

PERCEPTIONS OF PROFITABILITY OF SUBCONTRACTORS ON DESIGN-BUILD
AND DESIGN-BID-BUILD PROJECTS

By

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To my family—

Who without the love and support of my family I would not be who I am today. They have been there for me through the worst of times and have always stood at my side when I needed them most.

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Abstract of Thesis Presented to the Graduate School
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From 1985 to 2010, the use of the design-build project delivery method has increased in the United States from 5% to 45% in non-residential construction. Our economy can be stimulated, during difficult times, by the jobs that the construction industry provides, and the majority of the work force that is employed by the construction industry is employed by subcontractors. Subcontractors are the backbone of the construction industry and they employ the trades that physically erect the projects in the field. This observation has brought about the concern to determine how subcontractors can become more profitable to keep our nation employed in the construction industry during good and bad economical times.

When subcontractors succeed on projects they are able to provide more jobs. But, when times are tough, profit margins are critical in order for a subcontractor to keep their staff employed. The goal was to find out if profit margins were higher for projects using the design-build delivery method, as compared to the traditional, design-bid-build delivery method. The information collected from the respondents in the construction

industry also provided insight into the reason why subcontractors are able to better succeed in a design-build environment. The results have indicated that the design-build delivery method is beneficial to the profit margins of subcontractors.

CHAPTER 1 INTRODUCTION

In 1985, non-residential construction projects that used the design-build delivery method accounted for only 5% of the market share for US construction projects, whereas, the design-bid-build delivery method was used on 83% of the construction projects (DBIA 2011). By 2010, non-residential construction projects using the design-build delivery method accounted for 45% of US construction projects while the design-bid-build method decreased to 45% of US non-residential construction projects (DBIA 2011). The American Society of Civil Engineers (ASCE) (2005) predicted as far back as 2005 that the design-build delivery method will become the dominant project delivery method in the future. On top of that, the design-build delivery method has been the delivery method of choice for high profile projects such as the tallest building in the world, the Burj Dubai, and state-of-the-art sports arenas around the globe.

Design-Build

The design-build project delivery method dates back to the ancient Egyptians, and it is often referred to as one of the oldest construction delivery methods. Within the design-build delivery method, the design firm and the construction firm are engaged by the owner under one contract. The two firms work together in order to design and construct a project that satisfies the needs of the owner. It was not until 1979 that the American Institute Architects (AIA) code of ethics and professional conduct allowed their member architects to provide construction services.

The main reason that the design-build delivery method is chosen as a project delivery method is to overlap the design and the construction phases of a project. This reduces the overall project delivery time. The design-build method is also chosen as a

delivery method because it reduces the risk to the owner since the design-build firm takes total responsibility for entire process of designing and constructing the project. The contractor's input into the design phase enables construction method considerations to be incorporated into the design of the project, which is a cost control advantage of the design-build delivery method (USDOT 2006). The general contractor and subcontractor are usually consulted throughout the design phase of a design-build project and provide insight into the project.

Design-Bid-Build

In recent decades, the design-bid-build delivery method has been the traditional method of project delivery in construction. The design-bid-build delivery method consists of three phases that happen in sequence with no overlapping; the design phase, the bidding phase, and the construction phase, respectively. The design-bid-build delivery method eliminates bias in the procurement process because each construction firm bids on the same design, unlike the procurement process in the design-build method. This makes for a more competitive bidding environment among construction firms, which in tough financial times can reduce the profit margins for both general contractors and subcontractors.

In the design phase, the owner contracts a single designer to design and produce construction plans and specifications for a project. These construction documents and specifications are the bidding documents that the general contractor will use to determine a cost for the project.

In the bid phase, multiple general contractors' submit bids based on the construction documents and specifications that were produced by the designer. During this process, if any questions are brought up about the construction documents or

specifications, the general contractor will consult with the designer. The issues are usually resolved in the form of an addendum. Once the general contractors submit their bids, the designer reviews the bids and consults with the owner on which proposal is the lowest most qualified proposal.

Once a general contractor is selected, the construction phase can begin. The contractor will now receive the most updated construction documents and specifications, which will include all changes or addenda.

Some disadvantages that are associated with the design-bid-build method is that the design team is not always current with construction costs, and any increase in construction costs, that go unnoticed during the design phase, could potentially put the project over budget. In this case, the design of the building would have to be revised in order to reduce the costs, or the project must be postponed until the construction costs decrease. Also, because the general contractor is not involved in the project until after the construction documents and specifications are complete, the general contractor has very little input in the most cost effective way to construct a project. Disputes between the general contractor and the designer may also arise in this method because they represent two different organizations with two different goals to accomplish. The designer is required to meet the needs of the owner, while the general contractor is required to construct a project within budget and on time. But, since the design team is a separate entity, the design team looks out for the owner's best interest, which is an advantage for the owner over the design-build delivery method.

Overview

Both delivery methods have advantages and disadvantages for the owners, designers, and general contractors, but there is no mention made about the driving

force behind the construction industry, the subcontractors. Majority of the time, subcontractors are selected on the lowest qualifying bid, and profit margins are a large concern for subcontracting firms that bid work in a very competitive environment. With the design-build project delivery method being a strong candidate for the project delivery method of the future, we must determine how each of these delivery methods affects the profit margins of the subcontractors. The Design-Build Institute of America (2011) claims design-build contractors' produce higher profit margins, but no mention is made about the profit margins of subcontractor's when contracted under a design-build contract, compared to being contracted by design-bid-build contract. Therefore, it would be beneficial to determine if subcontractors obtain higher profit margins on projects that utilize a design-build delivery method over the traditional design-bid-build delivery method, and what factors may contribute to higher profit margins. A list of factors would include

- Preconstruction and office tasks
- Methods and Techniques
- Management and Personnel

This is not a lengthy list of factors but they could provide insight into the areas differ between the design-build delivery method and the design-bid-build delivery method that may contribute to profit increases for subcontractors.

Problem Statement

This research brings about beneficial information for both the country and the construction industry, as increased profit margins would not only increase profit margins for subcontractors', but also increase employment levels. Many jobs in our economy are provided by subcontractors, who are the backbone of the construction industry.

However, when economic times get tough, subcontractors are one of the most affected trades in the country. As a result, subcontractors have to lay employees off. Therefore, determining if subcontractors achieve a higher profit margin under the design-build delivery method over the design-bid-build delivery method can directly impact the economy and help to reduce unemployment levels.

Objective and Organization

The objective of this research was to determine if subcontractors achieve higher profit margins on projects that utilized the design-build delivery method over the design-bid-build delivery method. This research provided a point of reference to the construction industry to evaluate subcontractors' profitability on design-build projects. This research also identified the areas of the construction process that contributed to the increase in profitability for the delivery method. This research also aimed to collect data regarding the experience and educational credentials of the employees employed on projects utilizing each project delivery method. The research results characterized that the preconstruction process was a major factor that increased the profitability margins for design-build projects.

CHAPTER 2 LITERATURE REVIEW

Lack of Subcontractor Research

A large amount of literature has been published comparing the performance between design-build and design-bid-build projects, but few studies have been done with a focus toward subcontractors and their performance on design-build and design-bid-build projects, and whether subcontractors achieve larger profit margins when contracted under a design-build or a design-bid-build project delivery approach. The design-build project delivery method is the oldest approach that is regarded as a new and alternative delivery method (Ibbs 2003). But, the design-bid-build project delivery is the traditional approach, which has been the dominant delivery method over the past several decades. It was first developed when the field of architecture and engineering became two different professions (Ibbs 2003). In the design-build delivery method, the design of the project is only about 20% to 30% complete when construction begins, as where in the design-bid-build method, the design is complete before bidding and construction begins. This enables design-build projects to be completed in a shorter amount of time, saving time and money by overlapping the construction and design phases, but no studies have shown how these savings benefit subcontractors.

Profit Margins

Regarding profit margins between the two delivery methods, a survey by Practice Management Associates (1995) revealed that 85% of contractors reported that design-build projects were more profitable for general contractors. The reasons were related to better control of the project, less competition, negotiated contracts, rather than low bid contracts, and greater design and construction production efficiency.

Another study (Erzen 2000) was conducted focusing on profit margins and used 24 projects to determine which delivery method increased a general contractor's profit margin. When comparing projects of similar complexity, design-build contracts increased profit margins from 3% on design-bid-build projects to 7% on design-build projects. This represented a 4% increase in profit margin for a design-build project over a design-bid-build project. The construction projects that were evaluated were a mix between heavy civil, industrial, and commercial building.

Material Quantities

Looking more in depth into the differences between the two delivery methods, the Construction Industry Institute, in conjunction with the Pennsylvania State University, performed a study that showed the unit cost for materials on a design-build projects were 4.5% less than Construction Management and 6% less than design-bid-build projects (Tyson 2011).

To add to that, Erzen (2000) also compared actual and budgeted quantities in design-build projects and found that design-build projects experienced a larger fluctuation between budgeted and actual quantities of material than the traditional design-bid-build method. The actual quantities were 31% to 22% higher than the budgeted amount of material for design-build projects. This finding also noted that the amount of man hours on the projects were also increased due to the increased amount of actual materials compared to budgeted materials. Design-bid-build quantities generally changed less than 1% on a majority of the projects. These findings by Erzen (2000) represented design-bid-build projects having a clearer scope than design-build projects. This would be expected due to the fact that contracts are awarded, in design-build contracts, based on the design of the project being only 20%-30% complete.

Productivity

Erzen (2000) found production rates to be lower on design-build projects than on design-bid-build projects. This was linked back to the lack of confidence in the estimate because of the design being only 20% to 30% complete when the design-build projects are awarded. But, when looking at specific tasks that did not change in quantity of units it seemed that neither contract type had a particular advantage when it came to labor production. Unit labor costs in dollars per unit were also measured between the two types of contracts, and again neither contract method showed any advantage.

Comparing Delivery Methods

Both delivery methods showed advantages and disadvantages. Design-build contracts were able to achieve lower labor costs, but they carried a bigger risk as design-build projects general increased in quantities of material when compared to design-bid-build. A superintendent, that was interviewed, said the main ingredient to increased productivity and lower costs on design-build projects was cooperation of the owner's inspector and design engineer. Design-build budgets did not reflect the actual budgets though. In the end, labor is the most controllable project cost, and is the key to increasing short term profit margins (Erzen 2000).

Hale (2009) compared design-build and design-bid-build project delivery methods. A cost analysis was done comparing cost per unit in design-build and design-bid-build methods, and it was determined that the design-build method produced a significantly lower cost per unit than design-bid-build. In this study, it was also determined that the design-build method had about one half the cost growths as design-bid-build. In conclusion of this study it was determined that the design-build method was

superior to design-bid-build because of the fact that the design-build method had less time and cost growth.

Konchar (1998) compared cost, schedule, and quality performance between construction management at risk, design-build, and design-bid-build contracts was performed. These projects were completed between 1990 and 1996 in the United States. Unit costs were determined to be the lowest in the design-build method, cost growth was lowest in design-build, construction speed was fastest in design-build, and project delivery was fastest in design-build. In regards to quality, design-bid-build generally barely met owners' expectations. Design-build contracts out performed in the areas of start up, operation and maintenance, envelope, roof, structure, and foundation. The unit costs for design-build were to be about 6.1% less than the design-bid-build method and 4.5% less than construction management at risk. Construction speed in design-build was 12% faster than design-bid-build and 7% faster than construction management at risk. Delivery speed using design-build was 33.5% faster than design-bid-build, and 23.5% faster than construction management at risk. Cost growth was at least 5.2% less using design-build than design-bid-build and 12.6% less than construction management at risk. Schedule growth in design-build was 11.37% less than design-bid-build and 2.18% less than construction management at risk.

Changes

Ibbs (2003) revealed that design-build projects experience an increase in project costs, and the reason explained for this is that the design-build delivery method does not start with a well-defined scope. During the construction phase, there was an average of about 4% cost changes, while design-bid-build experienced about 9%. The reason for the lower cost change is explained to be related to the contractors' ability to

use innovative procedures to construct the facility. Also, improved communication between the contractor and designer allowed for the reduced need for design changes. In this study labor productivity is measured in regards to changes in schedule and change in cost. This study came to the conclusion that the design-bid-build delivery method had a slightly better productivity rate over the design-build method. This statistic was in relation the schedule change. When productivity was related to cost changes, productivity was increased when cost increased, but productivity decreased when costs decreased when using the design-bid-build delivery method. They concluded by saying that design-build did not perform much better than design-bid-build. A design-build and design-bid-build delivery methods productivity change, when dealing with either cost changes or schedule changes, both experienced higher productivity with the same changes in schedule as design-build.

Warne (2005) showed that design-build projects had better price certainty and also a lower cost growth compared to design-bid-build.

Studies have done extensive research comparing the entire process of the design-build and design-bid-build methods, but little research has been done comparing the actual labor productivity achieved in the field for subcontractors on the project. Labor cost is the one thing that does not remain constant between different contractors bidding a job, and how much a contractor spends on labor can win or lose the bid for the contractor, and can also directly affect a contractor's profit margin once a contract is acquired. Knowledge of whether a certain delivery method delivers a better labor productivity rate can be utilized when bidding projects and can also change the corporate strategy of a subcontractor.

Conclusion

Many studies have been carried out to determine which project delivery method will benefit the owner, and contractor, but there is a lack of research for the subcontractor sake of the matter. The designer/contractor are one entity when under a design-build contract and have more control when they operate together, therefore finding out how this situation affects the profit margin of a subcontractor can lead to changes in a subcontractors company.

CHAPTER 3 METHODOLOGY

Survey

Overview

The survey questions focused on the opinions of employees, of various backgrounds in the subcontractors' tier of the construction industry, on factors that could increase the profitability of a subcontractor when using the design-build delivery method over the design-bid-build delivery method. Those areas of interest included:

- Preconstruction and office tasks
- Methods and techniques
- Management and personnel

The responses to these statements were gathered to determine if and why a subcontractor achieved a higher profitability when contracted under a design-build delivery method over a design-bid-build delivery method.

Population

The sample population targeted for this survey consisted of those that were employed in the subcontracting tier of the construction industry. The respondents targeted were chief executive officers, chief financial officers, project managers, estimators, supervisors, and laborers. Respondents of varying experience and educational levels were also targeted for this survey.

Survey Design

The survey was not designed to target any specific employment category, but rather to get responses from personnel involved in every level of a construction company, on a subcontracting level. The surveying of a broad range of individuals enabled different types of information to be gathered on areas of construction that would

not have been able to have been gathered if only management or field personnel were targeted. For example, a chief financial officer would be able to better estimate profits that were produced on a project than the estimator; however an estimator would be able to give more information regarding the actual bidding and preconstruction aspect of a project.

The survey was created and distributed online through Zoomerang (<http://www.zoomerang.com/>). It consisted of nine questions and eleven statements. The first portion of the survey asked specific question about the individual taking the survey and about the company they were employed by. Following the first section was 4 sections of statements that respondents were to rate using a 5-point Likert scale. The lowest answer was 1; corresponding with strongly disagreeing with the statement, 2; corresponding with disagreeing with the statement, 3; indicating that the respondent was neutral on the statement, 4; indicating that the respondent agreed with the statement, and 5; indicating that the respondent strongly agreed with the statement. A neutral response in this survey was regarded as indicating that both project delivery methods were producing similar results.

Demographic Questions

The first question of the survey asked what construction division the company they were employed by performed work under. The answers listed the first 16 divisions of the CSI (Construction Specifications Institute), and also for the respondents to specify another questions. This question helped to make sure that all answers were available.

The second question asked what the respondent's role in the company they worked for was. The options that were available were; Owner, Chief Executive Officer, Chief Financial Officer, Chief Operating Officer, Project Manager, Estimator,

Superintendent, Foremen, Laborer, and Other, please specify. This question indicated if the survey represented each employment level of the construction industry.

The third question asked how long the respondent had been working in the construction industry. The response options were; 0–2 years, 3–5 years, 6–10 years, 11–20 years, 21–30 years, and more than 30 years. This question was used to make comparisons with statements that were answered by the respondents under the management and personnel section.

The fourth question asked the respondents what their current educational level was. The responses to this question included: did not complete high school, GED, high school, associate's degree, bachelors degree, masters degree, doctoral degree, and other, please specify.

The fifth question asks the respondent if they had ever taken educational courses in construction. The two choices were yes and no.

The sixth question asked respondents which area of the construction industry the company they were employed by performed work in. Respondents were able to choose more than one option and the options were: commercial, residential, industrial, transportation, heavy civil, and other.

The seventh question asked what the annual revenue of the respondents' companies was. The options were; under \$500,00, \$500,000–\$999,999, \$1,000,000–\$9,999,999, \$10,000,000–\$49,999,999, \$50,000,000–\$99,999,999, \$100,000,000–\$1 billion, \$1 billion–\$5 billion, \$5 billion–\$10 billion, and over \$10 billion.

The eighth question asked how many employees were employed by the respondents' companies. The option that were available were: less than 10 people, 10–

49 people, 50–99 people, 100–149 people, 150–249 people, 250–500 people, and more than 500 people.

The ninth question asked respondents what regional location their company performed work in. The options that were available were; Northeast (New England), Northeast (Mid-Atlantic), Midwest, West (Mountain), West (Pacific), Southwest, Southeast, and Other.

Preconstruction and Office Tasks Section

The preconstruction and office tasks section consisted of five statements that related to preconstruction and office tasks changing the profit margins for a design-build project compared to a design-bid-build project.

The first statement in the preconstruction and office tasks statement was related to whether profit margins were higher on projects in which the subcontractors received RFI responses from the General Contractor in a timely manner. This showed whether the collaboration between the designer and contractor in a design-build project could produce higher profit margins by providing more timely response to RFI's that are submitted by subcontractors, than on design-bid-build projects.

The second statement asked whether the respondent's firm produced higher profit margins on Design-Build projects because more time and resources are invested in preconstruction planning for design-build projects than on design-bid-build projects. This statement will show if more time and resources is invested in the preconstruction stage of development can increase profit margins in design-build projects.

The third statement asked whether the respondent's firm produced higher profit margins on design-build projects than on design-bid-build projects because it took advantage of the fact that they could give feedback to the designer/contractor on the

most cost effective way to construct a design-build project. The responses would be useful to determine whether subcontractors and contractors involvement and the feedback they give in the design process increased profit margins on design-build projects.

The fourth statement asked whether design-build projects had faster response times to submitted change orders and RFI's than design-bid-build projects, which leads to higher profit margins on design-build projects. This statement can be correlated another statement (11) to determine whether respondents do in fact believe that design-build projects had faster response times to design documents, resulting in an increased profit margin.

The fifth statement asked whether the respondents' firms estimated the initial cost of a project to be higher for a design-build project than a design-bid-build project; because of the incomplete and vague construction drawings that they typically received during the bid process. The responses to this statement would indicate whether firms tend to be more conservative when estimating with design-build design documents that are only 20–30% complete. This conservative method could possible increase profit margin on design-build projects.

Methods and Techniques Section

The methods and techniques section consisted of three statements that related to the methods and techniques used on design-build project as compared to the methods and techniques used on design-bid-build projects. The first statement asked whether the respondents' firm utilized Building Information Modeling (BIM) on design-build projects more so than on design-bid-build projects, resulting in more profitable design-build projects.

The second statement asked whether more advanced software is used on design-build projects than on design-bid-build projects, and resulting in a more profitable design-build project. This statement help in determining whether construction software is used more on design-build projects than on design-bid-build projects resulting in a more profitable design-build project.

The third statement asked whether more innovative and advanced construction techniques were used on design-build projects than on design-bid-build projects, resulting in a more profitable design-build project. This statement can be compared with other statements (13) to determine if subcontractors discuss new methods to construct a project and utilize those techniques in order to increase profit margins.

Management and Personnel Section

The management and personnel section consists of three statements that compare the management and personnel on a design-build project to those on a design-bid-build project.

The first statement in the management and personnel section asks that since design-build is a relatively new project delivery method to the construction industry, our firm seeks to employ more college graduates that have studied the design-build delivery method at a college or university, on design-build projects than on design-bid-build projects, which helps increase profitability on design-build projects. This statement can be compared to statement (10) and question (4).

The second statement asks whether the experience level of a project manager on a design-build project is lower than that of a project manager on a design-bid-build project, because the older generation is not as familiar with the design-build project delivery method, which is turn decreases the profitability margin on design-build projects

due the lack of experience. The statement can be compared with question (3), which asked for the respondent's length of time they have been employed in the construction industry.

The third statement whether the personnel in the respondents' firms are more familiar with managing design-bid-build projects than design-build projects, which helps to increase profitability on design-bid-build projects over design-build projects. This statement can be compared against the other two statements in this section to determine whether there is a correlation.

Overall Perspective

The overall perspective section dealt mainly with broad statements relating to design-build and the respondents overall perspective on the project delivery method and consisted of five statements.

The first statement asked whether profit margins are higher for design-build projects than for design-bid-build projects in the respondents' company. This statement will show if a respondent believes profit margins are higher for design-build projects, regardless of the reasoning.

The second statement asked whether design-build projects are more likely to finish on schedule than design-bid-build projects, resulting in a more profitable design-build project. The responses to this statement will show whether the design-build delivery method stays more on schedule than design-bid-build projects just because of the delivery method being used on the project.

The third statement asked whether the respondents' firms converted to doing design-build projects because they expected higher profit margins. This statement will

show if profit margins are the sole reason a company performs work under design-build contracts.

The fourth statement asked whether the respondents' firms achieved better field productivity on design-bid-build projects than on design-build projects, resulting in a higher profit margin on design-bid-build projects. This statement was generalized to determine whether respondents noticed better field productivity on design-bid-build projects resulting in higher profit margins.

The fifth statement asked whether in the future, the design-build project delivery method will be the preferred construction project delivery method. This statement will be used to see how the respondents forecast the use of the design-build project delivery method.

Analysis

The results of the survey were analyzed by obtaining the mean, median, mode, standard deviation, standard error, skewness, and kurtosis for statements (10) through (25). Microsoft Excel was used to calculate all the statistics.

The results were also analyzed for any correlation patterns between questions and this was accomplished by calculating Chi Squared and the Correlation coefficient. The Chi Squared calculation tested for independence. The probability of the Chi-Square test in the 95th percentile,

The Spearman Rank Order correlation method was also used to determine if there were any associations between variables. This analysis was only used to compare statements against statements, and was not used to compare statements to questions under the demographics section.

CHAPTER 4
RESULTS AND ANALYSIS

Demographics of Respondents

The survey was sent to personnel employed in the subcontractor and self-performing general contractor tier of the construction industry. It was completed by 44 individuals. These individuals had different roles in their companies, but the majority of the respondents were estimators and project managers, both, combined, representing 50% (22) of the respondents (Figure 4-1). The survey was also sent to respondents that represented different trades of subcontractors with 15% (7) of the respondents performing work under Division 15 of the mechanical trade, 39% (17) performing work under Division 1 as a self-performing general contractor, and 14% (6) performing work under Division 3 of the concrete trade (Figure 4-2).

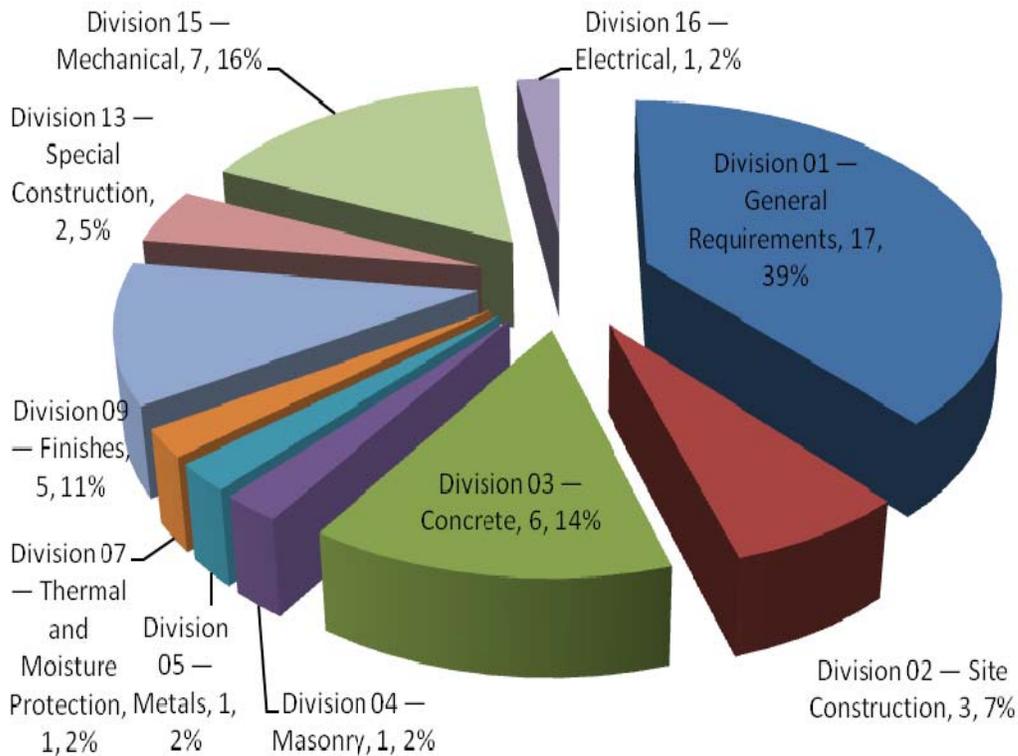


Figure 4-1. Respondents' role in their company

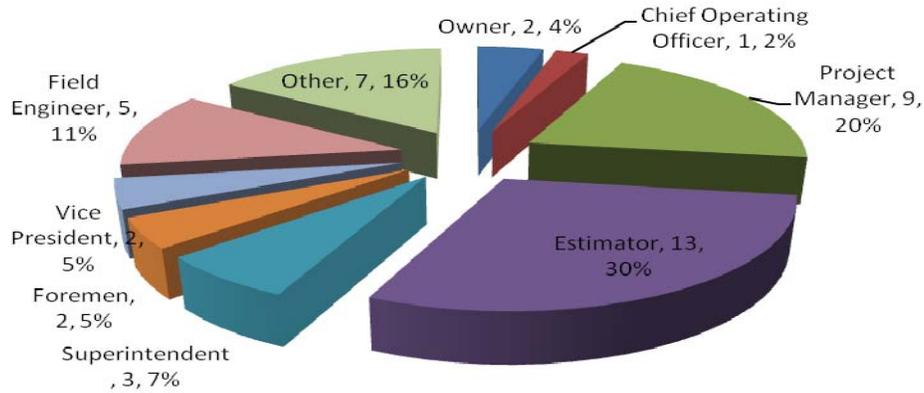


Figure 4-2. Construction division the respondents' companies performed work under

The respondents also provided personal information regarding the amount of time they have worked full-time in the construction industry. The majority of the respondents surveyed had spent more than 30 years in the construction industry, which represented 23% (10) of the respondents, and 19% (8) of the respondents had spent less than 5 years in the construction industry (Figure 4-3). The remaining 56% (25) of the respondents had between 6 and 30 years of construction experience (Figure 4-3).

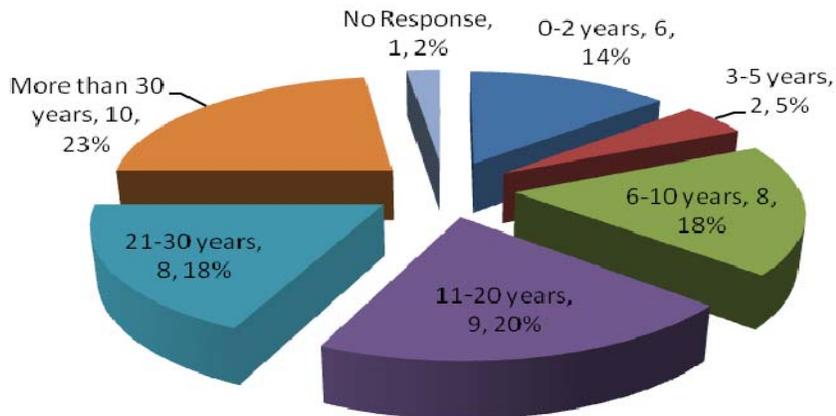


Figure 4-3. Respondents' years of full-time work in the construction industry

The respondents also provided information about their educational background and whether or not they have taken educational courses in construction. The survey reported that 70% (31) of the respondents had either a bachelors or a masters degree

(Figure 4-4) and 77% (34) of those respondents indicated that they have taken educational classes in construction (Figure 4-5).

The respondents also provided information regarding the area of the construction industry that they have performed work in. The largest number of respondents

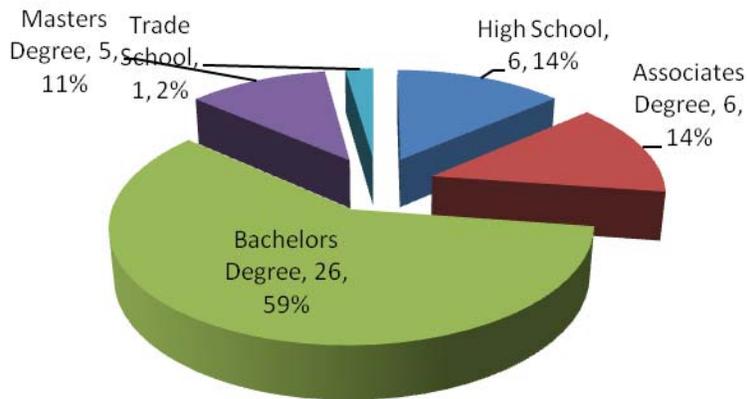


Figure 4-4. Respondents' current educational level

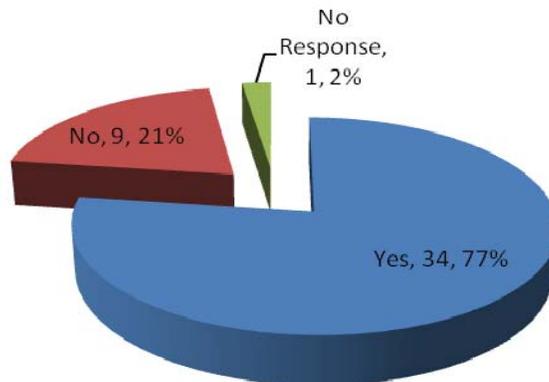


Figure 4-5. Respondents' participation in educational construction classes performed work in the areas of commercial and industrial construction, which represented 86% (38) and 71% (31) of the respondents, respectively. Other areas of

performance in the construction industry were in residential, transportation and heavy civil, which consisted of 27% (12), 23% (10) and 27% (12), respectively (Table 4-1).

Table 4-1. Construction industry respondents' company perform work in

Field of Work	Frequency	Total Possible	Percentage of Total
Commercial	38	44	86%
Residential	12	44	27%
Industrial	31	44	71%
Transportation	10	44	23%
Heavy Civil	12	44	27%
Healthcare/Educational	3	44	7%

The respondents were also asked to provide the annual revenue of the company that they currently worked for. A majority of companies, 70% (31), produced revenues in excess of 50 million dollars (Figure 4-6).

The respondents also provided information regarding the number of employees that were employed by their employer. A majority of the respondents, 61% (27),

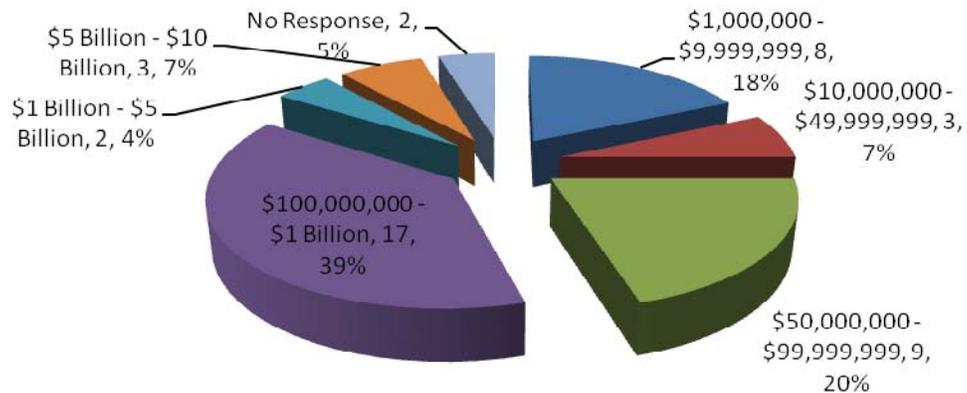


Figure 4-6. Respondents' company annual revenue reported having 250 or more employees employed by the company they were employed by (Figure 4-7).

Their geographical location was also requested from the respondents with 65% (28) of the respondents reporting to performing work in the Southeast region of the

United States, while an evenly distributed number of the respondents also performed work in other geographical areas around the United States (Table 4-2). Their companies also performed work in Mexico City and Canada (Table 4-2).

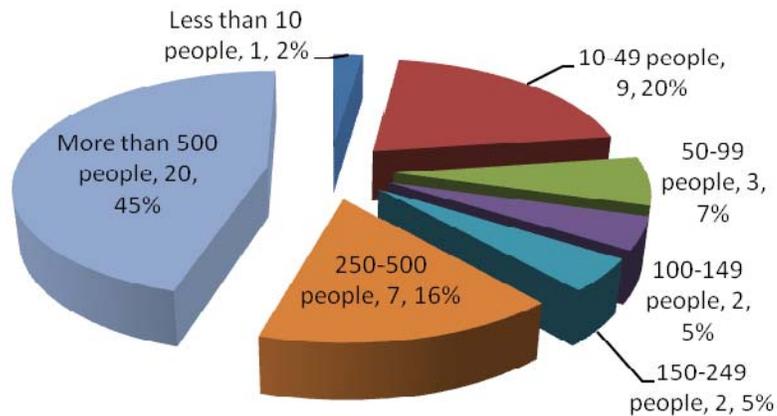


Figure 4-7. Number of employees employed by respondent's company

Table 4-2. Regional location of respondents' company headquarters

Location	Frequency	Total Possible	Percentage of Total
Northeast (New England)	4	44	9 %
Northeast (Mid-Atlantic)	5	44	11%
Midwest	5	44	11%
West (Mountain)	5	44	11%
Southwest	1	44	2%
Southeast	28	44	64%
Mexico City	1	44	2%
Canada	1	44	2%

Preconstruction and Office Tasks

The preconstruction and office tasks section was designed to determine if the preconstruction stage, and the way office tasks are handled, between each project delivery method affects a subcontractors profitability margin. This section was focused on the manner in which preconstruction services are performed, and the manner in

which duties in the office are handled. Each of the five questions had a response that averaged above 3.0. This showed that most of the respondents were in agreement with the statements in this section (Table 4-3).

The statement that had the highest average was (13) “Our firm produces higher profit margins on design-build projects than on design-bid-build projects because it takes advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a Design-Build project” where the average was 3.705 (Table 4-3). The standard deviation for the five statements was relatively the same for each of the five questions. As shown in Table 4-3, the largest standard deviation was 1.006, for statement (15). Statements (11) and (14) both represented the largest skewness value(negative), in this section (Table 4-3). This showed that the majority of the respondents were in agreement with each of the statements.

The frequency of the responses for each of the statements is shown in Table 4-4. Statement (13) received the largest amount of responses that strongly agreed with this statement (Figure 4-8). Statement (13) also had no strong disagreements with it (Table 4-4). Statement (11) also received no strong disagreements, and 66% (34) of the respondents either agreed or strongly agreed with the statement (Table 4-4). All of the statements had more of the respondents in agreement with them, than in disagreement with them. This showed that preconstruction and office tasks are a factor in increasing profit margins in design-build projects for subcontractors.

Table 4-3. Statistics on the preconstruction and office tasks section

Statement	Mean	Median	Mode	Std. Dev.	Std. Error	Skewness	Kurtosis
11) Profit margins are higher on projects in which the subcontractors receive RFI responses from the General Contractor in a timely manner.	3.614	4	4	0.841	0.127	*-0.622	-0.163
12) Our firm produces higher profit margins on DB projects because more time and resources are invested in preconstruction planning for DB projects than for DBB projects.	3.256	3	4	1.002	0.153	-0.102	-0.710
13) Our firm produces higher profit margins on DB projects than on DBB projects because it takes advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a DB project.	*3.705	4	4	0.978	0.147	-0.452	-0.695
14) DB projects have faster response times to submitted change orders and RFI's than DBB projects, which leads to higher profit margins on DB projects.	3.250	3	3	0.866	0.131	*-0.746	0.516
15) Our firm estimates the initial cost of a project to be higher for a DB project than a DBB project; because of the incomplete and vague construction drawings we typically get during the bid process.	3.318	3	4	*1.006	0.152	-0.119	-0.628

*Data that is referenced in the text

Table 4-4. Frequency of responses for preconstruction and office tasks

11) Profit margins are higher on projects in which the subcontractors receive RFI responses from the General Contractor in a timely manner.

	Frequency	Percentage
Disagree	6	14%
Neutral	9	21%
Agree	*25	57%
Strongly Agree	*4	9%

12) Our firm produces higher profit margins on DB projects because more time and resources are invested in preconstruction planning for DB projects than for DBB projects.

	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	10	23%
Neutral	13	30%
Agree	15	35%
Strongly Agree	4	9%
No Response	0	0%

13) Our firm produces higher profit margins on DB projects than on DBB projects because it takes advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a DB project.

	Frequency	Percentage
Disagree	7	16%
Neutral	8	18%
Agree	20	46%
Strongly Agree	*9	21%

14) DB projects have faster response times to submitted change orders and RFI's than DBB projects, which leads to higher profit margins on DB projects.

	Frequency	Percentage
Strongly Disagree	2	5%
Disagree	5	11%
Neutral	18	41%
Agree	18	41%
Strongly Agree	1	2%

15) Our firm estimates the initial cost of a project to be higher for a DB project than a DBB project; because of the incomplete and vague construction drawings we typically get during the bid process.

	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	9	21%
Neutral	14	32%
Agree	15	34%
Strongly Agree	5	11%

*Data that is referenced in the text

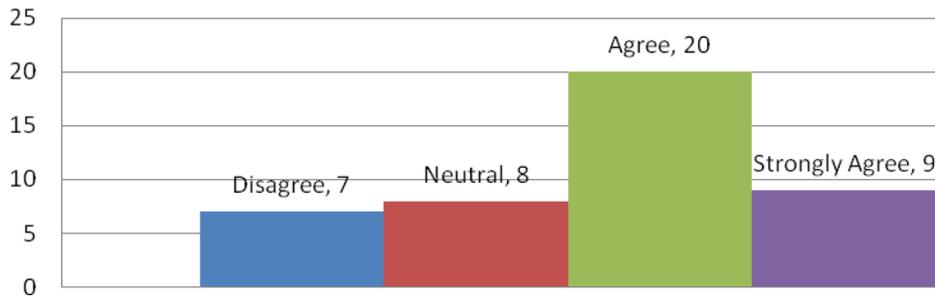


Figure 4-8. Statement 13 responses

A Spearman's Rank Order Correlation was performed to determine if there was any association between statement (10) that profit margins are higher for Design-Build projects than for Design-Bid-Build projects and all the statements in the preconstruction and office tasks section. Statement (10) was the most direct statement soliciting the respondents opinion on the profit margins between each delivery method, which was the reason why statement (10) was chosen for the Spearman's Rank Order correlation between questions in the preconstruction and office tasks section. The preconstruction and office tasks section had the highest response average of any of the sections, which indicated that the respondents were most in agreement with preconstruction and office tasks increasing profit margins. As shown in Table 4-5, the Spearman Rank Order Correlation analysis showed a strong association between statement (13) that the respondents' firms produced higher profit margins on design-build projects than on design-bid-build projects because it took advantage of the fact that they could give feedback to the designer/contractor on the most cost effective way to construct a design-build project and statement (12) that they produced higher profit margins on design-build projects because more time and resources are invested in preconstruction planning for design-build projects than for design-bid-build projects ($r=0.825$, $n=44$, $P=0.000$). A strong correlation was also shown between statement (10) and statement

(13) ($r=0.613$, $n=44$, $P=0.000$) (Table 4-5). These results indicated a strong correlation between respondents being in agreement with design-build projects producing larger profit margins because of differences in preconstruction and office tasks between each of the project delivery methods.

Methods and Techniques

The methods and techniques section dealt mainly with the amount of innovation and technology that is used with each of the project delivery methods. As shown in Table 4-6, two of the three statements, in this section, had a mean below 3.0. This indicated that most of the respondents disagreed with the statements in this section. Statement (18) that “more innovative and advanced construction techniques are used on design-build projects than on design-bid-build projects, resulting in a more profitable design-build project” had a mean slightly above 3.0, but not enough so as to be in strong agreement with the statement (Table 4-6). Statement (17) showed a strong, positive, kurtosis, representing a strong peak on its graph on the disagreement side of the spectrum (Figure 4-9).

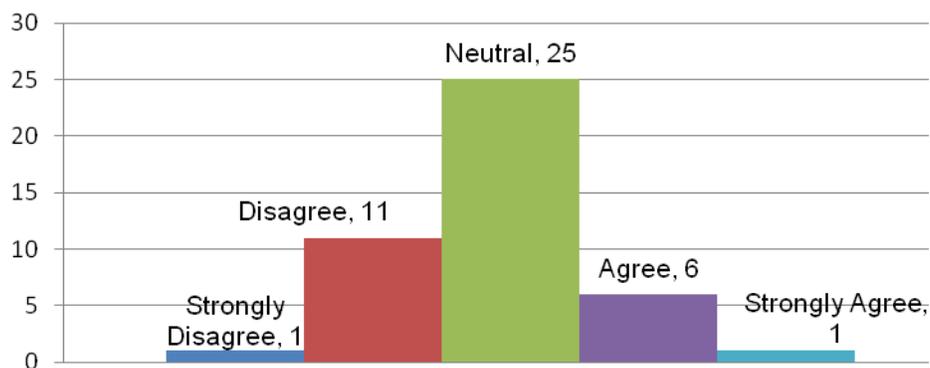


Figure 4-9. Statement 17 responses

Table 4-5. Spearman's Rank Order Correlation for statements 10, 11, 12, 13, 14, and 15

	10) Profit margins are higher for DB projects than for DBB projects in your company.	11) Profit margins are higher on projects in which the subcontractors receive RFI responses from the General Contractor in a timely manner.	12) Our firm produces higher profit margins on DB projects because more time and resources are invested in preconstruction planning for DB projects than for DBB projects.	13) Our firm produces higher profit margins on DB projects than on DBB projects because it takes advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a DB project.	14) DB projects have faster response times to submitted change orders and RFI's than DBB projects, which leads to higher profit margins on DB projects.	15) Our firm estimates the initial cost of a project to be higher for a DB project than a DBB project; because of the incomplete and vague construction drawings we typically get during the bid process.
Correlation Coefficient	1.000	0.153	0.609	*0.613	0.425	-0.123
P. (2-tailed)	-	0.077	0.000	0.000	0.000	0.127
Correlation Coefficient	0.153	1.000	0.206	0.169	0.327	-0.099
P. (2-tailed)	0.077	-	0.027	0.058	0.001	0.179
Correlation Coefficient	0.609	0.206	1.000	*0.825	0.532	-0.102
P. (2-tailed)	0.000	0.027	-	0.000	0.000	0.172
Correlation Coefficient	0.613	0.169	0.825	1.000	0.336	-0.115
P. (2-tailed)	0.000	0.058	0.000	-	0.001	0.143
Correlation Coefficient	0.425	0.327	0.532	0.336	1.000	-0.040
P. (2-tailed)	0.000	0.001	0.000	0.001	-	0.356
Correlation Coefficient	-0.123	-0.099	-0.102	-0.115	-0.040	1.000
P. (2-tailed)	0.127	0.179	0.172	0.143	0.356	-

*Data that is referenced in the text

Table 4-7 shows the frequency of the responses for each of the statements. The responses for statements (16) and (17) showed that the majority of the respondents were in disagreement with each of the statements. These statements showed similarity in that they all showed some sort of disagreement toward the fact that the methods and

techniques used on design-build projects were not a factor in increasing the profitability of a design-build project over a design-bid-build project.

Table 4-6. Statistics on the methods and techniques section

Statement	Mean	Median	Mode	Std. Dev.	Std. Error	Skewness	Kurtosis
16) Our firm utilizes BIM on DB projects more so than on DBB projects, resulting in a more profitable DB project.	*2.864	3	3	0.955	0.144	-0.101	0.115
17) More advanced software is used on DB projects than on DBB projects, resulting in a more profitable DB project.	*2.886	3	3	0.754	0.114	0.193	*0.808
18) More innovative and advanced construction techniques are used on DB projects than on DBB projects, resulting in a more profitable DB project.	*3.068	3	3	0.974	0.147	0.175	-0.665

*Data that is referenced in the text

A Spearman's Rank Order Correlation coefficient analysis was performed involving statement (24) that the respondents' firms achieved "better field productivity on design-bid-build projects than on design-build projects, resulting in a higher profit margin on design-bid-build projects" to determine if any change in field productivity correlated with more advanced methods and techniques being used on a design-build

projects. As shown in Table 4-8, statement (17) and (18) had the strongest correlation ($r= 0.708$, $n=44$, $P=0.000$). Statement (16) that the respondents' firms utilized BIM on design-build projects more so than on design-bid-build projects, resulting in a more profitable design-build project" had a strong positive correlation with statement (17) that "more advanced software is used on design-build projects than on design-bid-build projects, resulting in a more profitable design-build project," ($r=0.680$, $n=44$, $P=0.000$) (Table 4-8). The strongest of all associations was statement (17) with statement (18) ($r=0.708$, $n=44$, $P=0.000$) (Table 4-8). This correlation analysis indicated that

Table 4-7. Frequency of responses for methods and techniques section

16) Our firm utilizes Building Information Modeling (BIM) on Design-Build projects more so than on Design-Bid-Build projects, resulting in a more profitable Design-Build project.

	Frequency	Percentage
Strongly Disagree	2	5%
Disagree	10	23%
Neutral	21	48%
Agree	9	21%
Strongly Agree	1	2%
No Response	1	2%

17) More advanced software is used on Design-Build projects than on Design-Bid-Build projects, resulting in a more profitable Design-Build project.

	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	11	25%
Neutral	25	57%
Agree	6	14%
Strongly Agree	1	2%

18) More innovative and advanced construction techniques are used on Design-Build projects than on Design-Bid-Build projects, resulting in a more profitable Design-Build project.

	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	13	30%
Neutral	15	34%
Agree	12	27%
Strongly Agree	3	7%

of those respondents that utilized more advanced software to increase profit margins on design-build projects, also utilized more advanced construction methods and techniques leading to increases profit margins for design-build projects.

Management and Personnel

The management and personnel section asked the respondents whether design-build projects are staffed differently than design-bid-build projects. This section also asked the respondents to provide their educational levels, and their experience levels on both types of projects. As shown in Table 4-9, each of the three

Table 4-8. Spearman's Rank Order Correlation for statements 24, 16, 17, and 18

	24) Our firm achieves better field productivity on DBB projects than on DB projects, resulting in a higher profit margin on DBB projects.	16) Our firm utilizes Building Information Modeling (BIM) on DB projects more so than on DBB projects, resulting in a more profitable DB project.	17) More advanced software is used on DB projects than on DBB projects, resulting in a more profitable DB project.	18) More innovative and advanced construction techniques are used on DB projects than on DBB projects, resulting in a more profitable DB project.
Correlation Coefficient	1.000	0.134	0.049	-0.165
P (2-tailed)	-	0.107	0.325	0.062
Correlation Coefficient	0.134	1.000	*0.680	0.546
P (2-tailed)	0.107	-	0.000	0.000
Correlation Coefficient	0.049	0.680	1.000	*0.708
P (2-tailed)	0.325	0.000	-	0.000
Correlation Coefficient	-0.165	0.546	0.708	1.000
P (2-tailed)	0.062	0.000	0.000	-

*Data that is referenced in the text

statements had a mean below 3.0, showing that most of the respondents disagreed with all three of the statements. Statement (22) that “the experience level of a project manager on a design-build project is lower than that of a project manager on a design-bid-build project, because the older generation is not as familiar with the design-build project delivery method, which in turn decreases the profitability margin on design-build projects due to the lack of experience” had the lowest average at 2.341 (Table 4-9). Table 4-10 shows the frequency of the responses to the statements in the methods and techniques section. Two of the statements, statement (21) and (22) had over 50% of the respondents either being neutral on the statement, disagreeing or strongly disagreeing with each statement. Statement (23) had 36% (16) of the respondents disagree or strongly disagree with the statement (Table 4-10). This showed that education and experience levels were not a factor in increasing profitability on design-build projects. Of the three statements, more respondents agreed or strongly agreed with statement (23) than any other of the statements in the management and personnel section. This indicated that design-bid-build projects produce higher profit margins due to the firm’s familiarity with the design-bid-build project delivery method (Table 4-10).

A comparison of the years of experience of a respondent, and how they responded to the educational and experience level statements that were in the management and personnel section was done to determine whether there was any association between how the younger generation perceives the statements regarding management and personnel on a design-build project and how the older generation perceives the statements regarding management and personnel on design-build projects.

Table 4-9. Statistics on the management and personnel section

Statement	Mean	Median	Mode	Std. Dev.	Std. Error	Skewness	Kurtosis
21) Since DB is a relatively new project delivery method to the construction industry, our firm seeks to employ more college graduates, that have studied the DB delivery method at a college or university, on DB projects than on DBB projects, which helps increase profitability on DB projects.	2.886	3	3	0.722	0.109	-0.213	-0.101
22) The experience level of a project manager on a DB project is lower than that of a project manager on a DBB project, because the older generation is not as familiar with the DB project delivery method, which in turn decreases the profitability margin on DB projects due to the lack of experience.	*2.341	2	2	1.055	0.159	0.503	-0.420
23) The personnel in our firm are more familiar with managing DBB projects than DB projects, which helps to increase profitability on DBB projects over DB projects.	2.659	3	3	1.119	0.169	-0.040	-0.469

*Data that is referenced in the text

Table 4-11 shows the analysis of the Chi Square association test between statement (3) and statements (21), (22), and (23). The analysis showed that the strongest association was between statement (3) and statement (23) “the personnel in our firm are more familiar with managing design-bid-build projects than design-build

Table 4-10. Frequency of responses for management and personnel section

21) Since DB is a relatively new project delivery method to the construction industry, our firm seeks to employ more college graduates, that have studied the DB delivery method at a college or university, on DB projects than on DBB projects, which helps increase profitability on DB projects.

	Frequency	Percentage
Strongly Disagree	1	*2%
Disagree	11	*25%
Neutral	24	*55%
Agree	8	18%

22) The experience level of a project manager on a DB project is lower than that of a project manager on a DBB project, because the older generation is not as familiar with the DB project delivery method, which in turn decreases the profitability margin on DB projects due to the lack of experience.

	Frequency	Percentage
Strongly Disagree	10	*23%
Disagree	17	*39%
Neutral	10	*23%
Agree	6	14%
Strongly Agree	1	2%

23) The personnel in our firm are more familiar with managing DBB projects than DB projects, which helps to increase profitability on DBB projects over DB projects.

	Frequency	Percentage
Strongly Disagree	4	*9%
Disagree	12	*27%
Neutral	16	36%
Agree	9	21%
Strongly Agree	1	2%
No Response	2	5%

*Data that is referenced in the text

projects, which helps to increase profitability on design-bid-build projects over design-build projects” (Chi Square=27.858 and P=0.113) (Table 4-11). Although the P value of the analysis was not significant (P<0.05 Significant), its probability was 88.7%.

Table 4-11. Chi square analysis between statement 3 years of experience and statements 21,22, and 23 in the management and personnel section

Statements	Degrees of Freedom	P (2-tailed)	Chi Square Value
21) Since DB is a relatively new project delivery method to the construction industry, our firm seeks to employ more college graduates, that have studied the DB delivery method at a college or university, on DB projects than on DBB projects, which helps increase profitability on DB projects.	15	0.320	16.977
22) The experience level of a project manager on a DB project is lower than that of a project manager on a DBB project, because the older generation is not as familiar with the DB project delivery method, which in turn decreases the profitability margin on DB projects due to the lack of experience.	20	0.276	23.266
23) The personnel in our firm are more familiar with managing DBB projects than DB projects, which helps to increase profitability on DBB projects over DB projects.	20	*0.113	*27.868

*Data that is referenced in the text

The cross tabulation for statement (3) and statement (23) is shown in Table 4-12, and it shows that the majority of the respondents with over 11 years of experience responded that the personnel in their firm was more familiar with managing design-bid-build projects. This indicated that the older generation was more experienced with managing design-bid-build projects.

Overall Perspective

The overall perspective section asked respondents to respond to statements that were more generalized than any other statements in other sections about the profitability of the design-build project delivery method over design-bid-build project delivery method. As shown in Table 4-13, four of the five statements had a mean over 3.0. This indicated that majority of the respondents were in agreement with the

statements in this section that design-build projects produce higher profit margins than design-bid-build projects. Statement (20) “our firm converted to doing design-build

Table 4-12. Cross tabulation between statement 3 and statement 23 in the management and personnel section

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree	No Response	Total
		23) The personnel in our firm are more familiar with managing Design-Bid-Build projects than Design-Build projects, which helps to increase profitability on Design-Bid-Build projects over Design-Build projects.						
Years of Experience	0-2 yrs.	0	1	0	3	1	1	6
	3-5 yrs.	0	1	0	1	0	0	2
	6-10yrs.	0	0	6	1	0	1	8
	11-20yrs.	1	2	4	2	0	0	9
	21-30yrs.	2	4	1	1	0	0	8
	>30 yrs.	1	4	5	0	0	0	10
	No Resp.	0	0		1	0	0	1
	Total	4	12	16	9	1	2	44

projects because we expect higher profits from Design-Build projects” was the only statement in the overall perspective section that had a mean below 3.0 (Table 4-13). All of the statements showed a negative kurtosis, indicating that these statements were very distributed on graphs (Figure 4-10).

Table 4-14 shows the frequency of the responses for the statements in the overall perception section. Statement (10), statement (19), and statement (25) had about the same amounts of agreements and strong agreements responses (Table 4-14). All of these statements showed a trend toward the design-build project delivery method increasing profit margins for subcontractors.

Table 4-13. Statistics on the overall perspective section

Statement	Mean	Median	Mode	Std. Dev.	Std. Error	Skewness	Kurtosis
10) Profit margins are higher for Design-Build projects than for Design-Bid-Build projects in your company.	3.227	3	3	1.054	0.159	-0.115	-0.233
19) Design-Build projects are more likely to finish on schedule than Design-Bid-Build projects, resulting in a more profitable Design-Build project.	3.227	3	4	0.985	0.149	-0.178	-0.800
20) Our firm converted to doing Design-Build projects because we expect higher profits from Design-Build projects.	*2.909	3	3	0.830	0.125	0.175	-0.180
24) Our firm achieves better field productivity on Design-Bid-Build projects than on Design-Build projects, resulting in a higher profit margin on Design-Bid-Build projects.	3.091	3	3	0.910	0.137	0.166	-0.108
25) In the future, the Design-Build project delivery method will be the preferred construction project delivery method.	3.250	3	4	0.967	0.141	-0.373	-0.120

*Data that is referenced in the text

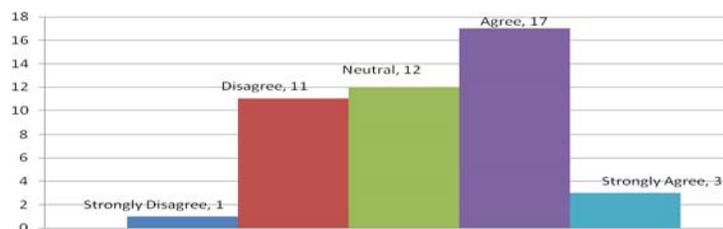


Figure 4-10. Statement 25 responses

Table 4-14. Frequency of responses for overall perspective section

10) Profit margins are higher for Design-Build projects than for Design-Bid-Build projects in your company.		
	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	7	16%
Neutral	17	39%
Agree	14	32%
Strongly Agree	4	9%
No Response	1	2%
19) Design-Build projects are more likely to finish on schedule than Design-Bid-Build projects, resulting in a more profitable Design-Build project.		
	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	11	25%
Neutral	12	27%
Agree	17	39%
Strongly Agree	3	7%
20) Our firm converted to doing Design-Build projects because we expect higher profits from Design-Build projects.		
	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	13	30%
Neutral	20	46%
Agree	9	21%
Strongly Agree	1	2%
24) Our firm achieves better field productivity on Design-Bid-Build projects than on Design-Build projects, resulting in a higher profit margin on Design-Bid-Build projects.		
	Frequency	Percentage
Strongly Disagree	1	2%
Disagree	10	23%
Neutral	20	46%
Agree	10	23%
Strongly Agree	3	7%
25) In the future, the Design-Build project delivery method will be the preferred construction project delivery method.		
	Frequency	Percentage
Strongly Disagree	2	4%
Disagree	7	15%
Neutral	16	34%
Agree	16	34%
Strongly Agree	3	6%
No Response	3	6%

CHAPTER 5 CONCLUSION

This research supported the hypothesis that the design-build project delivery method increases profit margins for subcontractors. The results in the overall perception section demonstrated that the respondents had success with design-build projects producing higher profit margins than design-bid-build projects.

The strong agreement of the respondents with the statements in the preconstruction and office tasks section indicated that this area contributed most to design-build projects producing higher profit margins over design-bid-build projects. The statements within the preconstruction and office tasks section had the largest mean values of all the sections in the survey. This showed that early involvement in a project was a major factor in contributing to the higher profit margins of design-build projects.

Most of the respondents did not agree that the experience level of a project manager on design-build project was lower. The comparison that was done with question (3) and the statements in the management and personnel section showed that the older generations in the construction industry are less familiar with design-build projects, which could have a negative impact on profit margins for design-build projects.

The results from statement (13) "our firm produces higher profit margins on design-build projects than on design-bid-build projects because it takes advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a design-build project" showed the overall results from this research with 56% (29) (n=44) of the respondents agreeing with this statement. This statement indicated that a subcontractor's involvement and input into a projects design will increase the subcontractor's profit margin on that project.

The researcher learned that the preconstruction stage of a project is an important part of a project that can determine the overall outcome of a project. Another piece of knowledge that the research took away from this research is the fact that each respondent had very different views on each of the delivery methods, but in the end majority of the respondents agreed that the design-build project delivery method will be the preferred project delivery method of the future.

Recommendations: The research could have improved by doing personal interviews. This could have provided more insightful feedback to the statements that respondents rated in the research survey.

Future research should focus on the preconstruction and office tasks. More of an in depth review of the amount of time and the type of feedback a subcontractor gives to a design/builder could greatly enhance to insight as to why preconstruction is such a big factor in increasing profit margins for subcontractors on design-build projects.

APPENDIX
SURVEY QUESTIONS

Relationship between the Profitability of Subcontractors, Design-Build and Design-Bid-Build

1. What construction division does your trade perform work under?
 - Division 01 — General Requirements
 - Division 02 — Site Construction
 - Division 03 — Concrete
 - Division 04 — Masonry
 - Division 05 — Metals
 - Division 06 — Wood and Plastics
 - Division 07 — Thermal and Moisture Protection
 - Division 08 — Doors and Windows
 - Division 09 — Finishes
 - Division 10 — Specialties
 - Division 11 — Equipment
 - Division 12 — Furnishings
 - Division 13 — Special Construction
 - Division 14 — Conveying Systems
 - Division 15 — Mechanical
 - Division 16 — Electrical
2. What is your role in your company?
 - Owner
 - Chief Executive Officer
 - Chief Financial Officer
 - Chief Operating Officer
 - Project Manager
 - Estimator
 - Superintendent
 - Foremen
 - Laborer

3. How many years have you been working in the construction industry?

- 0-2 years
- 3-5 years
- 6-10 years
- 11-20 years
- 21-30 years
- More than 30 years

4. What is your current education level?

- High School drop out
- GED
- High School
- Associates Degree
- Bachelors Degree
- Masters Degree
- Doctoral Degree

5. Have you ever taken educational courses in construction?

- Yes
- No

6. What area of the construction industry is your company in?

- Commercial
- Residential
- Industrial
- Transportation
- Heavy Civil

7. What is your companies annual revenue?

- Under \$500,000
- \$500,000 - \$999,999
- \$1,000,000 - \$9,999,999
- \$10,000,000 - \$49,999,999
- \$50,000,000 - \$99,999,999
- \$100,000,000 - \$1 Billion
- \$1 Billion - \$5 Billion
- \$5 Billion - \$10 Billion
- Over \$10 Billion

8. How many employees are employed by your company?

- Less than 10 people
- 10-49 people
- 50-99 people
- 100-149 people
- 150-249 people
- 250-500 people
- More than 500 people

9. What is the regional location of your company?

- Northeast (New England)
- Northeast (Mid-Atlantic)
- Midwest
- West (Mountain)
- West (Pacific)
- Southwest
- Southeast

10. Profit margins are higher for Design-Build projects than for Design-Bid-Build in your company.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. Profit margins are higher on projects in which the subcontractors receive RFI responses from the General Contractor in a timely manner.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12. Our firm produces higher profit margins on Design-Build projects because more time and resources are invested in preconstruction planning for Design-Build projects than Design-Bid-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. Our firm produces higher profit margins on Design-Build projects over Design-Bid-Build project because we take more advantage of the fact that we can give feedback to the designer/contractor on the most cost effective way to construct a Design-Build project.

1	2	3	4	5
	Disagree	Neutral	Agree	Strongly Agree

14. Design-Build projects have faster response times to submitted change orders and RFI's than Design-Bid-Build projects, which leads to higher profit margins on Design-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

15. Your firm estimates the initial cost of a project to be higher for a Design-Build project than a Design-Bid-Build project; because of the incomplete and vague construction drawings during the bid process, which in the end enables your firm to achieve a higher profit margins on Design-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

16. Your firm utilizes Building Information Modeling (BIM) on Design-Build projects more so than on Design-Bid-Build projects, resulting in a more profitable project.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

17. More advanced software is used on Design-Build projects than on Design-Bid-Build projects, resulting in a more profitable project.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

18. More innovative and advanced construction techniques are used on Design-Build projects than on Design-Bid-Build projects, resulting in a more profitable project.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

19. Design-Build projects are more likely to finish on schedule than Design-Bid-Build projects, resulting in a more profitable project.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20. Your firm is a recent convert to doing Design-Build projects because we expect higher profits.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

21. Since Design-Build is a relatively new project delivery method to the construction industry, your firm seeks to employ more college graduates, that have studied the Design-Build method at a college or university, on Design-Build projects than on Design-Bid-Build projects, which helps increase profitability on Design-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

22. The experience level of a project manager on a Design-Build project is lower than that of a project manager of a Design-Bid-Build project, because the older generation is not as familiar with the Design-Build project delivery method, which in turn decreases the profitability margin on Design-Build projects due to lack of experience.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

23. The personnel in your firm are more familiar with managing Design-Bid-Build projects than a Design-Build project, which helps to increase profitability on Design-Bid-Build projects over Design-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

24. Your firm achieves better field productivity on Design-Bid-Build project than on Design-Build projects, resulting in a higher profit margin on Design-Bid-Build projects.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

25. In the future, the Design-Build project delivery method will be the preferred construction project delivery method.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

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BIOGRAPHICAL SKETCH

Paul Joseph Segedin Jr. can be noted for his outstanding work ethic. Paul gained his great work ethic through watching his father and uncle start businesses in construction and other fields. Every business they built came to be successful, and it was through having these role models to watch that he came to realize the harder you work toward a goal, the more likely you are to become successful.

Paul was exposed to the construction industry at a very young age, watching his father working in the construction industry. It was during these times, Paul developed a passion for the construction industry.

After graduating from high school, Paul enrolled at the University of Central Florida in Orlando, FL, majoring in civil engineering. Paul dabbled in several different majors to experience all that college life had to offer. After three years at the University of Central Florida, Paul decided to transfer to the University of Florida in Gainesville, FL, to pursue a Master of Science in Building Construction. It took one year, after transferring from the University of Central Florida, to graduate with a Bachelor of Science in microbiology and cell science.

Once Paul received his Bachelor of Science degree, he immediately began working on his Master of Science in Building Construction. This was a great new chapter for Paul, in his academic career, as he was again pursuing his passion for a career in the construction industry. During the time Paul was working toward his master's, he was also working full-time as an estimator. This juggle between a full-time professional career and a full-time academic career was possible because of this

outstanding work ethic. Once Paul obtained his Master of Science in Building Construction in the summer of 2011, he eagerly pursued his goals outside of the walls of academia.