☐ Frequently use the same service provider to manage program activation
- ☐ Always use the same service provider to manage program activation

## **16. Operations and Maintenance**

Operations and maintenance includes all operations and maintenance procedures to be performed on the constructed facilities within the program.

16a. What percentage of operations and maintenance activities are outsourced? (As a percent of annual construction spending)

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

16b. If you outsource operations and maintenance activities, do you:

- ☐ Always select a different service provider for each project
- ☐ Consistently select from a small group (4 or less) service providers for each project
- ☐ Frequently use the same service provider
- ☐ Always use the same service provider

## **Costs of Managing Construction**

**17. Of your annual construction spending identified in question 4, what percentage is utilized to manage the process of construction (Combine both internal construction management and oversight costs with external or outsourced, program management, construction management, and oversight).**

Cost (Percentage of Annual Construction Spending): \_\_\_\_\_%

### **Outsourced Program Management**

**Note: Please only answer the following questions if you have purchased program management services from a program management service provider. If you have not purchased program management services you have completed the questionnaire. Your participation is greatly appreciated.**

**18. When hiring an external program management service provider, what is the approximate fee associated, as a percentage of the program value?**

Fee: \_\_\_\_\_ %

**19. Please rate the percentage each of the following factors is considered in selecting a program manager (0% = Not a Factor, and 100% = Strongly Considered):**

Individual lead program manager	0%	20%	40%	60%	80%	100%
Program controls	0%	20%	40%	60%	80%	100%
Experience with similar projects/programs	0%	20%	40%	60%	80%	100%
Depth on the bench	0%	20%	40%	60%	80%	100%
Past experience with your organization	0%	20%	40%	60%	80%	100%
Technical approach	0%	20%	40%	60%	80%	100%
Safety record	0%	20%	40%	60%	80%	100%
Projects and programs consistently delivered on time	0%	20%	40%	60%	80%	100%
Savings in design costs	0%	20%	40%	60%	80%	100%
Savings in construction costs	0%	20%	40%	60%	80%	100%
Greater economies of scale/efficiencies/integration	0%	20%	40%	60%	80%	100%

**20. What percentage of the time do you use the following service providers to manage your construction program? (If you are using a General Contractor or Construction Management Firm (At-Risk), please select internal staff)**

\_\_\_\_\_ % Program Management Firm (Agency)  
\_\_\_\_\_ % Construction Management Firm (Agency)  
\_\_\_\_\_ % Design Firm  
\_\_\_\_\_ % Internal Staff  
\_\_\_\_\_ % Other \_\_\_\_\_ (Define)  
**100 % Total**

**21. When hiring a program manager which of the following models do you typically use.**

_____	% Owner led, with program management firm providing staff support
_____	% Integrated owner and program management team
_____	% Program management consultant led
_____	% Program management at risk
_____	% Other _____ (Define)
<b><u>100</u></b>	<b>% Total</b>



## **12.2 Survey Final Draft**

The following section provides a copy of the final survey draft. This draft was provided to targeted participants in a paper format and was printed on 3 sheets of letter sized computer paper with text on both the front and back side of the paper. This draft was also used as a template for creating the online survey draft.

Name: \_\_\_\_\_ Title: \_\_\_\_\_  
Organization: \_\_\_\_\_ Email: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

**Confidentiality**

*All individual responses are considered proprietary and strictly confidential. No individual respondent information or responses will be shared or published in any fashion.*

**1. Which of the following best describes your organization?**

- ☐ Private/closely held
- ☐ Publicly traded stock corporation
- ☐ Quasi-public
- ☐ Municipal authority
- ☐ State agency
- ☐ Federal agency
- ☐ Other \_\_\_\_\_

**2. What industry/market sector(s) do you work in? (Please select all that apply.)**

- ☐ Amusements and Recreation (i.e. Amusement parks, sports arenas, movie theaters)
- ☐ Churches/Houses of Worship (i.e. Churches, chapels, mosques, synagogues)
- ☐ Commercial (i.e. Supermarkets, restaurants, retail, warehouse)
- ☐ Conservation and Development (i.e. Dam/levee, dredging, breakwater/jetty)
- ☐ Education (i.e. K-12 and higher education)
- ☐ Energy (i.e. electric, gas, petroleum, etc.)
- ☐ Highways and Streets (i.e. Pavement, lighting, bridge)
- ☐ Hospitals and Nursing Homes (i.e. Hospitals, nursing homes, medical buildings)
- ☐ Hotels and Motels
- ☐ Manufacturing (Including all buildings and structures at manufacturing sites)
- ☐ Military Facilities
- ☐ Private Office and Professional (Including State and federal office or court buildings)
- ☐ Public Safety, Administrative, and Other (i.e. Detention centers, police and fire stations)
- ☐ Telecommunications
- ☐ Water Supply/Waste Water Facilities (i.e. Plants, wells, lines, reservoirs)
- ☐ Other, please specify \_\_\_\_\_

**3. Number of construction projects your organization is involved with per year.**

- ☐ < 5
- ☐ 6-20
- ☐ 20-50
- ☐ 50-100
- ☐ 100-500
- ☐ > 500

**4. Annual construction spending by your organization.**

- ☐ < \$1M
- ☐ \$1-\$25M
- ☐ \$25-\$100M
- ☐ \$100-\$500M
- ☐ \$500M -\$1B
- ☐ > \$1B

**5. What are the three most important changes construction industry owners should make in the next five years?**

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**6. Please rate each of the following on their possible impact on the future of construction. (Circle your answer.)**

	Minimal Impact										Significant Impact
Globalization	1	2	3	4	5	6	7	8	9	10	
LEED/Green Building	1	2	3	4	5	6	7	8	9	10	
Aging Workforce	1	2	3	4	5	6	7	8	9	10	
Building Information Modeling (BIM)	1	2	3	4	5	6	7	8	9	10	
Material Costs	1	2	3	4	5	6	7	8	9	10	

**7. As the owner, how would you rate your organization on its capabilities and resources to manage a major construction program in-house? (Circle your answer.)**

Insufficient number or experience of staff to manage the entire program							Sufficient staff with the ability to manage the entire program			
1	2	3	4	5	6	7	8	9	10	

**8. Please estimate what percentage of the management of your construction program is performed in-house and what percentage is outsourced. (Total between both in-house and outsourced should equal 100%)**

**Manage in-house:**

0%                      20%                      40%                      60%                      80%                      100%

**Outsource:**

0%                      20%                      40%                      60%                      80%                      100%

### **Program Management Definition**

For the purpose of clarity regarding questions asked in this survey, the following definition for program management is provided. Please use the definition as a guideline when answering the questions in this survey.

**Definition:** *Program management* is the unified management of a capital improvement program consisting of one or more projects from inception to completion. Comprehensive construction management principles are used to integrate the different facets of the construction process - planning, design, procurement, construction, and activation - for the purpose of providing standardized technical and management expertise on each project.

**9. Using the definition above, are you currently using a program management approach (process) for your construction needs?**

- ☐ Yes, we are currently using program management for our construction needs.
- ☐ Yes, but the way we approach it is different from the definition given.
- ☐ No, but we plan to adopt an approach like this.
- ☐ No, we are not currently using program management for our construction needs.
- ☐ Comment: \_\_\_\_\_

**10. Please choose the functions that you feel should be performed by a program manager, regardless of whether or not you feel you are using program management. (Check all that apply.)**

- ☐ Acquisition of real-estate
- ☐ Procuring program financing
- ☐ Pre-Design planning (Developing the scope, project definition, program and project planning, financial planning, and program schedule)
- ☐ Design oversight
- ☐ Design performance
- ☐ Procurement oversight, (Bid advertising, questions and answers, bidding, addenda issue, bid review, and contract award)
- ☐ Construction oversight
- ☐ Construction performance
- ☐ Post-construction services (Commissioning, activation)
- ☐ Operations and Maintenance

**Phases of Construction**

**Pre-Design**

**11. Performance of Pre-Design Services**

The performance of pre-design services includes setting up the business end of a construction program, classical front end services, and planning activities. Examples of classical front end services during the pre-design phase include requirements definition, financial planning, and program schedule. Examples of planning activities during the pre-design phase include scope and project definition and program and project planning.

**11a. What percentage of activity involved with the pre-design phase of your program is outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

**11b. If you outsource the activities associated with the pre-design phase of your program, do you:**

- ☐ Always select a different service provider for each project
- ☐ Consistently select from a small group (4 or less) of service providers for each project
- ☐ Frequently use the same service provider
- ☐ Always use the same service provider
- ☐ N/A (Please select this option if you chose 0% for question 11a)

## **Design Phase**

### **12. Oversight of Design Services**

The oversight of design services involves establishing a process to select the individual design firm(s) for design phase services of the construction program; managing the design schedule; and creating the design packages for a construction program.

#### **12a. What percentage of the oversight of design phase services is outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **12b. If you outsource the oversight of design phase services, do you:**

- ☐ Always select a different firm to oversee design services for each project
- ☐ Consistently select from a small group (4 or less) of firms to oversee design services for each project
- ☐ Frequently use the same firm to oversee design services
- ☐ Always use the same firm to oversee design services
- ☐ N/A (Please select this option if you chose 0% for question 12a)

### **13. Performance of Design Services**

Performance of design services involves the development of the design for each phase or project within the program.

#### **13a. What percentage of the performance of design services is outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **13b. If you outsource design services, do you:**

- ☐ Always select a different design firm for each project
- ☐ Consistently select from a small group (4 or less) of design firms for each project
- ☐ Frequently use the same design firm
- ☐ Always use the same design firm
- ☐ N/A (Please select this option if you chose 0% for question 13a)

## **Construction Phase**

### **14. Oversight of Construction**

The oversight of the construction process typically includes logistics planning, schedule monitoring, change management, quality assurance and control, and facility commissioning. The owner's representative or a construction manager working in the role of an agent typically performs this function.

#### **14a. What percentage of the oversight of construction is outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **14b. If you outsource the oversight of construction, do you:**

- ☐ Always select a different firm to provide oversight of construction for each project
- ☐ Consistently select from a small group (4 or less) of firms to provide oversight of construction for each project
- ☐ Frequently use the same firm to provide oversight of construction
- ☐ Always use the same firm to provide oversight of construction
- ☐ N/A (Please select this option if you chose 0% for question 14a)

### **15. Construction Performance**

Construction performance involves the responsibility of schedule and cost performance for the construction phase. This function is typically performed by a general contractor, construction manager at-risk, or through a multi-prime contract.

#### **15a. What percentage of construction performance activity is outsourced.**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **15b. If you outsource the performance of construction, do you:**

- ☐ Always select a different construction firm for each project
- ☐ Consistently select from a small group (4 or less) of construction firms for each project
- ☐ Frequently use the same construction firm
- ☐ Always use the same construction firm
- ☐ N/A (Please select this option if you chose 0% for question 15a)

## **Post-Construction**

### **16. Program Activation**

Program activation is the process whereby the owner prepares to use a new facility or facilities. The goals of activation are ensuring that facilities are prepared and occupancy is achieved in a timely and efficient manner; ensuring that the intended level of services is achieved from the outset, and providing a seamless and transparent move from contractor completion to full operation.

#### **16a. What percentage of your program activation activities are outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **16b. If you outsource program activation activities, do you:**

- ☐ Always select a different service provider for each project
- ☐ Consistently select from a small group (4 or less) of service providers for each project
- ☐ Frequently use the same service provider
- ☐ Always use the same service provider
- ☐ N/A (Please select this option if you chose 0% for question 16a)

### **17. Operations and Maintenance**

Operations and maintenance includes all operations and maintenance procedures to be performed on the constructed facilities within the program.

#### **17a. What percentage of operations and maintenance activities are outsourced?**

- ☐ 100%
- ☐ 75% - 99%
- ☐ 50% - 74%
- ☐ 25% - 49%
- ☐ 1% - 24%
- ☐ 0%

#### **17b. If you outsource operations and maintenance activities, do you:**

- ☐ Always select a different service provider for each project
- ☐ Consistently select from a small group (4 or less) of service providers for each project
- ☐ Frequently use the same service provider
- ☐ Always use the same service provider
- ☐ N/A (Please select this option if you chose 0% for question 17a)

### **Costs of Managing Construction**

**18. Of your annual construction spending identified in question 4, what percentage is utilized to manage the process of construction (Combine both internal construction management and oversight costs with external or outsourced, program management, construction management, and oversight costs).**

Cost (Percentage of Annual Construction Spending): \_\_\_\_\_ %

### **Program Management User Feedback**

**Note: Please only answer the following questions if you have purchased program management services from a program management service provider. If you have not purchased program management services you have completed the questionnaire. Your participation is greatly appreciated.**

**19. When hiring an external program management service provider, what is the approximate fee associated, as a percentage of the program value?**

Fee: \_\_\_\_\_ %

**20. Which of the following do you use most often to manage your construction program?**

- ☐ Program Management Firm (Agency)
- ☐ Construction Management Firm (Agency)
- ☐ Design Firm
- ☐ Internal Staff
- ☐ Other \_\_\_\_\_ (Define)

**21. Please rate the percentage each of the following factors is considered in selecting a program manager (0% = Not a Factor, and 100% = Strongly Considered):**

Individual lead program manager	0%	20%	40%	60%	80%	100%
Program controls	0%	20%	40%	60%	80%	100%
Experience with similar projects/programs	0%	20%	40%	60%	80%	100%
Depth on the bench	0%	20%	40%	60%	80%	100%
Past experience with your organization	0%	20%	40%	60%	80%	100%
Technical approach	0%	20%	40%	60%	80%	100%
Safety record	0%	20%	40%	60%	80%	100%
Projects and programs consistently delivered on time	0%	20%	40%	60%	80%	100%
Savings in design costs	0%	20%	40%	60%	80%	100%
Savings in construction costs	0%	20%	40%	60%	80%	100%
Greater economies of scale/efficiencies/integration	0%	20%	40%	60%	80%	100%
Other _____	0%	20%	40%	60%	80%	100%

**22. When hiring a program manager which of the following models do you typically use.**

- ☐ Owner led, with program management firm providing staff support
- ☐ Integrated owner and program management team
- ☐ Program management consultant led
- ☐ Program management at risk
- ☐ Other \_\_\_\_\_ (Define)

**Thank you for completing the FMI/CMAA Seventh Annual Survey of Owners. Your time and effort are greatly appreciated. All those responding with their name and address will receive a copy of the final survey report.**

**Please return the completed survey to: Bart Grasso, FMI, PO Box 31108 Raleigh, NC 27622, or fax**



### 12.3 Survey Data

The following section presents the raw survey data for each question within the survey. Due to the large number of responses, the survey data continues across multiple pages. The data is presented in landscape format. The number for each question is given at the top of the column. The responses are shown as the numerical equivalent to the answer choice provided in the survey document. In order to determine the answer choice provided in the survey document that corresponds to each numeric response given in this appendices the reader may compare the numeric responses to those given in Section 6.0. For example, the table that provided the question and answer choices for question 1 was given in Section 6.1. The table was presented as follows:

**Table 12.1: Question and Answer Choices for Question 1**

1. Which of the following best describes your organization?	
1	Private/closely held
2	Publicly traded stock corporation
3	Quasi-public
4	Municipal authority
5	State agency
6	Federal agency
7	Other

The numbers to the left of each answer choice correspond to the numeric responses found in this appendix. Therefore any response to question 1 of private/closely held would be represented as 1 in this appendix. The exception to this format is the answer choices that required written or free responses and those questions that offered a clarification for an ‘other’ response. For these questions the survey data is presented as it was received from each respondent. Other responses are given directly to the right of the numeric response for ‘other.’

Also, the reader should note that question 7 is listed twice, with responses shown for a group of respondents in one column and the remaining responses given in the adjacent column. The first column gives the responses that were received using the faulty survey instrument.

These responses were discarded in the analysis and results. Only the responses in the adjacent column were used in the results and analysis.

For confidentiality reasons, all identifiers to the survey respondents have been removed. Only a respondent number is given to left of the survey responses. The respondent number can be used to connect answer choices across multiple questions.

Resp. #	1. Which of the following best describes your organization?		2. What industry/market sector(s) do you work in? (Please select all that apply.)																3. Number of projects your organization starts each year.	
1	4				4			7								15			3	
2	7	School district				5													3	
3	6							7					12	13	14	15			4	
4	4		1													15			3	
5	5					5													3	
6	6			3									12						1	
7	4					5													6	
8	7	Not For Profit Healthcare							8										2	
9	7	Private Educational Institution (Non-Profit)					5												5	
10	4					5		7					12	13	14				5	
11	4		1										12	13	14	15			2	
12	7	University	1	2	3		5	6	7				12		14				5	
13	2																16	Transportation - Aviation	2	
14	4							7								15			1	
15	4							7						13	14	15			5	
16	7	Regional Government Agency															16	Transportation	2	
17	4															15			2	
18	3			3				7		9			12	13			16	REDEVELOPMENT	2	
19	6												12						3	
20	3																16	airports	3	

21	4																			
22	3																	16	Transit	2
23	4																	16	Capital Planning and Construction/All facilities	2
24	5					5														5
25	4																			1
26	6												12	13				16	Government research laboratories	3
27	7	Educational				5														1
28	7	County											12	13						5
29	4					5	6						12	13	14					3
30	6																	16	Federal Tenant Space	5
31	7	Quasi-Government [State & Federal]																16	Transportation	3
32	5				4			7									15			1
33	3																	16	Transportation	2
34	5					5		8												5
35	7	regional airport authority																16	airports	3
36	4													13	14			16	Roads and parking lots	2
37	7	Universiyt & Hospital						8										16	Research Facilities	5
38	5				4	5	6	8				11	12	13	14	15	16		Utilitites, Heating Plants, research facilities	6
39	1					5														2
40	7	County K-12 School district					5													2

41	7	Quasi State and local agency					5														1
42	7	Private and State Land Grant University	1	2	3	4	5	6	7	8	9			12	13	14	15				5
43	4																15				2
44	1			2			5														3
45	5						5														2
46	6								7												2
47	4																15				3
48	6									8											2
49	7	Healthcare Authority- Non-profit								8											6
50	5						5														3
51	3									8											5
52	2																16	Aerospace			5
53	1							6					11	12			15				1
54	7	not-for-profit					5							12							2
55	7	K-12 Public School District					5														2
56	5						5														2
57	7	school District					5														6
58	2							6													5
59	1						5														2
60	5						5														2
61	1									8				12				16	senior housing		3
62	7	Local Government agency												12	13						2
63	4																	16	Airport infrastructure		3
64	2							6													2
65	7	Transit Authority							7									16	Transit Facilities		4

66	7	Local government							7					12	13	14		16	Parks and open space	3	
67	5																	16	TRANSPORTATION INFRASTRUCTURE (BRIDGES AND TUNNELS)	2	
68	7	Private/non-profit							8											1	
69	4						5													3	
70	4																	16	Solid Waste	4	
71	7	K12 School Public District					5													3	
72	6												12							2	
73	1								8											2	
74	3				3				7		9			12	13			16	Transportation: Airport and Seaport Terminals	4	
75	7	County Government												12	13			15	16	Community College Buildings, Senior Centers, Libraries	2
76	7	City							7						13			15		4	
77	7	Private University					5													2	
78	2											10								6	
79	6													12						2	
80	4						5													4	
81	4																	16	Federal Housing Programs	4	
82	2							6												5	
83	2							6												3	
84	2							6												3	
85	2											10								3	
86	2							6												6	

87	2						6									16	Transportation	4
88	4		1					7						13	14	15		4
89	2									10								5
90	2									10								3
91	2															16	electric utility	3
92	2									10								2
93	5					5												1
94	6										11							5
95	2									10						16	Pharma/Biotechnolgy	5
96	2				4		6											3
97	5					5												4
98	7	Public School District				5												4
99	2						6											4
100	7	Educational/School District				5												2
101	6				4		6							14	15			4
102	2		1															2
103	7	Public School District				5												2
104	2									10								6
105	2						6											4
106	7	Public Education				5												2
107	5					5												2
108	5							7										4
109	7	Local Education Authority/ LEA				5												3
110	5							7										5
111	1								8									2
112	2						6											4
113	2			3						10		12				16	Laboratories	4
114	7	501c3							8									6

115	2											10							3
116	4		1		4												16	Marine facilities (boat ramps, fuel docks, etc)	1
117	1		1		3								12		14				2
118	1			2	3		5				10	11	12						2
119	5					5			8				12						3
120	5		1		3		5		8				12	13					3
121	5					5													2
122	7	County Government											12	13					2
123	7	Public University					5												1
124	4												12						2
125	7	Private law firm representing over 40 local government entities and municipalities in Idaho				4	5	6	7		10			13		15	16	Public Works Facilities, canals, reservoirs, ponds	2
126	2						6												2
127	7	State University					5						12			15			5
128	3															16		Public Transit	3
129	7	School District					5												3
130	5						5												5
131	2										10								3
132	5						5												4
133	2										10								3
134	2										10								4
135	2							6											5
136	2										10								5
137	2															16		petroleum Refining	6
138	2							6											6



139	2						6											6
140	2						6											3
141	6			3			6	7				12			15			3
142	2						6											5
143	6						6											4
144	2										10							4
145	2										10							6
146	2										10							6
147	2						6											3
148	4					5												5
149	2						6			10					15			6
150	2						6								15			3
151	2						6											2
152	2						6											4
153	5							7										5
154	2														16	Electric Utility		4
155	4					5												3
156	2						6											2
157	2			3														3
158	7	higher education				5						12	13					3
159	2									10								5
160	5					5												3
161	4					5												3
162	7	School District				5												5
163	4					5												2
164	7	Public School				5												4
165	5					5												1
166	5					5	6	7				12		14	15			1
167	7	Public K-12 School District				5												3
168	7	K-12 Public Schools				5												2

169	7	School District					5													2
170	3						5													5
171	7	Public School District					5													1

Resp #	4. Annual construction spending by your organization.	5. What are the three most important changes construction industry owners should make in the next five years?
1	3	1. Better use of technology. 2. Better handle on costs. 3. Better understanding of green building.
2	3	1 take more control of subcontractor change order pricing. 2 provide better / more alternate designs and costs 3 Do not compress the construction schedule
3	4	
4	2	1. Modify delivery sytem 2. Prioritizing proejcts 3. Trainig staff
5	4	More design-build deliveries
6	4	Fully utilize BIM (3D/4D/5D) for design and construction. Embrace sustainable practices. Continue to make construction a worthy profession.
7	4	
8	3	
9	5	Material Cost and Availability Labor Shortages Technology
10	3	CM based instead of PM based staffing. intergration of design and construction design reviews. installation of more stringent pre-qualification requirements for highly specilized construction projects dealing with not only design but contracting as well.
11	2	1. Develop a process to clearly listen to the client...don't assume every client wants the same things on every project 2. Make it easier for the owner to move away from d-b-b
12	4	
13	4	Cost Escalation Technology changes Security
14	2	master planning improved construction management improved construction plans and cost control
15	4	Project Delivery, Budgets, Retention of Personnel
16	3	Secure adequate long term funding sources to support their infrastructure. Adapt to the changing delivery methods for construction. Manage the cost escalation of construction.
17	2	1. Transitioning from new capital projects to rehab projects. 2. Dealing with increased construction costs due to material increases. 3. Dealing with an aging work force and transitioning the knowledge base from the experienced workers to a new labor force.
18	3	
19	6	

20	4	learn design build and construction management delivery methods
21		
22	4	Standardize terms and conditions Improve project delivery methods Develop risk sharing strategies
23	4	1
24	4	Collaboration software
25	3	- Broadening procurement regulations to permit flexibility in project delivery methods - Expanding the function of schedule development and management into the design phase to ensure timely procurement - Expand recognition of, and preference for, CM's with the CCM designation.
26	2	More risk management practices; Be better prepared for global market; Train staff on latest developments, tools, techniques, etc.
27	3	Proper budgeting Defined scope of work Trained personnel to work (partnering) with CM
28	4	1. Flexible budgeting methods to manage cost increases. 2. Scope reduction strategies to manage cost increases. 3. Within the strategies to manage cost, awareness of impacts to operating costs.
29	3	1. Bringing more CM into the public sector market. 2. Cooperation and coordination among disciplines. 3. Easier and more effective close out of projects.
30	5	Use of BIM Technology Enhanced use of Electronic Project Management Hire CCMs on staff - get personnel certified
31	4	
32	3	allow price escalation for cement & fuel request certified CMs for public project
33	4	Deal properly with illegal alien workforce Find a way to deal with material escalation fairly Address security concerns effectively
34	4	
35	5	better quality documents hold down construction costs complete projects on schedule
36	2	Escalating costs/Skilled craftsmen
37	4	Design of Flexible and adaptable bldgs. Alternative construction materials Design and construction methods to accelerate schedules
38	5	Using technology in construction 3D, BIM Quality of Documents reviews Contractors pre-qualifications
39	2	understanding changes in case law that make design professionals financially liable for errors & omissions.
40	4	
41	2	1. Development of consistent quality standards across owners and states. 2. Assist construction companies in the development of highly qualified skilled labor. 3. Development of consistent expectations and standards for architectural and engineering contracts

42	4	Plan front end of projects in great detail. Budget for world driven commodities inflation. Stay on top of rapidly changing technology.
43	2	strive for energy efficiency develop and train professionals
44	2	
45	2	- Recognize and consider the global economy and its impact on construction costs when budgeting. - Become familiar with Building Information Modeling. - Include building commissioning on all new projects.
46	3	1. Look for ways to get more competition. 2. Implement actions that make bidding in a volatile market less risky (e.g. price adjustment clauses) 3. Be ready to adapt to fluctuating workload.
47	4	
48	4	Increase information gathering and retention during design and construction for use in facilities management (BIM, Electronic Records, Colaboration) Bring the constructor into the process earlier (Design Build, CM, Consultant)
49	5	1. Cost control/contract terms 2. Efficient use of space/ flexibility 3. Effects of new technologies on the built environment/ systems
50	3	1.Move to sustainable design and construction 2.Improve long term planning process 3.Increase the use of technology to document construction activities
51	4	Trends I see are: 1 the need to move towards green product (recyclable carpet, etc) 2 Finding more energy efficiency 3 Finding qualified employees
52	4	Lean Principles; Improve Productivity; Push Trades to Understand Owner Demands Best Value
53		Worker knowledge of craft Language Safety
54	2	
55	4	
56	3	
57	6	
58	6	1) Be an informed and engaged owner. 2) Promote and Drive Innovation in the Construction Industry. 3) Lead and demand performance excellence.
59	3	Take control of project scheduling Manage Programs instead of Projects Take wasted time and effort out of the design process.
60	3	Construction Management Design/ Build Fast Track Construction
61	4	1. Understand Industry Cost Trends 2. Build Owner networking and professional organization leverage (such as via COAA). 3. Demand liability for quality performance by design professionals and contractors.
62	2	

63	4	1 - Increase use of incentive and for safety and performance 2 - Increase use of task order construction contracts 3 - Improved construction specifications for identification and administration of 'concept and performance' type design features
64	4	
65	4	Workforce development.
66	3	1. better construction documents 2. more accurate trend analysis of material, labor, and equipment costs 3. better planning
67	4	A) plan for succession and 'brain drain' of engineer team. B) allow
68	2	1. More flexible financing models (development partnerships, joint ventures, etc.) 2. Recruitment of workforce 3. More consideration to operating cost vs. first cost of facilities.
69	3	1.Reduce scope of work to address spiralling inflation. 2.Explore new construction mehtods and techniques to reduce cost. 3.Incorporate above items into approaching LEED/Green Building.
70	3	Alternative Procurement for Public Sector. Cost-effective Green Building innovation.
71	3	Get tighter control of design and budget issues. Implement better systems to eliminate waste and inefficiency. Require better collaboration between all team members.
72	5	
73	6	Demand CM certification to insure minimum CM requirements are met. Require web based Porject Management systems for a transparent project Select Project Delivery System based on set selection criteria
74	4	1. Incorporate the new technologies, practices and techniques successfully used by others. 2. Develop integrity and be totally honest .Keep commitments. 3. Work cooperatively and safely.
75	3	1. Being open to alternative delivery methods. 2. Integrating latest technology in design and administering projects, i.e. BIM.
76	3	
77	3	1. Better planning 2. More transparency in construction projects 3. More communication before and during projects
78	6	Quickly adapting strategies to changing business conditions - sourcing strategies need to adjust to volatile market conditions, schedule impacts due to labor markets, and leveraging supply chain during extreme material volatility. Increased engagement in relations with labor markets to ascertain labor deficiencies, prepare for market volatility, and influence legislation in support of the construction industry. More emphasis on productivity improvements with the owner and contractor community for more competitive output at lower total cost
79	5	1. Plan for material cost escalations. 2. Improve design document quality. 3.
80	5	1. Implement sustainable building practices 2. Adopt continuous quality improvement 3. Adopt latest available technology
81	2	Greater responsive to payment and cashflow. Adjust and adapt to volitale market pricing. Life cycle costing, energy efficiency.
82	4	address shortage of resources address aging workforce

83	4	1) Promote skilled labor training and development 2) Promote use of computer-based project controls software 3) Continue to drive safety metrics
84	4	1. Shortage of resources/Market forces issues 2. Workface planning, Lean construction 3. 3D Modelling/Animation
85	5	Implement Lean Construction principles Improve productivity Workforce recruitment
86	6	improve training for the big crew change that is coming. improve their overall planning capability improve productivity by both better planning and increase capital investment
87	5	Shared Risk Craft Development Total Project Resource Development (manpower & material sources)
88	3	
89	6	Help make interoperability a functional reality for project and plant support systems. Support efforts to grow the number of crafts people. Lead K-12 programs to get more young people into Engineering.
90	4	1-Drive more consistency among Owners for Construction Industry changes. 2-Take a co-lead with Construction on development of collaborative softwares 3-Take the lead on workforce development issues
91	4	commitment to labor schedule of work
92	2	Online Collaborative Project Documentation Convert to 3D/4D Design Tools Integrated Building Modeling - IFC
93	3	1. Material Costs 2. Eliminate Prevailing Wage to help control costs 3. Educate upcoming employees - VO TECH
94	6	1. Due to inflation, commodities prices and world wide demand, prepare to spend more or accept less. 2. Embrace non-traditional delivery methods 3. Invest in anti-terrorism/force protection measures
95	6	Improve quality control of design and construction
96	6	1. Promote workforce development 2. Build partnerships with the contracting industry 3. Try to levelize workload demand.
97	3	1. Stabilize Labor Supply
98	4	
99	4	1. Better screening of workers to get workers who are fit for duty 2. Better screening of workers to get workers who are properly trained to do their craft/skills. 3. Addressing unsafe workers.
100	2	1)Dealing with Inflation, 2)Energy - Green Building, 3) Shortage of skill work force
101	4	Establish the priority of projects, schedule work to levelize and provide continuous work for the craft. There is not enough craft to do everyone's work on individual industry schedules.
102	5	Develop leading indicators for escalation models Develop strategic sourcing systems Migrate to the integrated project team
103	3	energy efficiency, better roofing, better data technology
104	6	1. Adjustment & Working in a Global Industrial Environment. 2. Work force changes & competition. Supply & demand factors. 3. Innovation and Creativity on new ways of performing AEC. E-world.
105	4	Improve project management, focus on quality, and developing adequate labor resources.

106	3	Owners must consider increasing construction budgets. Owners must explore more economical ways to renovate existing facilities. Owners must be aware of the changing skilled construction labor pool and adjust accordingly.
107	3	Quality cost effective construction
108	4	
109	4	Public Private Partnerships Certification of Participants Electronic Formatting and Estimating
110	4	1. Look for ways to reduce the overall cost of projects (support & capital costs) while maintaining quality. 2. Work in partnership with contractors to do #1 above. Cultural change in the way we work together. 3. Become more environmental considerate during construction - minimize impacts - water, air, wildlife.
111	3	1. Get costs down 2. Better, proactive pre-con - be a leader not a follower (i.e., help the owner, don't just do estimates) 3. Do the first two and I'm happy...
112	4	Keep skilled resources
113	5	Impact of escalation on materials due to availability in market - length of time that quotations are valid.
114	6	ability to deliver functionality, quality at an affordable price in a safe and environmentally friendly manner.
115	5	Implement enabling IT solutions to speed review and approval of design and execution documents. Foster the renewal of construction management curriculae in major engineering universities. Foster renewal of trade apprenticeship programs
116	1	Focus on maintenance of existing facilities Project scope control
117	2	Focus on what they know and do best. Don't try to be everything to an owner. Be willing to offer suggestions and help the owner find other qualified professionals when appropriate.
118	1	no comment
119	5	Apply Building Information Modeling Management of buildings for life Pre-fabricated building components
120	5	Focus on Completion Assist the industry in finding a more skilled workforce. Assist the industry in increasing profit margins
121	3	1) Continued use of alternate delivery methods 2) Negotiated supply contracts for things like cement, steel, lumber, etc that cap rate increases.
122	3	
123	2	Reduce cycle time from planning through construction. Consider adaptation and renewal rather than replacement. Utilize flexible space design
124	2	Update the process for cost estimating projects Build high performance/sustainable projects Educate and train Owner Team members
125	2	1: Increased accountability from design professionals to public owners; 2. Additional public funding sources/options; and, 3. Increased accountability for sureties to ensure the project is completed to the benefit of the public owner instead of protecting the contractor.
126	4	



127	4	1. Promote and mainstream alternative delivery methods; 2. Work to reduce dependence on petroleum-based products. 3. Integrate the constructor even more into the design process.
128	3	1) Better supervision of design 2) Try alternate project delivery methods 3) Better staff training/updating
129	2	1. Sustainable construction practices 2. Integrated design practices 3. Training and inducements to go into the trades
130	2	Owner Contracts
131	6	Use technology to enhance planning for design, construction coordination and schedule benefits.
132	3	
133	5	1. Promote Lean Construction 2. Mandate 3D Design 3. Pursue Relational Contracts
134	3	1. Improvements in speed of design delivery
135	4	1. keep pressure on labor to address resource availability 2. add to internal construction management staffing to manage increasing workload 3. set realistic goals for project execution based on industry work level issues
136	5	Ability to track people to the construction industry as a career. Find ways to reduce construction costs including reducing field man-hours Improve the construction process to eliminate waste
137	6	Develop better recruitment and training programs. Work with client to develop 'forward looking' project planning. Educate the client on the overall asset shortage in the construction industry.
138	6	Understand impacts of globalization Address current and future demographic shifts Develop more trusting relationships with Owners
139	6	1) Identify means for attracting new skilled labor resources...replacements for an aging construction industry work force. 2) Recognize construction labor costs (wages & benefits) are trending up. 3) What existing or newly founded technology is available to affect productivity and lower installed cost basis.
140	4	1.Support open shop training efforts 2.Assign risk to the appropriate place in a project 3. Get government support to import labor.
141	3	
142	4	Implement better cost and schedule tracking systems. Factor in market impacts in the project planning phase Increase networking with other owners
143	4	Improve productivity thru technology innovation Rebuild the workforce to meet demand Bring technology to the workforce
144	6	
145	6	Actively grow and develop the workforce Better utilize global material supply Work process efficiency
146	4	Increase speed of response and delivery Value engineering options Estimating models
147	6	

148	3	Better partnering with designer to obtain higher quality designs for bidding. Select and utilize alternative project delivery methods when best value for a project. Utilize the construction industry to assist in better projecting and controlling project costs
149	6	1. Method established to allow direct competition in cost and schedule with Chinese
150	3	Ways to foster safety improvements. Ways to increase productivity. Ways to improve cost performance.
151	5	1. Assist in solving the craft labor supply issue. 2. Better use of technology.
152	3	Labor and craft labor shortages Contractors not full filling commitments and schedules Cost overruns
153	6	Prepare for changing workforce Inform public of deteriorating infrastructure look for public/private funding options
154	4	Work with Union & contractors to develop additional resources.
155	4	1. Increase focus on sustainability. 2. Increase preventative maintenance. 3. Support industry efforts to increase the pool of skilled construction workforce.
156	3	Increase ability to attract staff and craft. Ensure staff is adequately qualified and trained.
157	3	1. Use non union labor without pressure from unions. 2. Relax building codes on fire sprinkler and fire alarm requirements. 3. Reduce construction material costs and rampant inflation.
158	2	energy awareness use of new /better construction materials Lean construction
159	3	Learn and aggressively apply lean principles to construction and construction management.
160	4	
161	4	1. Construction Costs, 2. LEED, 3. Energy
162	4	
163	2	1. Use construction management firms 2. Budget high for petroleum products, 3. Budget high for metals
164	3	
165	2	
166	2	1. Cost factors that address total construction
167	2	1. Budget adjustments due to construction - related materials and inflation, 2. Better incorporation of integration of systems, e.g. HVAC controls, lighting, security, etc., 3. Embracing LEED/Green Construction
168	3	1. Flexible Budgets, 2. Learn the "Art of Value Engineering", 3. Environmental Impacts
169	4	1. Cost, 2. Energy, 3. Stability
170	2	1. Better Assessment & Planning Methods
171	2	1. Embrace new technology for project/program management

Resp #	6. Please rate each of the following on their possible impact on the future of construction.					7. As the owner, how would you rate your organization on its capabilities and resources to manage a major construction program in-house?	7. As the owner, how would you rate your organization on its capabilities and resources to manage a major construction program in-house?
	Globalization	LEED/ Green Building	Aging Workforce	Building Information Modeling (BIM)	Material Costs		
1	8	7	10	6	9	2	
2	3	3	8	5	8	2	
3	9	5	9	6	9	2	
4	8	3	6	2	10	2	
5	7	7	6	6	9	2	
6	8	9	8	10	10	2	
7	3	4	8	3	10	2	
8	1	3	6	5	7	2	
9	8	6	9	4	10	2	
10	9	2	8	6	9	1	
11	10	6	7	8	10	2	
12	3	7	5	6	8	2	
13	8	2	2	8	9	1	
14	3	2	8	8	9	1	
15	8	8	10	8	9	2	
16	8	3	3	3	10	2	
17	1	3	9	5	10	1	
18	8	5	8	7	9	2	
19	5	5	8	3	5	2	
20	5	5	6	5	8	2	
21							
22	3	3	5	5	6	2	
23	10	8	8	6	8	3	
24	7	5	5	6	7	2	
25	6	3	3	5	9	1	
26	9	9	8	9	9	1	

27	1	5	1	9	9	2	
28	8	8	8	6	8	2	
29	5	5	7	5	8	2	
30	5	3	7	6	8	2	
31	4	8	9	6	10	2	
32	7	4	8	3	10	2	
33	10	7	7	6	10	2	
34	5	5	6	7	8	2	
35	4	5	6	6	9	2	
36	8	8	9	9	10	2	
37	10	4	8	6	10	2	
38	5	8	10	10	10	2	
39	2	8	4	8	8	2	
40	4	7	9	10	10	2	
41	5	8	10	3	8	2	
42	10	4	8	9	10		
43	6	4	3	2	9		4
44	9	5	7	6	9		7
45	10	6	10	8	10		10
46	7	7	6	5	9		9
47	5	7	8		7		7
48	8	9	9	10	10		8
49	2	7	8	5	8		10
50	5	8	4	7	9		6
51	6	7	7	5	6		7
52	8	2	10	5	8		8
53	7	3	8	7	9		7
54	6	10	5	5	10		3
55	9	8	9	7	10		8
56	7	7	9	9	10		1
57	7	2	2	1	10		5
58	8	10	10	7	7		4

59	5	6	4	8	8		7
60	7	8	9	8	10		8
61	6	7	7	5	10		5
62	7	7	6	5	8		7
63	7	3	6	6	7		1
64	4	2	6	2	6		6
65	10	2	9	2	10		9
66	7	7	5	7	7		8
67	10	8	9	6	9		8
68	3	4	7	4	6		8
69	10	5	8	5	10		10
70	8	7	6	7	7		3
71	8	7	5	8	8		4
72	5	7	7	6	10		8
73	5	7	10	4	10		1
74	9	8	2	2	9		8
75	5	9	10	9	10		3
76	8	7	9	7	10		7
77	7	7	7	5	9		7
78	8	4	7	5	9		8
79	3	5	5	7	8		7
80	9	10	10	10	7		1
81	10	9	6	8	8		8
82	7		8	3	7		3
83	8	6	8	7	8		3
84	5	6	8	8	7		7
85	8	5	8	10	7		6
86	8	2	10	2	8		8
87	8	6	9	3	6		3
88	7	6	7	8	10		6
89	10	8	10	6	9		5
90	8	5	8	7	6		2

91	5	3	9	6	9		4
92	4	6	4	9	6		8
93	9	10	10	6	9		10
94	9	5	7	5	10		2
95	8	6	7	6	7		7
96	5	5	9	7	8		8
97							
98	5	6	7	5	9		1
99	6		6		7		9
100	7	8	7	6	8		7
101	8	6	10	7	9		8
102	8	5	7	9	9		6
103	2	3	5	2	10		1
104	10	7	9	9	10		2
105	7	5	10	8	7		6
106	9	9	9	7	10		6
107	6	9	9	8	10		9
108	2	6	10	1	10		8
109	6	8	6	8	9		7
110	6	4	8	4	10		9
111	10	7	6	6	10		9
112	8	6	9	7	9		7
113	8	7	9	9	7		7
114	10	10	10	7	10		10
115	10	5	10	8	5		8
116	3	5	6	3	8		8
117	7	6	5		6		1
118			7	4	7		1
119	7	7	9	8	10		10
120	8	7	9	7	8		10
121	7	3	3	3	10		7
122	4	6	5	3	4		2

123	1	4	4	4	10		6
124	5	8	5	8	8		4
125	2	5	8	5	8		4
126	7	4	10	4	8		8
127	8	8	7	5	9		7
128	9	5	1	3	9		1
129	7	9	8	6	10		10
130	5	4	7	5	7		5
131	7	4	1	9	7		7
132	8	9	7	7	6		7
133	6	7	8	9	9		8
134	7	3	7	6	8		2
135	4		10	5	6		1
136	8	4	10	6	9		8
137	7	8	10	7	9		2
138	10	5	10	6	5		5
139	6	5	10	5	10		10
140	5	1	5	1	9		8
141	2	10	10	7	6		4
142	7	2	10	4	9		10
143	7	7	10	8	6		9
144	10	10	10	10	10		8
145	10	4	10	7	8		4
146	9	4	4	3	7		5
147	5		10		8		7
148	6	6	8	4	9		8
149	8	1	2	2	9		10
150	3	4	7		8		1
151	5	3	8	7	8		9
152	6	4	10		8		6
153	6	4	5		6		5
154	1	3	10	5	8		7

155	10	9	9	7	10		8
156	10	6	8	5	5		6
157	8	4	6	5	10		4
158	8	2	8	8	7		
159	8	7	7		10		3
160	8	6	8	5	9		10
161	3	7	3		10		7
162	10	3	3	3	10		8
163	6	4	3	6	10		2
164	8	7	5	5	8		5
165	5	8	7	8	6		4
166	9	7	10	9	10		8
167	7	7	6	6	10		8
168	2	5	7	5	10		7
169	6	7	5	4	5		3
170	1	1	10	7	10		6
171	8	8	7	5	7		7



Respondent #	8. Please estimate what percentage of the management of your construction program is performed in-house and what percentage is outsourced. (Total between both in-house and outsourced should equal 100%)		9. Using the definition above, are you currently using a program management approach (process) for your construction needs?	
	Manage in-house	Outsource		
1	5	2	1	
2	6		1	
3	6		1	
4	5	2	2	
5	6		1	
6	6	1	1	
7	6		1	
8	5	2	1	
9	6		1	
10	3	4	4	
11	5	2	5	Are interested in moving that direction, but government bureaucracy continues to resist
12	5	2	3	
13	2	5	1	
14	2	5	2	
15	6	1	1	
16	3	4	5	For a portion of our work (a major transportation initiative)
17	2	5	4	
18	3	4	1	
19	6		1	
20	6	1	1	
21				
22	6		1	
23	5	2	1	

24	2	5	1	
25	2	5	1	
26	3	4	2	
27	2	5	1	
28	3	4	1	
29	6		2	
30	3	4	1	
31	6	1	1	
32	5	2	1	
33	6		1	
34	4	3	2	
35	2	5	1	
36	6		1	
37	5	2	1	
38	6	1	2	
39	6		4	
40	6		4	
41	6		1	
42	6		1	
43	4	3	5	No, but we have in the past and will when workload increases
44	5	2	2	
45	6	1	4	
46	6	1	2	
47	6		2	
48	6	6	2	
49	5	2	1	
50	6		2	
51	4	3	1	
52	6		1	
53	5	2	1	
54	4	3	1	
55	6	1	4	

56	1	6	3	
57	2	5	1	
58	3	4	1	
59	4	3	2	
60	5	2	2	
61	5	2	2	
62	6		1	
63	2	5	1	
64	2	5	1	
65	5	2	1	
66	6	1	1	
67	2	5	1	
68	5	2	2	
69	6		4	
70	2	5	1	
71	3	4	1	
72	3	4	1	
73	2	6	2	
74	5	2	1	
75	5	2	1	
76	5	2	3	
77	3	4	1	
78	4	3	1	
79	3	4	1	
80	2	5	1	
81	5	2	4	
82	2	5	4	
83	4	3	1	
84	5	2	1	
85	4	3	1	
86	5	2	1	
87	2	5	1	

88	4	3	4	
89	2	5	1	
90	2	5	1	
91	2	5	2	
92	3	4	2	
93	6	1	4	
94	5	2	1	
95	5	2	1	
96	4	3	1	
97				
98	1	6	1	
99	5	2		
100	6		2	
101	3	4	1	
102	3	4	2	
103	6	1	4	
104	2	5	2	
105	4	3	1	
106	2	5	2	
107	6		1	
108	6	1	4	
109	6		1	
110	6	1	1	
111	6		1	
112	5	2	1	
113	5	2	1	
114	6		1	
115	5	2	1	
116	5	2	2	
117	2	5	1	
118	5		4	
119	6	1	1	

120	5	2	1	
121	3	4	1	
122	3	4	2	
123	2	5	1	
124	2	5	1	
125	2	5	2	
126	4	3	2	
127	4	3	5	We are using program mgmt. on a defined number of projects related to one another but are not using it uniformly across our enterprise.
128	2	5	4	
129	5	2	2	
130	4	3	2	
131	2	5	2	
132	6		1	
133	5	2	1	
134	3	4	2	
135	4	3	2	
136	4	3	2	
137	2	5	1	
138	2	5	1	
139	5	2	1	
140	5	2	1	
141	2	5	1	
142	5	2	1	
143	2	5	1	
144	5	2	1	
145	5	2	1	
146	3	4	2	
147	2	5	1	
148	6	1	1	
149	6	1	1	

150	2	5	2	
151	5	2	1	
152	2	5	1	
153	4	3	1	
154	3	4	1	
155	5	2	1	
156	5	2	2	
157	5	2	4	
158	6	1	2	
159	3	4	2	
160	6	1	1	
161	2	5	1	
162	6	1	4	
163	6	1	1	
164	4	3	1	
165	3	4	2	
166	3	4	2	
167	5	2	1	
168	5	2	2	
169	2	5	1	
170	5	2	1	
171	3	4	2	

Resp #	10. Please choose the functions that you feel should be performed by a program manager, regardless of whether or not you feel you are using program management. (Check all that apply)									
	Real Estate	Procuring Program financing	Pre-Design planning	Design Ovsght	Design performance	Procurement oversight	Construction oversight	Construction performance	Post-construction services	Operations and Maintenance
1	1	2	3	4		6	7		9	
2	1	2								
3			3	4	5		7	8	9	
4					5	6	7	8		
5			3	4	5	6	7	8	9	
6	1	2	3	4		6	7			
7	1	2	3	4	5	6	7	8	9	
8			3	4	5	6	7	8	9	
9	1	2	3	4	5	6	7	8		
10					5		7	8	9	
11			3	4	5	6	7	8	9	
12				4	5	6	7	8	9	
13			3	4			7	8	9	10
14	1	2	3	4	5	6	7	8	9	10
15			3	4		6	7	8	9	
16			3	4			7			
17			3	4	5	6	7	8	9	
18			3	4	5	6	7	8	9	
19			3	4	5	6	7	8	9	10
20	1	2	3	4	5	6	7	8	9	
21										
22	1	2	3	4	5	6	7	8	9	10
23			3	4	5	6	7	8	9	10
24	1	2	3	4	5	6	7		9	
25		2	3	4		6	7		9	
26	1	2	3	4		6	7		9	10
27	1	2	3	4	5	6	7	8	9	
28			3	4	5		7	8	9	

29			3	4	5	6	7	8	9	
30			3	4		6	7		9	
31		2	3	4		6	7			
32	1	2	3	4		6	7		9	10
33			3	4	5		7	8	9	
34			3	4	5	6	7	8		
35			3	4	5		7	8	9	
36	1	2	3	4	5	6	7	8	9	
37	1		3	4	5	6	7	8	9	
38			3	4	5	6	7	8	9	10
39				4		6	7	8	9	
40			3	4	5	6	7	8	9	
41			3	4	5	6	7	8	9	
42		2	3	4	5	6	7	8	9	10
43			3			6	7			
44			3	4	5	6	7	8	9	10
45			3	4	5		7	8	9	
46			3	4	5	6	7			
47			3	4		6	7		9	
48		2								
49			3	4		6	7		9	10
50	1	2	3	4	5	6	7	8	9	
51			3	4	5	6	7	8	9	
52			3	4	5	6	7	8	9	10
53		2	3	4	5	6	7	8	9	10
54			3	4	5	6	7	8	9	
55		2	3							
56			3	4	5	6				
57	1	2	3	4	5	6	7	8	9	
58			3	4	5	6	7	8	9	
59			3	4		6		8		
60			3	4		6	7		9	
61	1	2	3	4	5	6	7	8	9	10



62			3	4		6	7		9	
63			3	4	5	6	7	8	9	
64				4	5	6	7			
65	1	2	3	4	5	6	7	8	9	10
66			3	4	5	6	7	8	9	
67	1	2	3	4		6	7	8	9	
68			3	4	5	6	7	8	9	
69							7	8		
70		2	3	4	5		7	8	9	
71			3	4		6	7		9	
72			3	4	5	6	7	8	9	
73			3	4	5	6	7	8	9	
74			3	4		6	7	8	9	
75			3	4	5	6	7	8	9	
76	1	2	3	4		6				
77			3	4	5	6				
78		2	3	4		6	7			
79				4	5	6	7	8	9	
80			3	4	5	6	7	8	9	
81		2	3	4	5	6	7	8	9	
82			3			6	7	8	9	
83			3	4	5	6	7	8		
84		2	3	4		6	7	8	9	
85				4	5		7	8	9	
86		2	3	4	5	6	7	8	9	
87			3	4	5	6	7	8	9	10
88			3				7	8	9	10
89			3	4	5	6	7	8	9	
90		2	3	4	5	6	7	8	9	10
91		2	3	4	5	6	7	8	9	
92		2								
93	1	2								
94	1	2	3	4	5	6	7	8	9	10

95			3	4	5	6	7	8	9	
96			3	4		6	7		9	
97										
98			3	4		6	7		9	
99										
100					5			8		
101	1	2	3	4	5	6	7	8	9	10
102	1	2	3	4		6	7		9	
103							7	8	9	
104	1	2	3			6				
105	1	2		4			7			
106			3	4	5	6	7	8	9	
107	1		3	4	5	6	7	8	9	10
108				4	5					
109			3	4	5	6	7	8	9	
110		2	3	4		6	7			
111	1		3	4	5	6	7	8	9	
112	1	2	3	4	5		7	8	9	10
113	1		3	4	5	6	7	8	9	10
114	1	2	3	4	5	6	7	8	9	
115		2	3	4		6	7		9	
116	1	2	3	4		6	7		9	
117		2	3	4	5	6	7	8	9	
118	1	2				6	7	8	9	
119			3	4		6	7		9	10
120	1	2	3	4		6	7	8	9	
121			3	4	5		7	8	9	
122				4	5		7	8		
123	1	2	3				7			
124	1		3	4	5	6	7	8	9	
125	1	2		4		6	7	8	9	
126		2	3			6	7	8		
127			3	4		6	7		9	

128				4			7			
129	1		3	4	5		7	8	9	10
130			3	4	5	6	7	8	9	
131	1	2	3	4	5	6	7	8	9	
132			3	4	5	6	7	8	9	
133			3	4	5	6	7	8	9	
134						6	7	8	9	
135			3	4	5	6	7	8		
136			3	4	5	6	7	8	9	
137			3	4	5	6	7	8		
138			3	4		6	7		9	
139			3	4	5	6	7	8	9	10
140		2	3	4	5	6	7	8	9	
141	1	2	3	4	5	6	7	8	9	10
142			3	4	5	6	7	8	9	
143		2	3	4		6	7			10
144			3	4		6	7	8	9	
145			3	4		6	7		9	
146		2	3	4		6	7			
147			3	4	5	6	7	8	9	
148			3	4	5	6	7	8	9	
149			3	4	5	6	7	8	9	
150			3	4	5	6	7	8	9	
151	1	2	3	4		6	7		9	
152		2	3	4	5	6	7	8	9	10
153			3	4	5		7	8	9	
154		2					7	8		
155			3	4		6	7	8	9	
156			3	4		6	7	8	9	
157			3				7	8	9	
158			3	4	5	6	7		9	
159			3	4	5	6	7	8	9	
160		2	3	4	5	6	7	8	9	

161				4	5	6	7	8	9	
162			3	4	5	6	7	8	9	
163	1	2	3	4	5	6	7	8		
164				4	5	6	7	8	9	
165			3		5	6	7	8	9	
166			3	4		6	7			
167	1	2	3	4		6	7		9	10
168	1					6			9	
169			3			6	7	8	9	
170	1		3	4	5	6	7	8	9	
171			3	4	5	6	7	8	9	

<b>Resp #</b>	<b>11a. What percentage of activity involved with the pre-design phase of your program is outsourced?</b>	<b>11b. If you outsource the activities associated with the pre-design phase of your program, do you:</b>	<b>12a. What percentage of the oversight of design phase services is outsourced?</b>	<b>12b. If you outsource the oversight of design phase services, do you:</b>	<b>13a. What percentage of the performance of design services is outsourced?</b>	<b>13b. If you outsource design services, do you:</b>	<b>14a. What percentage of the oversight of construction is outsourced?</b>
1	5	1	4	1	2	1	4
2	6		6		2	2	4
3	4	2	4	2	2	2	2
4	6	2	5	2	5	2	5
5	4	3	4	3	2	1	6
6	5	2	5	5	1	1	3
7	6	5	6	5	2	1	6
8	2	2	2	2	2	2	5
9	6	5	6	5	2	1	6
10	5	1	4	1	1	1	3
11	5	3	3	3	2	2	3
12	4	2	6	5	2	1	5
13	4	2	3	2	1	2	4
14	5	1	5	1	2	1	2
15	5	2	5	2	5	2	6
16	3	3	5	3	2	3	4
17	5	2	6	5	1	1	2
18	4	1	4	1	1	1	3
19	5	2	5	2	2	2	6
20	6	5	6	5	3	3	6
21							
22	4	4	6	5	3	4	6
23	3	2	6	5	2	2	5
24	3	1	6		6	1	2
25	3	2	3	2	2	2	2

26	4	2	5	2	2	2	2
27	2	2	5	2	5	2	2
28	3	1	3	1	3	1	3
29	3	2	3	2	1	1	4
30	3	2	5	2	1	1	3
31	6	5	6	5	2	3	6
32	3	2	2	2	3	2	5
33	6		6		2	2	6
34	6	5	6	5	1	1	5
35	2	4	2	4	1	1	2
36	2	2	6	5	1	3	5
37	6	2	6	5	1	1	5
38	2	1	6	5	6	5	2
39	5	2	6	5	1	2	1
40	6	5	6	5	1	1	6
41	1	3	6	5	1	1	5
42	2	1	2	1	2	1	6
43	4	3	5	3	2	2	1
44	5	2	5	2	5	2	5
45	5	3	6	5	1	1	6
46	6	5	6	5	4	2	5
47	6	5	6	5	3	1	6
48	5	1	6		1	1	4
49	6	5	5	3	1	2	5
50	6		6	5	2	1	6
51	4	2	3	2	2	2	3
52	5	3	6	5	2	2	6
53	3	3	3	2	3	5	5
54	5	2	5	2	5	2	5
55	4	3	6	5	2	2	6
56	2	2	1	2	1	2	3
57	3	2	3	2	2	2	3

58	3	2	3	2	2	2	2
59	4	2	4	2	2	2	2
60	5	1	5	1	2	1	5
61	4	2	5	2	1	2	4
62	6	5	6	5	1	2	6
63	2	4	2	4	1	1	2
64	2	2	5	1	1	2	1
65	5	3	2	2	2	2	5
66	6	5	6	5	2	1	6
67	5	1	6	5	2	1	2
68	6	5	6	5	6	5	5
69	6	5	6	5	1	4	6
70	2	2	2	2	2	2	2
71	5	3	5	2	2	3	3
72	4	1	4	1	2	1	3
73	2	1	2	3	1	1	2
74	5	1	5	1	2	1	5
75	5	1	5	1	5	1	5
76	2	3	5	4	4	4	5
77	6	5	5	2	2	2	2
78	4	2	5	2	2	2	4
79	4	1	4	1	2	1	2
80	1	1	2	1	1	1	1
81	6	5	6	5	1	1	6
82	2	2	2	1	2	1	3
83	4	2	4	2	3	2	3
84	3	2	2	2	2	2	5
85	5	2	6	5	1	2	3
86	2	2	1	2	1	2	1
87	5	2	5	2	5	2	5
88	3	2	2	2	2	2	2
89	5	3	5	3	3	2	4

90	3	3	2	3	2	2	2
91	5		2	2	2	2	3
92	5	2	6	5	2	2	3
93	5	2	5	2	1	2	6
94	5	2	6	5	3	1	5
95	5	2	6	5	2	2	6
96	6	5	5	2	5	2	4
97							
98	1	4	1	4	1	3	1
99							
100	5	1	1	1	1	1	2
101	4	3	2	3	2	3	2
102	6	5	6	5	3	1	6
103	5	2	2	2	2	2	6
104	5	3	4	2	2	2	5
105	4	2	4	2	2	2	4
106	2	3	5	3	5	3	2
107	2	1	6	5	2	1	6
108	5	1	6		4	1	6
109	5	2	6	5	1	1	6
110	6	5	6	5	5	4	6
111	6	5	6	5	1	3	6
112	4	2	4	2	4	2	4
113	3	2	6	5	1	2	6
114	6	5	6	5	1	2	1
115	6	5	4	2	2	2	5
116	5	1	6	5	2	1	5
117	2	2	2	2	2	2	2
118	6	5	1	2			6
119	6		6	5	1	1	5
120	1	1	5	1	1	1	5
121	3	2	2	1	2	1	3



122	1	2	4	2	1	1	3
123	5	3	2	1	2	1	2
124	2	2	1	1	2	2	3
125	2	3	1	3	1	3	3
126	4	2	2	2	2	2	3
127	3	2	6		2	1	5
128	6	5	6	5	2	2	3
129	5	2	6	5	2	3	6
130	5	3	4	3	4	2	2
131	4	2	6	5	2	2	2
132	5	1	6	5	2	1	6
133	6	5	6	5	2	2	2
134	5	3	4	3	3	3	4
135	6	5	2	1	2	1	3
136	6		6		2	2	5
137	2	2	2	2	2	2	1
138	5	2	2	2	2	2	2
139	5	2	5	2	5	2	5
140	5	2	4	2	3	2	5
141	4	4	2	4	1	1	2
142	3	2	2	2	2	2	5
143	5	3	6	5	3	4	6
144	5	3	4	3	1	3	5
145	6	5	5	2	2	2	6
146	5	2	3	2	3	2	3
147	5	2	5	1	1	1	3
148	3	1	6	5	1	1	6
149	6	5	6	5	5	2	6
150	2	2	2	2	1	2	1
151	5	2	6		5	2	6
152	5	1	5	1	5	1	5
153	4	1	5	1	4	1	5

154	2	2	4	2	2	2	3
155	6	5	6	5	2	1	6
156	1	2	1	2	1	2	2
157	5	1	5	2	1	2	5
158	4	2	5	3	5	3	6
159	5	3	5	3	4	2	4
160	6	5	1	3	1	2	1
161	4	4	3	4	3	4	2
162	6	5	6	5	6	5	6
163	4	1	6	5	1	2	6
164	5	3	5	3	1	3	2
165	5	3	6	5	2	3	4
166	4	2	3	2	3	2	3
167	5	2	6	5	3	2	5
168	6	5	5	2	5	2	6
169	5	1	6	5	1	2	3
170	6	5	4	1	1	3	4
171	4	1	4	1	2	1	3

<b>Resp #</b>	<b>14b. If you outsource the oversight of construction, do you:</b>	<b>15a. What percentage of construction performance activity is outsourced?</b>	<b>15b. If you outsource the performance of construction, do you:</b>	<b>16a. What percentage of program activation activities are outsourced?</b>	<b>16b. If you outsource program activation activities, do you:</b>	<b>17a. What percentage of operations and maintenance activities are outsourced?</b>	<b>17b. If you outsource operations and maintenance activities, do you:</b>
1	2	1	1	5	1	6	5
2	2	2	2	5	2	5	3
3	2	6		4	2	3	1
4	2	5	2	5	2	6	5
5	4	3	3	3	3	6	4
6	2	1	1	5	2	2	2
7	5	2	1	6	5	6	5
8	2	2	2	1	1	6	5
9	5	2	2	5	3	5	3
10	2	1	1	6	5	6	5
11	3	3	2	5	2	5	2
12	2	1	1	5	2	6	5
13	2	1	1	4	2	3	2
14	3	1	1	5	3	6	5
15	5	6	5	6	5	6	5
16	3	1	1	3	3	5	3
17	2	6	5	6	5	6	5
18	1	2	1	2	1	1	1
19	5	6	5	5	2	4	1
20	5	1	1	6	5	1	5
21							
22	5	1	1	6	5	5	1
23	2	1	1	1	1	4	2
24	1	1	1	1	1	5	1
25	2	2	2	3	2	4	2
26	2	1	1	2	2	2	2

27	2	2	2	5	2	5	2
28	1	1	1	4	1	6	5
29	1	1	1	3	1	1	1
30	2	1	1	2	1	2	1
31	5	2	1	6	5	5	1
32	2	2	2	4	2	5	2
33		1	1	6		6	
34	1	1	1	1	1	6	5
35	4	1	1	2	4	3	1
36	2	5	3	6	5	6	5
37	2	1	1	6	5	6	5
38	1	2	1	3	1	6	5
39	2	1	2	6	5	5	2
40	5	1	1	6	5	6	5
41	2	1	5	6	5	6	5
42	5	3	1	6	5	6	5
43	3	2	1	2	3	5	2
44	2	2	2	5	2	6	5
45	5	1	1	6	5	1	2
46	4	1	1	6	5	6	5
47	5	1	1	6	5	5	2
48	1	1	1	6		5	1
49	2	2	2	5	3	6	5
50	5	1	1	6	5	3	2
51	2	2	2	4	3	5	3
52	5	1	2	2	2	5	2
53	3	5	4	5	3	5	3
54	2	5	2	5	2	3	4
55	5	1	1	6	5	5	2
56	2	1	2	3	2	6	5
57	2	3	2	3	2	5	2
58	2	2	2	2	2	4	2

59	4	3	2	5	4	2	3
60	1	2	1	2	1	5	1
61	2	1	2	4	2	4	2
62	5	1	1	6	5	4	1
63	4	1	1	4	4	4	3
64	2	1	2	6	5	6	5
65	2	2	2	5	2	6	5
66	5	1	1	4	1	4	2
67	1	1	1	2	1	3	2
68	3	5	3	6	5	6	5
69	5	1	2	6	5	4	2
70	1	1	1	2	1	5	1
71	2	1	1	5	2	6	5
72	1	4	1	3	1	2	1
73	3	1	2	1	1	6	5
74	1	1	1	2	1	4	1
75	1	5	1	5	1	5	1
76	3	5	3	5	3	5	4
77	2	1	2	3	2	6	5
78	2	3	2	3	2	5	3
79	1	1	1	3	1	2	1
80	1	1	1	1	1	5	3
81	5	6	5	5	2	6	5
82	2	2	2	6		6	
83	2	1	2	2	2	5	2
84	2	2	2	5	2	5	3
85	2	1	1	3	1	5	2
86	2	2	2	5	2	6	
87	2	2	2	5	2	2	2
88	2	3	2	4	2	5	2
89	2	2	3	6	5	5	1
90	2	2	2	5	2	5	2

91	2	2	2	5	2	6	5
92	2	1	2	3	2	5	2
93	5	6	5	6	5	5	2
94	1	6	5	6	5	5	1
95	5	2	2	3	2	3	2
96	2	4	2	6	5	5	2
97							
98	4	1	1	1	1	6	5
99							
100	1	1	1	6	5	6	5
101	3	2	3	2	3	4	3
102	5	2	1	6	5	5	5
103	5	6	5	6	5	5	1
104	2	2	2	5	2	2	2
105	2	5	2	4	2	5	1
106	3	2	3	5	3	5	2
107	5	2	1	4	1	6	5
108		6		6		5	1
109	5	4	2	5	2	5	2
110	5	1	1	6	5	6	5
111	5	1	3	6	5	6	5
112	2	4	2	5	2	5	3
113	2	1	2	6	5	3	3
114	2	1	2	6	5	6	5
115	2	2	2	6	5	6	5
116	1	1	1	6	5	5	2
117	2	2	2	2	2	5	2
118	5	6	5			6	2
119	1	1	1	1	5	1	5
120	1	1	1	5	1	4	1
121	2	1	1	5	2	5	2
122	2	2	2	6	5	3	1

123	1	1	1	4	1	6	5
124	1	1	1	1	2	1	5
125	3	2	1	2	3	5	4
126	2	1	1	2	2	3	2
127	1	1	1	6	5	6	5
128	2	6	5	5	2	5	1
129	5	2	1	2	2	6	5
130	2	2	2	3	2	4	2
131	2	2	2	5	2	5	2
132	5	2	1	6		4	3
133	2	1	1	3	1	5	1
134	3	4	3	2	3	6	5
135	2	3	2	6	5	6	5
136	1	1	1	5	2	5	1
137	2	2	2	6	5	2	2
138	2	1	2	5	2	3	2
139	2	4	2	5	2	2	2
140	2	1	2	2	2	6	5
141	4	1	1	2	4	1	4
142	3	5	3	6	5	6	5
143	5	2	3	6	5	5	4
144	3	2	3	5	3	5	3
145	5	1	3	6	5	4	2
146	2	3	2	5	2	5	2
147	1	1	1	5	1	3	1
148	5	1	1	6	5	6	5
149	5	6	5	6	5	6	5
150	2	1	2	2	2	5	2
151		3	2	6		6	
152	2	5	2	5	2	2	2
153	1	6		6		5	1
154	2	2	2	3	2	5	2

155	5	1	1	1	2	5	2
156	2	1	2	1	2	6	4
157	2	1	2	5	2	1	2
158	5	5	3	6	5	4	3
159	3	4	2	5	2	4	2
160	2	1	2	1	2	6	5
161	4	2	4	2	4	4	2
162	5	6	5	6	5	6	5
163	5	1	2	6	5	4	1
164	3	2	3	2	3	4	2
165	4	4	4	6	5	6	5
166	2	3	2	3	2	5	2
167	2	2	1	5	2	5	2
168	5	6	5	6	5	6	5
169	2	2	1	5	1	6	5
170	1	1	1	4	1	5	3
171	1	3	1	6	5	6	5



Resp #	18. Of your annual construction spending identified in question 4, what percentage is utilized to manage the process of construction (Combine both internal construction management and oversight costs with external or outsourced, program management, constr	19. When hiring an external program management service provider, what is the approximate fee associated, as a percentage of the program value?	20. Which of the following do you use most often to manage your construction program?	
	Cost (% of Annual Construction Spending)	Fee (%):		
1	7%			
2	3	3.6	4	
3	12%		2	
4	10%			
5	75	7	4	
6	10			
7	0			
8	1%		4	
9	05%			
10	7-10%			
11	10-15 percent	4-8%	4	
12	20%			
13	5%	1.5%	2	
14	15	8-10	3	
15	25%	12%	4	
16	20%	7%	2	
17	12% to 15%			
18	5		2	
19	10			
20	19			
21				
22	8%			

23	\$250,000 approximate staff salaries			
24	4-6%	2-3%	1	
25			2	
26	12		3	
27	10	5	5	All the above as a team
28	9.7%	4 - 6%	1	
29	10% +/-			
30	7%	3.5 percent	2	
31	8%		4	
32	20%			
33	12%	4%	1	
34	7%			
35	4%	9%	1	
36	4 to 5 %			
37	1 - 2%		4	
38	4%		3	
39	10			
40	Less than 1%			
41	10%	8 -10%	3	
42	6 % +/-			
43	20	8	1	
44	8-10%		4	
45	2%			
46	14%			
47	1.5%			
48	0			
49	1/2 %	1 %	4	
50	4%		4	
51	2%			
52	5			
53		8	2	
54	10%	10-20%	1	

55	1.5% - 2.0%			
56	8%	5%	2	
57	7%	4%	1	
58	Don't Know		1	
59	2%	1%	2	
60	20%			
61	varies	3.5%	4	
62	2%			
63	10%	15%	1	
64			5	EPCM Contractor
65	13	N/A	4	
66	0			
67	10-20%			
68	2.5%			
69	2%			
70	5%			
71	12%			
72	15%			
73	3-4%	3-4%	1	
74	Total: 8.6% = Internal 2.5% + External 6.1%	2.8%	2	
75	85%			
76	6%	7%	4	
77	5%	5%	2	
78	15% - 20%			
79	10%	10%	2	
80	10%	4%	1	
81	15			
82	5%			
83	5%	10%	2	
84	10%		4	
85	3		2	

86	8	2-3	5	mixture of all
87	10%			
88				
89	3%			
90	30-45%	20-30%	2	
91	15			
92	14%			
93	1%	Should be flat fee and based on the project	4	
94	10%		4	
95	35		2	
96	10-15%			
97				
98	3%	3%		
99				
100	0%			
101	20%			
102	10		4	
103	3			
104	50 %	3 -6%	2	
105	35	4	3	
106	10% maximum	3.5% - 5%	1	
107	0		4	
108	10%		4	
109	3.5			
110	38%	N/A	4	
111	about 2.5%-3.0%		4	
112	30	10	4	
113	1.5% - 4% of Direct Construction Cost (Cost above includes owner costs which are typically 20 -25%)			
114			4	

115	8 - 10%			
116	10%			
117	7-15	7-10	2	
118			4	
119	2.7%			
120	2%	1-3%	4	
121			2	
122	3	1	5	owner's rep
123	2%	2%	3	
124	15%	3.5 to 4%	1	
125	From 10-25% (varies from year to year)	From 0-15% (varies from project to project)	3	
126	10%		4	
127	approximately five percent		2	
128				
129	3-4%		4	
130				
131	10		2	
132	5			
133	3%(est)			
134	4%			
135	<10%			
136			4	
137	100	8	1	
138	5		5	EPC Contractor
139	8%	5%	2	
140	about 10%	10%	2	
141	8			
142	10-20			
143	10%		4	
144	11%	6%	4	
145	20%		1	

146	3%	na	2	
147			2	
148	4%			
149	Near 0%	dna done in house	4	
150	2		3	
151	8%		2	
152	65%			
153	20%			
154	50	NA	4	
155	15%	3%	4	
156	20%	15%	2	
157	10%	6%	3	
158	1%			
159	5%	2 - 3%	5	Construction Management at Risk
160	100%	3.50%	1	
161	4%	2.80%	1	
162	3%			
163	1%			
164	4%	3%	1	
165	10%			
166	49%	5.50%	3	
167	1-2%			
168	0.50%			
169	8%	4%	2	
170	5%	3%	1	
171	4%	3-6%	2	

Resp #	21. Please rate the percentage each of the following factors is considered in selecting a program manager (0% = Not a Factor, and 100% = Strongly Considered)											22. When hiring a program manager which of the following models do you most typically use?	
	Individual lead program manager	Program controls	Experience with similar projects	Depth on the bench	Past experience with your organization	Tech	Safety	Delv. on time	Savings in design costs	Savings in const costs	Greater ecos of scale		
1													
2	5	3	3	3	4	2	4	3	2	2	2	1	
3	6	5	5	4	3	5	6	5	4	4	4	1	
4													
5	5	5	6	5	5	4	4	5	5	5	4	2	
6													
7													
8	5	5	6	4	6	3	4	6	3	5	5	1	
9													
10													
11	6	5	5	5	4	6	6	6	5	6	5	2	
12													
13	6	6	4	4	5	6	5	4	4	5	5	2	
14	6	5	6	5	5	5	4	6	5	5	6	1	
15	1	1	1	5	5	1	1	1	1	1	1	1	
16	6	5	5	4	4	4	4	4	4	4	4	2	
17													
18	6	6	6	6	4	6	6	6	6	6	5	2	
19													
20													
21													
22													

23													
24	6	4	6	6	5	6	1	5	2	2	2	1	
25	4	4	6	4	5	5	3	5	4	4		3	
26	6	6	6	3	2	4	2	6	3	3	3	1	
27	5	5	5	4	5	4	4	5	4	3	2	1	
28	6	5	5	5	4	5	3	4	3	3	4	2	
29													
30	5	4	6	3	6	5	5	6	3	4	4	1	
31	2	5	6	3	5	2	3	5	2	4	3	2	
32													
33	5	5	6	5	5	5	6	6	4	4	5	1	
34													
35	6	6	6	6	5	5	6	6	6	6	6	1	
36													
37	6	5	6	5	5	5	4	5	5	5	6	1	
38	4	4	6	5	6	6	5	5	5	5	5	1	
39													
40													
41	5	5	6	3	5	5	3	5	5	5	5	3	
42													
43	6	4	6	4	5	4	2	5	4	5	3	2	
44	5	5	5	3	4	4	4	5	3	4	3	1	
45													
46	3	4	4	4	5	5	5	6	6	6	3		
47													
48													
49	6	6	5	3	4	5	5	5	5	5	5	2	
50													
51													
52													
53	6	5	5	5	5	5	6	6	5	6	5	1	
54	4	5	6	6	5	6	5	6	6	6	5	2	



55													
56	6	4	5	5	6	5	4	6	2	6	4	1	
57	6	6	6	5	5	4	1	5	2	4	3	2	
58	6	5	6	5	3	4	6	6	5	5	5	2	
59												2	
60													
61	5	5	5	4	5	4	5	5	5	5	5	1	
62													
63	5	5	5	3	4	4	5	5	4	4	4	2	
64	6	6	6	5	5	5	6	5	5	5	5	2	
65	6	6	6	6	6	6	6	6	6	6	6	1	
66													
67													
68													
69													
70													
71													
72													
73	5	4	4	5	5	4	3	5	3	3	2	3	
74	6	4	6	5	2	5	1	5	5	5	4	1	
75													
76	5	6	5	4	5	5	4	5	6	6	5	1	
77	6	5	4	5	5	4	3	4	3	4	5	5	Owner led
78													
79	6	4	4	3	4	3	3	4	2	2	2	1	
80	5	5	4	5	5	5	5	4	5	5	5	1	
81													
82													
83	6	4	5	5	4	5	6	4	4	4	4	4	
84	4	5	6	4	4	4	6	5	4	4	3	1	
85													

86	4	4	5	4	4	2	4	5	5	5	5	1	
87													
88													
89													
90	5	5	6	5	5	4	5	5	3	4	4	1	
91													
92													
93	5	5	6	5	6	5	6	6	5	5	4	5	N/A
94													
95	5	4	4	5	4	4	5	5	4	4	5	2	
96													
97													
98	6	6	6	6	6	6	6	6	6	6	6	5	RFP proce ss, By Owne r
99													
100													
101													
102	5	6	4	5	4	5	6	6	5	5	4	5	When it occur s, owner led
103													
104	4	6	5	5	6	5	6	5	4	4	5	1	
105	4	3	3	3	3	4	3	2	2	3	3	2	
106	6	5	6	6	6	6	6	6	5	5	5	2	
107													
108	4	2	3	2	3	3	1	2	1	1	1		
109													

110	6	4	6	6	5	5	4	5	1	1	4	2	
111													
112	6	5	6	4	5	5	5	5	5	5	5	1	
113													
114													
115													
116													
117	5	4	4	5	4	4	4	5	5	5	5	2	
118													
119													
120	4	2	5	4	4	3	4	5	1	1	2	2	
121	5	5	4	3	3	4	2	5	2	2	2	1	
122	3	3	3	2	4	3	3	3	3	3	3	4	
123	3	2	5	4	5	4	4	5	4	4	4	2	
124	6	5	6	4	5	4	4	5	3	3	4	1	
125	5	5	5	4	1	4	4	5	5	5	5	3	
126	5	4	6	4	5	3	6	5	3	5	5	1	
127	5	4	5	5	5	4	5	5	5	5	5	3	
128													
129													
130	3	3	4	3	4	4	3	4	3	4	4	2	
131	2	5	6	5	5	4	5	5	1	1	5		
132													
133													
134													
135													
136	5	6	6	5	6	5	6	5	4	5	3	1	
137	6	4	5	5	6	4	4	3	1	5	1	1	
138	6	5		4	4	4	6	6	6	6	5	2	
139	6	6	6	5	6	6	6	6	6	6	6	1	
140	6	6	6	6	3	2	5	6	6	6	6	2	
141													

142													
143	6	5	5	5	6	3	6	6	3	5	6	2	
144	6	5	4	5	2	6	6	6	5	5	5	2	
145	2	3	5	5	4	3	6	4	2	2	2	2	
146	5	3	5	2	5	3	4	5	3	3	4	2	
147	4	4	5	4	5	5	6	4	4	4	4	1	
148													
149	6	6	6	6	6	6	6	6	6	6	4	5	Comp leted in house
150	5	5	5	4	5	5	6	6	6	6	5	1	
151													
152													
153													
154	5	5	5	3	2	2	6	5	4	4	5	2	
155	3	4	4	3	2	2	1	5	2	4	2	1	
156	5	6	6	4	3	5	6	6	5	6	3	1	
157	6	4	5	5	5	6	3	6	5	5	5	2	
158													
159	3	3	6	5	6	5	5	5	4	6	5	4	
160	6	6	6	6	5	6	6	6	6	6	6	1	
161	5	5	6	4	5	5	4	4	3	3		1	
162													
163													
164	1	3	4	4	2	5	3	5	5	5	4	2	
165													
166	4	4	5	6	6	5	5	6	6	6	6	3	
167													
168													
169	5	4	5	4	4	3	3	5	4	4	4	2	
170	6	6	6	5	3	6	6	6	6	6	6	2	

171	5	6	6	5	5	3	2	6	4	4	2		
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## 13.0 ANNOTATED BIBLIOGRAPHY

The following sections provide detailed background on the references used within this thesis. The information that is provided for each reference includes: title, author, category, complete citation, description, and reference. If a portion of the information for the reference could not be found then the section is left blank. The references are ordered alphabetically by the author and a grouped according to topic. A quick reference table is given to aid the reader.

<b>13.1 Past and Current CMAA Surveys</b>	
[Bridgers 2000]	CMAA/FMI Owner Survey
[Bridgers 2006]	FMI/CMAA Seventh Annual Survey of Owners
[Bridgers & Napier 2005]	FMI/CMAA Sixth Annual Survey of Owners
[Doran 2004]	FMI/CMAA Fifth Annual Survey of Owners
[Doran 2003]	FMI/CMAA Survey of Owners: The Results of FMI/CMAA's Fourth Annual Survey of Owners
[Doran & McComb 2002]	2002 Owners Survey Results Say Loud and Clear: "It's the People"
[McComb & Doran 2001]	CMAA and FMI Owner Survey
<b>13.2 Construction Statistics</b>	
[Datamonitor 2006]	Construction & Engineering in the United States: Industry Profile
[Simonson 2006]	Quick Facts about the Construction Industry
<b>13.3 Program Management Procedures</b>	
[Cullerton et al. 2003]	Program Management Procedures: 2003 Edition
[Kenig et al. 2004]	Project Delivery Systems for Construction: 2nd Edition
<b>13.4 Outsourcing within Construction</b>	
[Arditi & Nawakorawit 1999]	Issues in Building Maintenance: Property Managers' Perspective
[Bon & Luck 1999]	Outsourcing of Property-Related Management Functions in Europe and North America, 1993-1998
[Gibson et al. 2001]	Owner Outsourcing Trends and their Affects on Project Practices and Performance
<b>13.5 Sourcing Strategies</b>	
[3D/I 2006]	What Does a PM Cost
[Dozzi et al. 1996]	More-Stable Owner Contractor Relationships
[Harper & Bernold 2005]	Success of Supplier Alliances for Capital Projects

[Hatush & Skitmore 1997]	Criteria for Contractor Selection
[Holt et al. 2000]	The Learning Organization: Toward a Paradigm for Mutually Beneficial Strategic Construction Alliances
[Samuels & Bruder 1996]	Construction Representative: Scheduling and Cost Management
[Waara & Bröchner 2006]	Price and Nonprice Criteria for Contractor Selection
<b>13.6 Risks of Managing a Construction Program</b>	
[Kashiwagi et al. 2005]	Source of Construction Industry Instability and Performance Problems
[Minato & Ashley 1996]	Data-Driven Analysis of “Corporate Risk” Using Historical Cost-Control Data
[Molenaar 2005]	Programmatic Cost Risk Analysis for Highway Megaprojects
[Zapalac et al. 1994]	Establishing Management Information Systems for Multiproject Programs
<b>13.7 Professional Websites</b>	
[Construction Management Association of America (CMAA) 2006]	Construction Management Association of America website
[Construction Owners Association of America (COAA) 2006]	Construction Owners Association of America Website
[Construction Users Roundtable (CURT) 2006]	Construction Users Roundtable Website
[Health Facility Institute 2006]	Health Facility Institute Website
[The Council of Educational Facility Planners (CEFPI) 2006]	The Council of Educational Facility Planners (CEFPI) website

### 13.1 Past CMAA Surveys

<b>Title:</b>	CMAA/FMI Owner Survey
<b>Author:</b>	Mark Bridgers
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Bridgers, M. (2000). <i>CMAA/FMI Owner Survey</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the first of a series of surveys directed at owners of construction. The inaugural survey was focused on assessing the current use and status of construction management. The survey addressed the issues of the definition of construction management, certification of a construction manager, and the use of the correct project delivery method. The description and findings of the survey are contained within the research report.
<b>Reference:</b>	[Bridgers 2000]

<b>Title:</b>	FMI/CMAA Seventh Annual Survey of Owners
<b>Author:</b>	Mark Bridgers
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Bridgers, M. (2006). <i>FMI/CMAA Seventh Annual Survey of Owners</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the seventh survey in a series of surveys directed at owners of construction. The survey's focus shifted from construction management, the theme of the previous six surveys, to program management. The survey contained research on outsourcing, sourcing strategy, and the hiring of an external program manager. Also, a study of the relationship between low cost capital construction and sourcing strategy is included in the report.
<b>Reference:</b>	[Bridgers 2006]

<b>Title:</b>	FMI/CMAA Sixth Annual Survey of Owners
<b>Author:</b>	Mark Bridgers & Mark Napier
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Bridgers, M., & Napier, M. (2005). <i>FMI/CMAA Sixth Annual Survey of Owners</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the sixth survey in a series of surveys directed at owners of construction. The survey focused on: delivery methods within construction, design and designer roles, project leadership and the role of the construction manager, collaboration and project control, commissioning, sustainable building, and the future of construction. The description and findings from the survey are contained within the research report.
<b>Reference:</b>	[Bridgers & Napier 2005]



<b>Title:</b>	FMI/CMAA Fifth Annual Survey of Owners
<b>Author:</b>	Dennis Doran
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Doran, D. (2004). <i>FMI/CMAA Fifth Annual Survey of Owners</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the fifth survey in a series of surveys directed at owners of construction. The survey focused on: schedule and cost issues, the phases of construction, decline in design document quality, green building, improving communication and collaboration, information technology, establishing relationships built on trust and ethical practices, and the changing construction industry. The description and findings from the survey are contained within the research report.
<b>Reference:</b>	[Doran 2004]

<b>Title:</b>	FMI/CMAA Survey of Owners: The Results of FMI/CMAA's Fourth Annual Survey of Owners
<b>Author:</b>	Dennis Doran
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Doran, D. (2003). <i>FMI/CMAA Survey of Owner: The Results of FMI/CMAA's Fourth Annual Survey of Owners</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the fourth survey in a series of surveys directed at owners of construction. The survey focused on: the phases of construction, construction manager leadership, design process and A/E productivity, quality of construction documents, owner responsibilities, time spent on recent projects by phase, the most significant changes that will improve project delivery, delivery methods, roles in the construction process, roadblocks to collaboration, and future challenges for owners. The description and findings from the survey are contained within the research report.
<b>Reference:</b>	[Doran 2003]

<b>Title:</b>	2002 Owners Survey Results Say Loud and Clear: "It's the People"
<b>Author:</b>	Dennis Doran & Gretchen McComb
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Doran, D., & McComb, G. (2002). <i>2002 Owners Survey Results Say Loud and Clear: "It's the People"</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the third survey in a series of surveys directed at owners of construction. The survey focused on: the predesign phase, design phase, procurement phase, construction phase, and future challenges for owners. The description and findings from the survey are contained within the research report.
<b>Reference:</b>	[Doran & McComb 2002]

<b>Title:</b>	CMAA and FMI Owner Survey
<b>Author:</b>	Gretchen McComb & Dennis Doran
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	McComb, G. G., & Doran, D. D. (2001). <i>CMAA and FMI Owner Survey</i> . Raleigh, NC: FMI Corporation.
<b>Description:</b>	The survey is the second survey in a series of surveys directed at owners of construction. The survey focused on: the role and responsibility of construction managers, additional assistance and value added by construction managers, selecting a construction manager, problems with outsourced construction managers, the role of construction managers in quality control and assurance. The description and findings from the survey are contained within the research report.
<b>Reference:</b>	[McComb & Doran 2001]

## 13.2 Construction Statistics

<b>Title:</b>	Construction & Engineering in the United States: Industry Profile
<b>Author:</b>	Datamonitor
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Datamonitor. (2006). <i>Construction &amp; Engineering in the United States: Industry Profile</i> (Reference Code: 0072-2028). New York: Datamonitor.
<b>Description:</b>	Construction & Engineering in the United States: Industry Profile is a research report that includes statistics on the construction industry. The report provides information on market value, market segmentation, competitive landscape, leading companies, market forecasts, and macroeconomic indicators.
<b>Reference:</b>	[Datamonitor 2006]

<b>Title:</b>	Quick Facts about the Construction Industry
<b>Author:</b>	Ken Simonson
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Simonson, K. (2006). Quick Facts about the Construction Industry. Associated General Contractors of America.
<b>Description:</b>	The report is written by the chief economist of the Associated General Contractors of America and provides general statistics on the construction industry.
<b>Reference:</b>	[Simonson 2006]

### 13.3 Program Management Procedures

<b>Title:</b>	Program Management Procedures: 2003 Edition
<b>Author:</b>	Richard Cullerton, Robert Fraga, Roger Kaul, John Macrae, Michael Miller, & Jeffrey Tyley
<b>Category:</b>	Book
<b>Complete Citation:</b>	Cullerton, R., Fraga, R., Kaul, R., Macrae, J., Miller, M., & Tyley, J. (2003). <i>Program Management Procedures: 2003 Edition</i> . McLean, Virginia: Construction Management Association of America.
<b>Description:</b>	The book provides a description of the procedures a program manager should follow. The book, which is published by the Construction Managers Association of America, addresses the requirements of a program manager during the execution of capital improvement programs. The book addresses the issues of setting up the program management activity, program development, and selecting a program manager. The responsibilities of the program manager are also discussed within each phase of construction including: planning, procurement, design, construction, activation, and operations and maintenance support.
<b>Reference:</b>	[Cullerton et al. 2003]

<b>Title:</b>	Project Delivery Systems for Construction: 2 <sup>nd</sup> Edition
<b>Author:</b>	Mike Kenig, Daniel Donohue, Dirk Hare, Damian Hill, Stan Martin, Rick Poppe, & Stephen Shapiro
<b>Category:</b>	Book
<b>Complete Citation:</b>	Kenig, M., Donohue, D., Haire, D., Hill, D., Martin, S., Poppe, R., & Shapiro, S. (2004). <i>Project Delivery Systems for Construction: 2nd Edition</i> . United States of America: Associated General Contractors of America.
<b>Description:</b>	The book addresses project delivery methods within construction. The book, which is published the Associated General Contractors of America, provides the defining characteristics of the following project delivery methods: Design-Bid-Build, Design-Build, and Construction Manager at-risk. The book also addresses the use of management techniques within construction including construction management agency and program management. Finally the book reviews variations of the delivery methods including aspects of financing and real estate.
<b>Reference:</b>	[Kenig et al. 2004]

### 13.4 Outsourcing Within Construction

<b>Title:</b>	Issues in Building Maintenance: Property Managers' Perspective
<b>Author:</b>	David Arditi & Manop Nawakorawit
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Arditi, D. & Nawakorawit, M. (1999). Issues in building maintenance: property managers' perspective. <i>Journal of Architectural Engineering</i> , 5(4), 117-132.
<b>Description:</b>	The paper investigates the current maintenance practices of property management firms. The researchers conducted a survey of the top 230 property management firms. The paper reports the findings of the survey and draws conclusions from these findings. The issues addressed within the paper include: outsourcing versus using in-house maintenance services; the use of preventative/routine/corrective/deferred maintenance, the selection of maintenance contractors, internal policies, and the facility managers involvement with design.
<b>Reference:</b>	[Arditi & Nawakorawit 1999]

<b>Title:</b>	Outsourcing of Property-Related Management Functions in Europe and North America, 1993-1998
<b>Author:</b>	Ranko Bon & Rachael Luck
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Bon, R. & Luck, R. (1999). Outsourcing of property-related management functions in Europe and North America, 1993-1998. <i>Construction Management and Economics</i> , 17, 409-412.
<b>Description:</b>	The paper is a study of the outsourcing trends of several property related management functions. The study is based upon an annual survey of corporate real estate practices in Europe and North America. The study covers a period of six years from 1993 to 1998 and reviews the outsourcing trends of the following functions: design management, construction management, facilities management, and maintenance management. Also, a correlation analysis is performed on the outsourcing within each function.
<b>Reference:</b>	[Bon & Luck 1999]

<b>Title:</b>	Owner Outsourcing Trends and their Affects on Project Practices and Performance
<b>Author:</b>	G. Edwards Gibson, Gregory C. Jantz, & Todd A. Graham
<b>Category:</b>	Research Report
<b>Complete Citation:</b>	Gibson, E., Jantz, G., & Graham, T. (2001). <i>Owner Outsourcing Trends and their Affects on Project Practices and Performance</i> . Retrieved February 1, 2007, from University of Texas at Austin, Center for Construction Industry Studies website: <a href="http://www.ce.utexas.edu/org/ccis/a_ccis_report_19.pdf">http://www.ce.utexas.edu/org/ccis/a_ccis_report_19.pdf</a>
<b>Description:</b>	The research report is from the Center for Construction Industry Studies at the University of Texas at Austin. The study focuses on owners of construction and on outsourcing within construction from 1994 to 1998. Three project phases are addressed in the study: pre-project planning, design, and procurement. The outsourcing trends for these three project functions are assessed along with the combination of all three phases. An analysis of the outsourcing trends and contractor performance is also performed within the study. The analysis compares the three project phases, five project attributes, five performance metrics, contract type selection, and three practice use indices. Conclusions are drawn on the results of the outsourcing study and the analysis.
<b>Reference:</b>	[Gibson et al. 2001]

### 13.5 Sourcing Strategies

<b>Title:</b>	What Does a PM Cost
<b>Author:</b>	N/A
<b>Category:</b>	Essay
<b>Complete Citation:</b>	3D/I. (n.d.). <i>What Does a PM Cost?</i> Retrieved Mar. 1, 2006, from <a href="http://www.3di.com/rnd/Files/Essays/What%20does%20a%20PM%20Cost.pdf">http://www.3di.com/rnd/Files/Essays/What%20does%20a%20PM%20Cost.pdf</a>
<b>Description:</b>	The essay is from 3D/I a construction services company based in Houston, Texas. The essay covers the potential costs of hiring an external program manager and the considerations for an owner when staffing up in-house or hiring an external program management firm.
<b>Reference:</b>	[3D/I 2006]

<b>Title:</b>	More-Stable Owner Contractor Relationships
<b>Author:</b>	Peter Dozzi, Francis Hartman, Neil Tidsbury, & Rafi Ashrafi
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Dozzi, P., Hartman, F., Tidsbury, N., & Ashrafi, R. (1996). More-stable owner-contractor relationships. <i>Journal of Construction Engineering and Management</i> , 122(1), 30-35.
<b>Description:</b>	The paper presents a study of contracting philosophies, strategies, methods of execution, tendering processes, and techniques. The study was based on a previous study by the Construction Owners Association of Alberta (COAA). After a review of the results of a questionnaire the researchers found that there was a reliance on lump sum contracts and that the construction industry can improve the contracting process by closer cooperation between owners and contractors.
<b>Reference:</b>	[Dozzi et al. 1996]

<b>Title:</b>	Success of Supplier Alliances for Capital Projects
<b>Author:</b>	Douglas G. Harper & Leonard E. Bernold
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Harper, D. G. & Bernold, L. E. (2005). Success of supplier alliances for capital projects. <i>Journal of Construction Engineering and Management</i> , 131(9), 979-985.
<b>Description:</b>	The paper presents a study of supplier alliances that were used on energy sector capital projects. The study discusses the opportunities and barriers with supplier alliances and reviews the metrics for measuring the success of supplier alliances. The researches concluded that the industry was slow to adopt supplier alliances and that alliances must be managed and evaluated in order for them to be successful.
<b>Reference:</b>	[Harper & Bernold 2005]

<b>Title:</b>	Criteria for Contractor Selection
<b>Author:</b>	Zedan Hatush and Martin Skitmore
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Hatush, Z. & Skitmore, M. (1997). Criteria for contractor selection. <i>Construction Management and Economics</i> , 15, 19-38.
<b>Description:</b>	The paper attempts to identify common criteria for the prequalification and bid evaluation of contractors. The study encompasses an extensive literature review and a series of interviews with a small sample of industry professionals. The most common criteria used by contractors for prequalification included: financial soundness, technical ability, management capability, and the health and safety performance of contractors.
<b>Reference:</b>	[Hatush & Skitmore 1997]

<b>Title:</b>	The Learning Organization: Toward a Paradigm for Mutually Beneficial Strategic Construction Alliances
<b>Author:</b>	Gary D. Holt, Peter E.D. Love, & Heng Li
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Holt, G. D., Love, P. E., & Li, H. (2000). The learning organisation: Toward a paradigm for mutually beneficial strategic construction alliances. <i>International Journal of Project Management</i> , 18, 415-421.
<b>Description:</b>	The paper presents a study of strategic alliances within the construction industry. The study discusses the use of learning alliances or strategic alliances where partners have a relationship that encourages mutual learning. A framework for to establish a learning relationship is presented. Also, a case study is given to support the advantages of a learning strategic alliance.
<b>Reference:</b>	[Holt et al. 2000]



<b>Title:</b>	Construction Representative: Scheduling and Cost Management
<b>Author:</b>	Allan F. Samuels & Michael J. Bruder \
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Samuels, A. & Bruder, M. (1996). Construction representative: scheduling and cost management. <i>Journal of Construction Engineering and Management</i> , 122(3), 281-290.
<b>Description:</b>	The paper presents a study of the use of construction representatives within an owner's organization. The researchers present an approach for better management of construction representative manpower which is referred to as a Construction Management Program. Three phases of cost control and scheduling of manpower are addressed including: the planning phase, the staffing phase, and the monitoring phase. A case study of the Construction Management Program by the Arizona Department of Transportation is reviewed in the paper.
<b>Reference:</b>	[Samuels & Bruder 1996]

<b>Title:</b>	Price and Nonprice Criteria for Contractor Selection
<b>Author:</b>	F. Waara & J. Bröchner
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Waara, F. & Bröchner, J. (2006). Price and nonprice criteria for contractor selection. <i>Journal of Construction Engineering and Management</i> , 132(8), 797-804.
<b>Description:</b>	The paper presents a study of how public owners use multiple criteria for contractor selection. Bidding documents from Swedish Municipalities were reviewed. Transaction cost theory is used to evaluate the contractor selection process of the Swedish Municipalities. The researchers analyzed the use of nonprice criteria by the Swedish Municipalities and concluded that owners prioritize bidders that will function efficiently in a contractual relationship.
<b>Reference:</b>	[Waara & Bröchner 2006]

### 13.6 Risks of Managing a Construction Program

<b>Title:</b>	Source of Construction Industry Instability and Performance Problems
<b>Author:</b>	Dean Kashiwagi, Kenneth T. Sullivan, David Greenwood, Jacob Kovell, & Charles Egbu
<b>Category:</b>	Conference Paper
<b>Complete Citation:</b>	Kashiwagi, D., Sullivan, K., Greenwood, D., Kovell, J., & Egbu, C. (2005). Source of construction industry instability and performance problems. <i>Construction Research Congress</i> .
<b>Description:</b>	The paper reviews the selection of contractors and how it affects performance problems within the selection industry. The paper evaluates nine different concepts to show how performance problems are caused by the selection process of contractors and not the delivery method used by the owner.
<b>Reference:</b>	[Kashiwagi et al. 2005]

<b>Title:</b>	Data-Driven Analysis of “Corporate Risk” Using Historical Cost-Control Data
<b>Author:</b>	Takayuki Minato & David B. Ashley
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Minato, T. & Ashley, D. (1998). Data-driven analysis of "corporate risk" using historical cost-control data. <i>Journal of Construction Engineering and Management</i> , 124(1), 42-47.
<b>Description:</b>	The paper focuses on risk management in construction. The paper proposes that a company that manages multiple projects should approach risk management differently than how it is handled for a single project. The paper proposes that companies should classify risks and adopt a corporate strategy for how to handle risks that exist simultaneously and routinely across multiple projects. The study suggest that if risk management is performed at a corporate level for risk that a common amongst multiple projects then this risk could be efficiently diminished.
<b>Reference:</b>	[Minato & Ashley 1998]

<b>Title:</b>	Programmatic Cost Risk Analysis for Highway Megaprojects
<b>Author:</b>	Keith R. Molenaar
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Molenaar, K. (2005). Programmatic cost risk analysis for highway megaprojects. <i>Journal of Construction Engineering and Management</i> , 131(3), 343-352.
<b>Description:</b>	The paper studies the risk involved with highway megaprojects. Highway megaprojects have had difficulty with cost overruns. The uncertainty of these projects is high due to their size and complexity. The uncertainty in the highway megaprojects is rarely reflected properly in the estimates of such projects. The paper reviews the methodology used by the Washington State Department of Transportation (WSDOT) for managing risk and estimating their large projects. The methodology is known as Cost Estimating Validation Process. The Cost Estimating Validation Process takes into account the programmatic risks with large projects and the paper states that the WSDOT is successful with their estimates using the Cost Estimating Validation Process.
<b>Reference:</b>	[Molenaar 2005]

<b>Title:</b>	Establishing Management Information Systems for Multiproject Programs
<b>Author:</b>	Russell Zapalac, Karen Kuemmler, & Tim Malagon
<b>Category:</b>	Journal Paper
<b>Complete Citation:</b>	Zapalac, R., Kuemmler, K., & Malagon, T. (1994). Establishing management information systems for multiproject programs. <i>Journal of Management in Engineering</i> , 10(1), 37-42.
<b>Description:</b>	The paper discusses the use of information technology in construction for construction programs. The requirements for an effective management information system are addressed. Recommendations for assessing the programs need, developing the schedules, and monitoring finances.
<b>Reference:</b>	[Zapalac et al. 1994]

### 13.7 Professional Websites

<b>Title:</b>	Construction Management Association of America Website
<b>Author:</b>	
<b>Category:</b>	Website
<b>Complete Citation:</b>	Construction Management Association of America. (n.d.). <i>What is Construction Management?</i> Retrieved Feb. 08, 2006, from <a href="http://cmaanet.org/cm_is.php">http://cmaanet.org/cm_is.php</a>
<b>Description:</b>	The website of the Construction Management Association of America includes information on the association along with resources on construction and program management.
<b>Reference:</b>	[Construction Management Association of America (CMAA) 2006]

<b>Title:</b>	Construction Owners Association of America Website
<b>Author:</b>	
<b>Category:</b>	Website
<b>Complete Citation:</b>	Construction Owners Association of America (COAA). (n.d.). <i>Construction Owners Association of America, Inc.: Representing the construction project Owner's interests.</i> Retrieved Aug. 23, 2006, from <a href="http://www.coaa.org/">http://www.coaa.org/</a>
<b>Description:</b>	The website of the Construction Owners Association of America provides information on the association and webpage on resources and publications for owners of construction.
<b>Reference:</b>	[Construction Owners Association of America (COAA) 2006]

<b>Title:</b>	Construction Users Roundtable Website
<b>Author:</b>	
<b>Category:</b>	Website
<b>Complete Citation:</b>	Construction Users Roundtable (CURT). (n.d.). <i>The Construction Users Roundtable: The Owners Voice to the Construction Industry.</i> Retrieved Aug. 23, 2006, from <a href="http://www.curt.org/2_0_about_curt.html">http://www.curt.org/2_0_about_curt.html</a>
<b>Description:</b>	The website for the Construction Users Roundtable provides information on the roundtable along with information on safety and workforce issues.
<b>Reference:</b>	[Construction Users Roundtable (CURT) 2006]

<b>Title:</b>	Health Facility Institute Website
<b>Author:</b>	
<b>Category:</b>	Website
<b>Complete Citation:</b>	Health Facility Institute. (n.d.). <i>Health Facility Institute: Dedicated to the Education of Health Facility Professionals</i> . Retrieved Aug. 23, 2006, from <a href="http://www.hfi.org/">http://www.hfi.org/</a>
<b>Description:</b>	The website for the Health Facility Institute provides information on the institute including symposiums, membership, and certification.
<b>Reference:</b>	[Health Facility Institute 2006]

<b>Title:</b>	The Council of Educational Facility Planners (CEFPI) website
<b>Author:</b>	
<b>Category:</b>	Website
<b>Complete Citation:</b>	The Council of Educational Facility Planners (CEFPI). (n.d.). <i>CEFPI, The School Building Association</i> . Retrieved Aug. 23, 2006, from <a href="http://www.cefpi.org/">http://www.cefpi.org/</a>
<b>Description:</b>	The Council of Educational Facility Planners website provides information on the council including resources on the construction of educational facilities.
<b>Reference:</b>	[The Council of Educational Facility Planners (CEFPI) 2006]