ASSESSMENT OF THE ROLE OF OWNER’S REPRESENTATIVES ON CONSTRUCTION PROJECT PERFORMANCE

by

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ABSTRACT

The modern construction industry is complex and heterogeneous. Three major players in this industry are: owners, constructors, and architects/engineers. However, there is a fourth party that can also be involved on construction projects, the owner’s representative. Owner’s representatives are individuals or firms hired by an owner to manage the construction project in the owner’s stead. They may provide a range of services between the contracting parties depending on the needs of an owner. Given the important role owner’s representatives can play in this industry, there is a dearth of literature today regarding them, and what exists possesses significant biases and shortcomings regarding authors’ perspectives and lack of data. The objectives of this research are to gain an understanding of when an owner is likely to hire an owner’s representative, and what impact owner’s representatives have on project performance. This study was conducted unbiasedly from the owner’s perspective using data from projects with an owner’s representative and projects without an owner’s representative.

In this study, it was found that hiring or not hiring an owner’s representative leads to no significant difference on project performance. However, there are roles, responsibilities, and characteristics of owner’s representatives that do have a significant impact on project performance when an owner decides to hire an owner’s representative. The one circumstance where a project is likely to have improved budget performance when an owner’s representative is hired is on design-build projects. Ultimately each project and owner is unique, so projects should be considered individually such that an owner may determine whether or not an owner’s representative is the correct choice. This research will help owners determine when and how an owner’s representative is needed for improving project performance.
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CHAPTER 1 INTRODUCTION

1.1 Introduction

In the construction industry today, there is a heavy focus on research and articles about contractors, architects, and engineers, however, there is a dearth of literature about owners, and more specifically, owner’s representatives. All construction projects start with the owner’s desire to build something, so it is surprising that there has not been a large focus on research regarding owners and the individuals acting on their behalf, owner’s representatives.

Owner’s representatives are hired by an owner to manage the construction project in the best interests of the owner. This means that the owner’s representative has a relationship with the contractor, architect/engineer, and the owner, making them a key player on any construction site, but there is little research done in today’s construction industry about the role of the owner’s representative, and the impact they have on construction projects. Not all owners decide to hire an owner’s representative, as many owners decide to manage the construction project internally without hiring a third party, so it must be asked why owners choose to hire an owner’s representative or not.

Contractors, owners, architects, and engineers may all have different opinions about owner’s representatives and their importance on a construction project. It is not uncommon to hear mixed emotions from contractors concerning owner’s representatives regarding and especially their interference in project or the value they provide for an
owner. Contractors may see owner’s representatives as an unnecessary additional party that makes their work more difficult, but contractors may also see owner’s representatives as a beneficial party that helps facilitate the information between them and the owner.

Owner’s representatives on the other hand have a lot to say about their profession and the necessity of it. Online, there are many owner’s representatives available and numerous writings about their in the construction industry. Most of the literature about owner’s representatives is even written by owner’s representatives. Thus, it is difficult to gauge an unbiased view of how effective owner’s representatives are when the only available literature is written from their point of view.

The opinion that matters most about owner’s representatives comes from the owners themselves, as they are the ones deciding to hire owner’s representatives. There are many owners who are happy about their decision to hire an owner’s representative, and there are also many owners who are happy about their decision to not hire an owner’s representative. These different views bring up the question of whether an owner’s representative adds value to the construction project or not, and if they are worth the added investment.

1.2 Motivation

Owner’s representatives have a relationship with all contracting parties on a construction project. All of these parties have different opinions of the value an owner’s representative
provides. The actual value that an owner’s representative provides an owner is unknown, and has never been studied before. Since owner’s representatives play a large role on construction projects, and they effect a lot of relationships, there is motivation to gain insight into their value.

Another question many members of the construction industry have is why some owners decide to hire an owner’s representative while others do not. There is inadequate data supporting or opposing owner’s representatives’ value on construction projects, which makes one question why they are hired. There is little literature that exists today about owner’s representatives, but the literature that does exist is full of bias as it is written from owner’s representatives’ perspectives. There is a need for an unbiased point of view about owner’s representatives, with data to analyze why they are hired and the value they provide.

From additional research into the topic of owner’s representatives, the construction industry can gain a better understanding of the need for owner’s representatives on construction projects, and the value they provide to an owner. Learning what characteristics help or hurt owner’s representatives’ performance on projects can help owners navigate hiring an owner’s representative when one is needed. Also, looking into which projects owner’s representatives are likely to work on, and seeing their effect on project outcomes will help the construction industry come to a conclusion about the value owner’s representatives add to a project, and when they are beneficial for an owner on a project.
1.3 Objective

The main objectives of this research are to gain an understanding when an owner is likely to hire an owner’s representative or not, and what impact owner’s representatives have on project performance. To complete these objectives the following three goals are followed throughout the research process:

- Unbiased – current literature today is influenced largely by owner’s representatives, so conducting this research in an unbiased fashion with no influence from existing construction industry opinion is essential to get an accurate understanding about owner’s representatives.

- Owner’s perspective – an owner’s representative’s job is to act on behalf of the owner, and owners make the decision to hire an owner’s representative or not, so this study is conducted from the owner’s perspective.

- Projects with and without owner’s representatives – this research is conducted from data collected from a survey sent out to owners regarding specific projects both with and without owner’s representatives. From this project data, it is possible to determine if there is a difference between the projects with and without owner’s representatives.

By following these goals, recommendations can be made to owners and the construction industry as a whole about owner’s representatives and the value they provide towards a project’s performance. From these recommendations, owners will be able to make informed decisions about hiring an owner’s representative or not, and what characteristics, responsibilities, and roles of owner’s representatives have the most impact.
on regarding project performance. Project performance will be discussed in greater detail in Section 3.2.

1.4 Definitions

Concepts used in this research have the possibility to be defined and interpreted differently by members of the construction industry. To clarify these concepts and eliminate confusion, the following concepts have been defined as follows:

- **Owner’s Representative** – A third party who acts on the behalf of an owner throughout the life cycle or part of the life cycle of a construction project. An owner’s representative may provide a range of services between the contracting parties depending on the needs of an owner

- **Project Performance** – The performance of the projects are measured through five different metrics: budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. The project performance is rated on a Likert scale from the perspective of the owner

1.5 Scope of Research

The scope of this research is limited to the perspectives of the owners who completed the survey. The majority of the survey asks qualitative questions regarding a specific project and the owner’s experience with or without an owner’s representative. As the data is not quantitative, many questions are written using a Likert scale that allows owners to rate their experiences on either a five or seven point scale.
The analysis with the data is limited to owner’s reasoning to hire an owner’s representative or not and the project performance observed from hiring an owner’s representative or not. Due to the lack of existing literature, there are a large range of additional topics regarding owner’s representatives that can be explored in the future.

1.6 Summary and Report Organization

There exists a substantial amount of research today about the construction industry, however there exists very little research about one of the key players on construction projects, owner’s representatives. The research that does exist is written from the perspective of owner’s representatives, and thus is biased. The objective of this report is to gain an understanding of when an owner is likely to hire an owner’s representative, and what impacts owner’s representatives have on project performance from data provided in a survey of owners.

This report is intended to provide owners and other members of the construction industry with more insight into owner’s representatives. This report consists of five chapters. Chapter 2 reviews existing literature published about owner’s representatives. Chapter 3 discusses the methodology used in the process of this research. Chapter 4 presents the analysis and correlations present in the data. Chapter 5 presents a summary and overall conclusions regarding owner’s representatives. The attached appendices provide additional information regarding the research.
CHAPTER 2  REVIEW OF EXISTING LITERATURE

2.1 Introduction

A literature review was conducted to learn more about the role of owner’s representatives in today’s construction industry. This chapter reviews who owner’s representatives are in today’s construction industry, why they are involved, what makes them effective, and best practices for owner’s representatives, followed by descriptions of the lack of data and biases in the existing literature.

2.2 Who an Owner’s Representative Is

Owner’s representatives have become prevalent in today’s construction industry, particularly as project sizes and complexity continue to grow. An owner’s representative is best described as “an individual tasked with controlling the design and development process while protecting the best interest of the owner” (“LEED Certification”, 2017). Owners choose to hire owner’s representatives to act on their behalf, however, owner’s representatives are only given as much control as the owner allows. It is common for owner’s representatives to make decisions, solve disputes, and manage changes and coordination with multiple parties on a construction project (Jawahar-Nesan, 1997).

Not all owners decide to hire owner’s representatives. There are individual reasons for an owner to choose to hire an owner’s representative. If owners decide not to hire an owner’s representative, then they must represent themselves or have another entity represent them, which may be the architect/engineer or a construction manager.
2.3 Importance of Owner’s/Owner’s Representative’s on Construction Projects

Abdulaziz Bubshait said in 1994 that: “Owner Involvement is essential to project quality. Success or failure is, in many cases, related directly to the level of owner involvement.” This quote is still relevant today, as many owners understand the importance of involving themselves on construction projects. Many times if they are unable to spend the necessary time and effort on a project, they decide to hire an owner’s representative to act in their stead. It is not uncommon for owners to have facility managers or dedicated members on their staff in charge of construction projects, as owners understand the importance of having someone who is protecting their best interests. Other owners hire a third party owner’s representatives to be their voice and represent them on the project team. Regardless of who is representing the owner, they are a crucial part of the project team, and without their input the project is likely to fail or not meet expectations (Petersen & Murphree, 2004).

2.4 Why Owners Hire Owner’s Representatives

An owner will have individual reasons to hire an owner’s representative, however there are several articles written by owner’s representatives about why they are important. Owner’s representatives say they are important because they help with complex, expensive, and risky projects. These projects deal with significant financial and schedule impacts from the design and construction teams, which may be difficult for an owner to understand. An owner’s representative is supposed to transition communications to increase owners’ understanding of the project which can improve outcomes, reduce risk, and prevent unnecessary expenses (Gainsboro, 2006). It can also be said that owner’s
representatives keep the construction team honest, and assists in getting the owner the best price possible (Res, 2016).

2.5 What Makes a Good Owner’s Representative

When owners make the decision to hire an owner’s representative, they need to look for someone who will best represent them. This is important as not all owner’s representatives are the same, and the skills and effectiveness of the owner’s representative will affect the project performance. Barbara Res, an engineer and attorney who acts as an owner’s representative says that “the owner’s representative should have sufficient experience working for owners, but also for contractors and subcontractors. Credentials as an engineer or architect are helpful, but it is more important that the owner’s representative has worked intimately with the owner’s organization to the greatest extent possible” (2016). It is also said that the best owner’s representatives have experience working for the owner, facilities, and design. The best way to find qualified owner’s representatives is talk to industry experts, board members and associations (Gainsboro, 2006). Lastly, having a proactive owner’s representative is significantly better than having a reactive owner’s representative. The proactive owner’s representatives will be the ones taking initiative to be a leader, while the reactive will deal with issues and opportunities only after they have presented themselves (McKew, 2001).

The best practices and responsibilities of owner’s representatives has been evaluated in articles where they rank the best practices or skills an owner’s representative should
possess. One such article is from 1997. It evaluates best practices from unimportant to essential, however, it was found that all six practices evaluated are equally important. These practices include: “conduct meetings of top level representatives from all parties, and share project plan and objectives”, “assist the members to jointly develop action plans for problem solving”, “assist the members to establish the joint team and delegate responsibilities”, “ensure the membership of the joint team is well balanced by the representative”, “assist the joint team in appointing quality improvement team and corrective action teams”, and “record the agreed action plan, and communicate it to the entire organization” (Jawahar-Nesan, 1997). Another more recent article expresses the important skills of owner’s representative. Of the 14 skills defined, the top five include, communicating, project management experience, building trust, team building, and planning (Petersen & Murphree, 2004).

2.6 Bias in Existing Literature

There is a limited amount of literature that exists today about owner’s representatives, and most of the existing literature is written by owner’s representatives. Thus, it is difficult to obtain a bias free perspective about owner’s representatives as they are likely to promote themselves. Current literature that exists almost exclusively encourages owners to hire owner’s representatives, and it is difficult to find any literature that is not written or influenced by an owner’s representative.

Another difficulty with today’s literature is the lack of statistical evidence regarding the topic of owner’s representatives. Most articles are based on the opinions of owner’s
representatives. One article, written by Petersen and Murphree goes into statistical data about the impact of owner’s representatives, however, the data used in the analysis comes from a survey where potential participants included owner’s representatives.

One final problem with the literature available today is the lack of articles that compare projects with an owner’s representative and projects without. Research available typically looks at only projects where the owners decide to hire an owner’s representative. There do not exist any articles that have data corresponding to owners who do not hire an owner’s representative, and very little data about projects where owners do hire owner’s representatives. Today’s articles express the benefits of having owner’s representatives without any data proving that they have an impact on the project performance.

2.7 Conclusion

From the limited amount of literature available for review, an understanding can be gained about who owner’s representatives are, what their job is, and why they are important. However, there are a large number of biases and shortcomings in the available literature regarding authors’ perspectives and lack of data. Due to the above reasons, this paper is important for the construction industry. This paper introduces data from projects that both have and do not have owner’s representatives, and analyses it to understand the impact that owner’s representatives have on projects. This paper also looks at the roles, responsibilities, and characteristics of what makes an effective owner’s representative on a project from collected data, all of which is lacking in today’s literature. Looking at the
impact of owner’s representatives from an outside perspective allows an unbiased
evaluation of their significance.
CHAPTER 3 METHODOLOGY

3.1 Introduction

After reviewing the lack of existing literature present today concerning owner’s representatives, it is determined that additional research about why owner’s representatives are hired and the value they provide to a project is necessary. Said research must be performed unbiasedly with data presented by owners. This chapter outlines the methodology used throughout this research to accurately understand owner’s perceptions of owner’s representatives. The methodology begins by discussing how value is determined regarding project performance, along with how the data was collected, and how the data is analyzed.

3.2 Project Performance

To understand the impact that owner’s representatives have on overall project outcome, five project performance questions were included at the end of the survey sent out to owners. The questions included: budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. These questions were assessed using a five or seven point Likert scale to get a better understanding of how the owner views the outcome of the project. Likert scales allow owners to rate their experiences by asking them to choose the strength/intensity of their experiences from a linear scale (McLeod, 2008). Using Likert scales makes it possible to perform nonparametric tests from the different rankings the owners gave about project performance, and find correlations between aspects of the project, particularly focused on owner’s
representatives. These statistical tests are described further in Section 3.4. The specific scales used to measure performance of the different metrics are described below:

- **Budget Performance** – Seven point Likert scale range between “Extremely lower than budgeted” to “Extremely higher than budgeted”

- **Schedule Performance** – Seven point Likert scale range between “Extremely shorter than scheduled” to “Extremely longer than scheduled”

- **Change Performance** – Five point Likert scale questioning the amount of approved changes between “None at all” and “A lot”

- **Owner Satisfaction** – Seven point Likert scale range between “Extremely dissatisfied” to “Extremely satisfied”

- **User Satisfaction** – Seven point Likert scale range between “Extremely dissatisfied” to “Extremely satisfied”

### 3.3 Survey

To get a better understanding of what owners think about their representatives, why they may or may not hire a representative, and the value that owner’s representatives provide to projects, a survey was written with the intent to gather data from specific projects that owners have worked on in the recent past. This survey was sent out to a variety of owners and facility managers with the hopes of gathering a variety of projects that range in size, location, and type. The survey had the following goals:

- Gain insight into why owners decide to hire an owner’s representative or not;

- Determine what roles and responsibilities owner’s representatives are performing on projects, and how effective they are in these roles;
• Identify if owners are happy with their decision to hire or not hire an owner’s representative, and if they would choose to hire an owner’s representative given the same project;
• Determine the success of the project from the owner’s point of view.

This section reviews the methods used to develop and distribute the survey to owners and facility managers, and the breakdown of what questions the survey contains. Also, this section includes a company profile to show the characteristics of the companies who completed the survey.

The idea for research into owner’s representatives was brought to the University of Wisconsin-Madison from Boldt Construction in Appleton, WI in the fall of 2016. This topic was pursued as it is thought that both contractors and owners can find value in learning why owner’s representatives are hired, and which roles and responsibilities they perform. To get insight from owners, a web based survey was created and distributed to owners, facility managers, and planners around the United States. A total of 225 surveys were completed in a time span of two months. The survey asked questions specific to owner’s representatives from the owner’s point of view. Whether or not a company decided to hire an owner’s representative is taken into consideration, and two sets of questions were formulated and given to the owners depending on if they had or had not hired an owner’s representative.
The survey started broad and asked about owner’s preferences on construction projects, however, after completing more research about owners, the survey was converted to specifically ask questions regarding owner’s representatives. Over the course of the fall of 2016, the survey underwent several drafts that were reviewed by Mr. Paul Reiser, Mr. Dave Kievet, and Mr. Jay Harris of Boldt Construction along with Dr. Awad Hanna of the University of Wisconsin-Madison. The help from members of the industry and a professor with previous survey experience and knowledge of construction was extremely beneficial during the writing process as they gave important insight into what questions should be asked and potential resources for respondent contacts. With the help of industry members, professors, and previous surveys as examples, a complete survey was created and ready to be put into an online format using Qualtrics.

The University of Wisconsin-Madison has an agreement with the web-based survey company, Qualtrics (Qualtrics, 2017). This allows all students and faculty at the university free use of the program. By putting the survey into an online format, it was easier to distribute to potential respondents, and it was easier for them complete. In the end, when all the data was collected, Qualtrics provided a detailed data report that is able to be loaded into Microsoft Excel (2013) where it can be organized and analyzed using the statistical program R (R Core Team, 2016).

The online survey program also allows the use of logic for different questions, so certain questions only show up to respondents who answered a previous question in a particular way. For example, if someone answers the question “Have you worked with this owner’s
representative in the past?” with “Yes”, then they receive the follow up question of “How positive was your experience with this owner’s representative in the past?”, but if they answer “No” to the first question, the follow up question does not display.

Before the survey was ready to be sent out to owners and facility managers, a meeting was scheduled with the University of Wisconsin-Madison Survey Center to review a draft of the survey and help improve questions and make sure the survey was as effective as it could be (Dykema, 2017). For example, before meeting with the Survey Center, a question asked “What was your company’s reasoning to hire an owner’s representative? Check all that apply” with a long list of potential options the respondent could choose from. After meeting with the Survey Center the same questions was worded “Were any of the following reasons why your company decided to hire an owner’s representative?” along with the same list, but it included a yes or no button for each reason. The motive for changing the survey in this way is that each potential reason would be more likely to be looked at and thought about before answering. With the previous organization of the same question, it was more likely that the options later in the list would not be considered or even fully read.

Additionally, several questions were changed to have a seven point Likert scale versus a five point Likert scale depending on whether or not the answers were bipolar or unipolar. A five point Likert scale question with bipolar answers would have options such as “Very satisfied”, “Somewhat satisfied”, “Neutral”, “Somewhat dissatisfied”, and “Very dissatisfied”. This question has bipolar answers because it ranges between the two
options of “satisfied” and “dissatisfied”. Similar unipolar answers would range between “satisfied” and “not at all satisfied”. The unipolar Likert scales makes the respondents choose whether there is a presence or absence of a quality (“Unipolar vs Bipolar”, 2017), while the bipolar Likert scale makes the respondents choose between a range of two different qualities. During the meeting with the Survey Center, it was advised to change all bipolar answers to a seven point Likert scale and keep the unipolar answers at a five point Likert scale. The reason for this is because when spanning the differences between two separate qualities with only five points, the gap between two values is large. In this type of situation, it is difficult to gauge what “Somewhat satisfied” actually means. By using the seven point Likert scale and changing the answers to be “Extremely satisfied”, “Moderately satisfied”, “Slightly satisfied” “Neither satisfied nor dissatisfied”, … , and “Extremely dissatisfied” it became more obvious how the respondents felt about the questions. The five point Likert scale is reasonable for unipolar questions because the difference between the answers is smaller since there is only one extreme end point.

The survey was distributed to a wide range of owners and facility managers all around the country. Approximately 20,000 emails with the link to the survey were sent out. Around 500 of the email respondents opened the survey link, and 225 answered enough questions to be considered in the data analysis.

3.3.1 Survey Breakdown

The survey sent out to owners and facility managers is broken into three different sections regarding a specific project. These different sections are important to get
information about the project description, why an owner’s representative was hired and what they did or why an owner’s representative was not hired, and the overall project performance. Details about these different sections are below.

*Project Description*

In the Project Description section of the survey, background questions are asked of respondents to get an overview of what their project was like. Questions in this section include type of project, delivery method, owner type, and most importantly whether a separate owner’s representative was hired for the particular project.

*Project Characteristics*

This short section of the survey is important to understand the size of projects being recorded. There are only three questions in this section, which ask what year the project was completed in, the final square footage of the project, and cost of the project. Even though this section is short, the questions are important to understand trends regarding owner’s representatives given size and date of projects.

*Owner’s Representative*

The largest and most important part of the survey is the section regarding questions about owner’s representatives. This section consists of two separate sets of questions for whether the respondents answered yes or no to the question: Did you hire an owner’s representative?
If the respondents answered “yes” to having hired a separate owner’s representative, the following questions ask about the owner’s experience with the owner’s representative. These questions include: satisfaction of the owner, would they choose to hire an owner’s representative again, what roles and responsibilities the owner’s representative performed on the project, how effective the owner’s representative was, and many more.

For respondents who answered “no” to hiring a separate owner’s representative, the following section asks questions to learn why an owner’s representative was not hired. Some questions displayed to these respondents are: who represented your organization, company’s reasons not to hire an owner’s representative, satisfaction of not hiring an owner’s representative, etc.

Project Description

The last section of the survey asks questions about the project team, performance, and overall outcome. The data from this section is used to determine correlations between the performance of the project, and questions regarding owner’s representative. The performance is measured through questions about cost, schedule, changes, and satisfaction of the project. This section ends with a final question about how respondents would change their contracting approach on the next project based on lessons learned to give owners an opportunity to express their thoughts about not just owner’s representatives, but any aspect of contracting they wish to comment about (see Section 5.4). For a complete list of questions from the survey, see Appendix B.
3.3.2 Characteristics of Owners

The survey was open for two months, and a total of 225 owners responded in this time. 20,000 emails were sent out to potential respondents, a response rate of around 1%. There are several reasons the response rate of this survey is low. One reason in particular being the large amount of emails sent out were not only to owners and facility managers. Several of the emails sent out had received replies saying that the recipient was not the appropriate audience for this type of survey. Another reason why the response rate is so low, is that hundreds of emails that were sent out were bounced back saying that the email no longer exists. Several organizations do not keep an up to date record of their members in the directories, so a large percentage of people emailed may either be retired or working at a different job.

The following sections gives an overview of the characteristics of responses received. These show the variety of projects reported, and explain the importance of each. These characteristics include respondents with and without owner’s representatives, location of respondents, size of projects, types of projects, year completed, delivery method, and project owner.
3.3.2.1 Respondents with Owner’s Representatives

As the main focus of this research is owner’s representatives, it is important to get a good distribution of projects with an owner’s representative and without. This is the most important question of the survey as answering this question with “yes” or “no” will lead a respondent to separate follow up questions. Out of the 225 respondents who completed the survey 137 respondents reported hiring an owner’s representative, and 88 respondents did not. This data is visually represented in Figure 3.1 below. The responses to this question are critical in determining what factors influence an owner’s decision to hire an owner’s representative, and also what roles, responsibilities, and characteristics make an owner’s representative most effective.

![Figure 3.1. Distribution of Projects that Have/Do Not Have an Owner’s Representative](image)

Figure 3.1. Distribution of Projects that Have/Do Not Have an Owner’s Representative
3.3.2.2 Location of Respondents

Owners were asked to share the location of the specific project they were responding to the survey about. This question was optional, but about 96% of respondents chose to answer. Of the respondents who left the location blank, the IP Address location was acquired from the online survey program Qualtrics as long as they completed the survey. Only four response locations were unable to be identified. The purpose of this question is to not only ensure that the responses fairly represent the entire country, but also to see if there are any differences between the regions of the United States regarding owner’s representatives.

Figure 3.2 shows the total number of respondents who answered the survey from each state. There are a total of 38 states in the United States that received responses, along with two responses from Canada. The states with the largest number of responses are Wisconsin, California, and Minnesota. When split up into the different regions of the United States, as specified by the United States Census Bureau (“Census Regions”, n.d.), the Midwest is very well represented, while the Northeast is represented the least. Table 3.1 shows the number and percentage of respondents in these different regions. Overall, the spread of respondents around the United States is fairly well dispersed, with only a few areas lacking respondents.
Table 3.1. Breakdown of Responses from Different Regions of US

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Responses</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>52</td>
<td>23.6%</td>
</tr>
<tr>
<td>Midwest</td>
<td>79</td>
<td>35.9%</td>
</tr>
<tr>
<td>Southeast</td>
<td>61</td>
<td>27.7%</td>
</tr>
<tr>
<td>Northeast</td>
<td>28</td>
<td>12.7%</td>
</tr>
</tbody>
</table>

Figure 3.2. Distribution of Number of Respondents around the United States

3.3.2.3 Size of Projects Performed by the Respondents

Since the survey sent out to owners is project specific, there are two questions to help determine the size of the projects owners are constructing: size in square feet and cost. Thirteen respondents did not report the final square footage and fourteen respondents did not report the final cost of their projects due to confidentiality. The projects reported by respondents range in size from 300 to 1,600,000 square feet, and the cost ranged from
$26,000 to $1,600,000,000. Figure 3.3 and Figure 3.4 show the distribution of projects based on their square footage and cost respectively.

Figure 3.3. Distribution of Projects Reported by Square Footage

Figure 3.4. Distribution of Projects Reported by Cost
The physical size and cost of the project is asked of survey respondents to see if there is any correlation between sizes of projects and owner’s representatives. It is also important that different project sizes are well represented.

3.3.2.4 Types of Projects

There are five major project types reported in this survey: commercial, industrial, education, healthcare, and residential. There are also a large amount of projects that owner’s reported as “Other”. These other project types included museums, temporary facilities, government buildings, non-profit, recreational facilities, etc. Figure 3.5 shows the percentages of projects reported by type.

![Figure 3.5. Distribution of Projects Reported by Type](image)

The type of project is important to determine if there is any difference between the project types and decision to hire an owner’s representative or not.
3.3.2.5 Year Completed

Figure 3.6 below shows that the majority of respondent projects are newly constructed and only a few years old. This is important as it allows for an understanding of current construction practices.

![Bar chart showing distribution of projects completed by year](image)

Figure 3.6. Distribution of Projects Completed by Year

3.3.2.6 Type of Delivery Methods

Figure 3.7 below shows the distribution of delivery methods of respondent projects. As shown, design-bid-build is the most prominent delivery method reported, followed by design-build. Only ten Integrated Project Delivery (IPD) projects were collected, making it the least prevalent delivery method in this analysis. Having a good distribution of delivery methods is important, as the different contract styles can have an impact on both the decision to hire an owner’s representative, and the effectiveness of the owner’s representative.
3.3.2.7 Type of Ownership

Figure 3.8 shows the distribution of the type of ownership from the respondent projects. A majority of projects received are from private owners, but over a quarter of the responses are projects owned by public (government) entities. This information is useful in determining whether or not the project owner has any impact on the owner’s representative.
3.4 Data Analysis

The first step that has to be taken before any analysis can begin is sorting and organizing of the data. Qualtrics records every survey opened by respondents, including responses with no questions answered. For the analysis of this research, only survey responses which were completed up to project characteristic and have answered if an owner’s representative was hired or not are kept. Several other responses were also deleted due to being answered by an inappropriate party, such as an owner’s representative. These responses have been filtered out using the comments written by respondents.

Once all the responses have been filtered, the data input into the survey was reviewed and edited. Since two responses came from Canadian projects, the cost of the projects were changed from Canadian dollars to United States dollars. A few respondents also gave ranges for square footages and costs, so to make these values usable in data analysis, the
average of the range was selected. The last step before the data was usable for analysis was to convert the Likert scale questions into numbers. For example, if a Likert scale question ranged from “Extremely dissatisfied” to “Extremely satisfied”, a value of one was given to “extremely dissatisfied”, two was given to “Moderately dissatisfied”, all the way to a seven for “Extremely satisfied”. Once the data was fully cleaned and organized, it was able to be uploaded and analyzed in the statistical program R Studio.

From the different types of questions in the survey, there are three different types of response variables: categorical, ordinal (e.g. Ranked Likert scale), and continuous (e.g. square footage). To obtain a better understanding of the relationships between the different variables, boxplots, tables, and plots are presented to visually interpret what is represented in the data before any statistical analysis is completed. With these three variable types, four different statistical tests are performed to see if there are any statistical correlations between the variables. These four tests are described below:

- **Kruskal-Wallis** – this is a nonparametric test between an independent variable that consists of more than two categorical groups and a dependent variable that is measured with an ordinal or continuous level. The observations used in this test are independent from each other, and are not assumed to be normally distributed. This type of statistical test is commonly used throughout this analysis for comparing categories to Likert scale questions such as project performance ("Kruskal-Wallis H Test", 2017).

- **Wilcoxon Rank-Sum** – also known as the Mann-Whitney U Test, the Wilcoxon Rank-Sum Test is a nonparametric test similar to the Kruskal-Wallis test where it
measures correlations between an independent categorical variable and a
dependent ordinal or continuous variable. The observations in this test are
independent from each other, and are not assumed to be normally distributed. The
difference between the Kruskal-Wallis Test and the Wilcoxon Rank-Sum Test is
that there are only two independent variable categories in the Wilcoxon Rank-
Sum Test. An example of this test found in this research is the comparison of
projects with and without owner’s representatives to the project performance
metrics (“Mann-Whitney U Test”, 2017).

- **Kendall Tau-b** – this test measures the strength and direction between two
  ordinal or continuous variables. Kendall Tau-b is a nonparametric measure used
to find associations between two variables. An example of this test in this research
is comparing two Likert scale questions with each other such as the effectiveness
of an owner’s representative and the project performance metrics (“Kendall’s
Tau-b”, 2017).

- **Pearson’s Chi-Square** – the final test used throughout this research measures
correlation between two or more categorical, independent variables. For this test,
all observations are independent of the others. An additional restriction of
Pearson’s Chi-Square Test is that no more than 20% of the expected values are
less than five. (“Chi-Square Test”, 2017) (Weaver, 2017)

Nonparametric tests are used throughout the analysis of this paper because of the
qualitative Likert scale data collected. The distributions of the qualitative Likert scale
data ranged from question to question, and cannot all be assumed to be normal. By using
nonparametric statistical tests, there are no assumptions about the distribution of data, which makes nonparametric tests more appropriate for the ordinal scales present in this research (Stefanowski, 2013).

For each of the four tests described above, there is a null hypothesis and an alternative hypothesis. By completing the statistical tests, a p-value is found which may or may not reject the null hypothesis. A p-value less than 0.05 will reject the null hypothesis and be considered statistically significant. Having a statistically significant value means that there is a “likelihood that a relationship between two or more variables is caused by something other than random chance” (“Statistically Significant”, 2016). When the null hypothesis is rejected, the alternative hypothesis is accepted. The null and alternative hypothesis for the four statistical correlation tests performed in this research are described below:

- **Kruskal-Wallis**
  - Null Hypothesis: The observations from the different categorical groups come from identical populations
  - Alternative Hypothesis: The observations from at least one of the categorical groups comes from a different population

- **Wilcoxon Rank-Sum**
  - Null Hypothesis: The observations from the two categorical groups come from identical populations
  - Alternative Hypothesis: The observations from the two categorical groups come from a different population
• **Kendall Tau-b**
  - Null Hypothesis: There is no relationship between the two variables
  - Alternative Hypothesis: There is a relationship between the two variables

• **Pearson’s Chi-Square**
  - Null Hypothesis: There is no association between the two variables
  - Alternative Hypothesis: There is an association between the two variables

By obtaining a p-value less than 0.05 the null hypotheses are rejected and correlations can be found between variables. To understand the correlations found, the boxplots, tables, and plots are used to visually see the relationships, and to make sense of the significance. Once the significance of correlations is discovered, recommendations can be made to the industry regarding owner’s representatives.

### 3.5 Summary

By following this methodology through the research of owner’s representatives, an unbiased understanding can be gained using statistical analysis from the data provided. It is important to understand that project performance is judged using five different categories: budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. The project performance is used to help calculate statistically the value owner’s representatives contribute to a project. Along with the project performance, a large amount of other data collected from the owner’s representative survey is used to find correlations about why owner’s representatives are hired, and the roles and responsibilities they perform. Using this methodology, final
recommendations are able to be made to the industry regarding owner’s representatives and the value they provide to project performance.
CHAPTER 4 DATA ANALYSIS

4.1 Introduction

The survey as described in Chapter 3 was written to gain an insight of the usage of owner’s representatives in the construction industry. The focus of the questions was to understand why owners and/or facility managers choose to hire an owner’s representative or not, what the output of a specific project was with or without the owner’s representative, and what roles and responsibilities owner’s representatives have on construction projects where they are used. Most of the data collected from this survey is qualitative, based on owners and facility manager’s opinions, however, this data can be used to find correlations between diverse respondents to the survey and find any relationships between project characteristics, owner’s representatives roles, project performance, etc.

Chapter 4 will use the responses from the survey to try to answer five major questions. The first question asked is to gain an understanding of the construction industry, and to understand what project characteristics, including the decision to hire an owner’s representative or not, have an impact on the overall performance of the project. The following question asks if hiring or not hiring an owner’s representative has an impact on the project performance for each individual delivery method. The succeeding question is to determine why owners and facility managers chose to hire owner’s representatives. Next is to gain insight into which characteristics, roles, and responsibilities make owner’s representatives effective at improving project performance and what characteristics are
being used today, followed lastly by characteristics when owner’s representatives are not hired by owners along with their significance on project performance.

4.2 Which Project Characteristics Have an Impact on Project Performance?

To understand the data set obtained from the owner’s representative survey, the project characteristics are compared with the overall performance of the project to determine if any correlations exist. The project characteristics of delivery method, project type, project size, project owner, having experience with the general contractor in the past, and whether an owner’s representative was hired or not are all compared against the five project performance metrics asked: budget, schedule, changes, owner satisfaction, and user satisfaction.

4.2.1 Delivery Method

The first project characteristic that is examined for an effect on project performance is the delivery method chosen for the project. The survey had six delivery method options as described above in Section 3.3.2.6, which include design-bid-build (DBB), design-build (DB), construction management – agent (CMA), construction management at risk (CMR), integrated project delivery (IPD), and multiple prime contractors (MP).

To see if there are any correlations between the type of delivery method selected and the project performance, the Kruskal-Wallis statistical test is used. This type of statistical test is used throughout this data analysis to determine correlations between independent variables such as project delivery method, and dependent ranked variables such as project
performance which have either five or seven point Likert scales (“Kruskal-Wallis H Test”, 2017).

The Kruskal-Wallis test is performed five times to see if any correlations are present between the project delivery method and the five project performance metrics. Boxplots are also made for each of the correlation tests to better visualize the data. Figure 4.1 shows the boxplot between the six project delivery methods and the budget performance of the projects. The boxplots for the comparisons between the project delivery methods and schedule, changes, owner satisfaction, and user satisfaction can be seen in Figure C.1 – Figure C.4 in Appendix C.

Figure 4.1. Budget Performance Boxplots of Project Delivery Methods (1 = much lower than budgeted, 7 = much higher than budgeted)
The result of this statistical test shows that there is no significance between the different delivery methods and the project performance at the 95% confidence level. The resulting p-values can be found in table 4.1.

Table 4.1. Kruskal-Wallis Correlation Test between Project Delivery Methods and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.4026</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.9179</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.8755</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.1627</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.2936</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The relatively high p-values from Table 4.1 shows that there is no correlation between the six major project delivery methods at the 95% confidence level.

The final result of comparing the different project delivery methods to the project performance metrics did not unearth anything significant. In fact, most of the comparisons between metrics shows very similar findings. For both budget and schedule performance of the projects, it is seen that most projects regardless of delivery method are either on budget or slightly above budget, and majority of projects are either on schedule or slightly longer than scheduled. Most of the project delivery methods have similar amounts of changes ranging between “a little” and “a moderate amount” of changes. Lastly, owners and users are either moderately or extremely satisfied with the result of the project.
4.2.2 Project Type

The type of project is also considered to have an effect on project performance. There are five major project types that are represented in this data, along with several “Other” project types as described in section 3.3.2.4. The category of “other” boasts a large number of project types that are removed from this analysis as to not skew the results for the original project types. The project types analyzed herein include commercial, industrial, education, healthcare, and residential.

The Kruskal-Wallis statistical test is again used to determine correlations between the different project types and the project performance metrics. Boxplots are made for each of the correlation tests to better visualize the data. Figure 4.2 shows the boxplot of the relationship between the project types and the budget performance of the projects. The boxplots of the relationships between project types and schedule, change, owner satisfaction, and user satisfaction can be found in Figure C.5 – Figure C.8 in Appendix C.
Figure 4.2. Budget Performance Boxplots of Project Types
(1 = much lower than budgeted, 7 = much higher than budgeted)

The p-values obtained from the statistical tests of project type and project performance are evaluated at the 95% confidence level, the results of which are in Table 4.2.

Table 4.2. Kruskal-Wallis Correlation Test between Project Type and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.2043</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.9571</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.9649</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.0705</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.3039</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
The results of the tests performed shows that there are no significant values at a confidence level of 95\% between project performance metrics and the project types.

Considering the final results of the difference between the project types and the project performance metrics, it is fairly easy to see that they do not vary too much between project types. As with project delivery method, all project types average between on budget/on schedule and slightly above budget/slightly longer than scheduled. There is slightly more variance between the amount of changes and the project types, but nothing large enough to be significant since most are between “a little” or “a moderate amount” of changes. Finally, with the same result as above, most owners and users are satisfied with the final result of their projects regardless of type.

4.2.3 Project Owner

Whether a project is public or private has the potential to have an effect on project performance as well. The survey results give information on whether the project is privately or publicly owned. The respondents who answered “Other” for this question were removed from the analysis to obtain a better comparison between public and private ownerships.

The Wilcoxon Rank-Sum statistical test is used for the comparison between project owner and project performance. This type of test is used because the independent variable of project owner has two values, public or private (“Mann-Whitney-Wilcoxon Test”, 2017). The Wilcoxon Rank-Sum, or Mann-Whitney U Test as it is also called, relates the
independent variable to the ranked dependent variable, which in these cases is project performance metrics ranked on either a five or seven point Likert scale (“Mann-Whitney U Test”, 2017). Boxplots are made for each of these correlation tests to see visualize any significance that is found. Figure 4.3 shows the boxplot of the relationship between the project owner and the final user satisfaction of the project. This test is the only significant finding between the project owner and the project performance. The boxplots of the relationships between project owner and budget, schedule, change, and owner satisfaction can be found in Figure C.9 – Figure C.12 in Appendix C.

![Boxplot of Owner Satisfaction](image)

Figure 4.3. Owner Satisfaction Boxplots of Project Owners
(1 = extremely unsatisfied, 7 = extremely satisfied)
The p-values obtained from the statistical tests of project type and project performance are evaluated at the 95% confidence level, and results can be seen below in Table 4.3.

Table 4.3. Wilcoxon Rank-Sum Correlation Test between Project Owner and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.4641</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.3652</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.1465</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.5374</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.03077</td>
<td><strong>Significant</strong></td>
</tr>
</tbody>
</table>

The results shown above in the Table 4.3 show that there is only one significant value at a significance level of 95%. Thus, there is a strong correlation between the overall user’s satisfaction of the project and the project owner. The boxplot in Figure 4.3 shows that privately owned projects have a slightly higher user satisfaction than publicly owned projects. However, the majority of the projects that are privately owned have a user satisfaction rank of six or higher, which means that most of those users are either “Moderately Satisfied” or “Extremely Satisfied”. So even though the statistical test shows a significant result, the government owned projects only have slightly less satisfied users than private projects.

The final result of the comparison between the two different project owners compared to the five project performance metrics is not substantially different. Looking at both the budget and schedule performance of projects with public and private owners, they both
are likely to be delivered on budget and on schedule. The boxplots for both of these comparisons, which can be found in Figure C.9 and Figure C.10 in Appendix C, look almost identical. The comparison between the amount of changes between private and public again are very similar with having most projects range between “a little” and “a moderate amount” of changes as shown in Figure C.11 in Appendix C. Lastly, whether the project is privately or publicly owned, most owners and users are ultimately happy with the result. This shown from having the majority of responses be either “moderately satisfied” or “extremely satisfied” which can be seen in Figure 4.3 and Figure C.12.

4.2.4 Project Size

Another comparison between projects in this dataset is the comparison of project sizes and project performance. Projects vary by square footage and cost from the data obtained from the survey. This research asks the question: “are smaller more likely to be successful than larger projects?”

To evaluate this data the Kendall’s Tau-b nonparametric test is used to find any correlations. This test is used because it is able to relate two variables measured on ordinal or continuous scales. In this example, Kendall’s Tau-b relates the ordinal Likert scale answers of project performance against the continuous variables of project size in square footage or cost (“Kendall’s Tau-b”, 2017). The results of these tests can be seen below in Table 4.4 and Table 4.5 respectively.
Table 4.4. Kendall’s Tau-b p-values and significance of comparison between project square footage and project performance

<table>
<thead>
<tr>
<th>Square Footage</th>
<th>P-value</th>
<th>Tau-b</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.1735</td>
<td>-0.07439</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.06925</td>
<td>-0.10175</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.1074</td>
<td>0.09132</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner’s Satisfaction</td>
<td>0.9027</td>
<td>-0.00724</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User’s Satisfaction</td>
<td>0.06627</td>
<td>-0.10888</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 4.5. Kendall’s Tau-b p-values and significance of comparison between project cost and project performance

<table>
<thead>
<tr>
<th>Project Cost</th>
<th>P-value</th>
<th>Tau-b</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.7221</td>
<td>-0.01955</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.6263</td>
<td>-0.02745</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.03935</td>
<td>0.11810</td>
<td>Significant</td>
</tr>
<tr>
<td>Owner’s Satisfaction</td>
<td>0.4329</td>
<td>-0.04689</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User’s Satisfaction</td>
<td>0.2474</td>
<td>-0.06919</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The results from these tables show one significant finding between the cost of a project and the change performance. The relationship between these variables shows that as the cost of the project increases, the number of approved changes also increases. This can be expected as projects have more changes, the cost of those projects tends to go up.

4.2.5 Owner’s Representative

The last project characteristic is arguably the most important in regards to this research as it investigates the correlations between whether an owner’s representative is hired or not and how successful it is. The major question asked is: does an owner’s representative
make a project more successful? This section follows a similar procedure to the previous and looks at how successful projects are with and without an owner’s representative in terms of project budget, schedule, changes, owner satisfaction, and user satisfaction.

The Wilcoxon Rank-Sum is used for this comparison as there are two independent variables that have corresponding rankings from the survey results. Boxplots have been made for each of these comparisons to see if there is any difference between projects which have or do not have owner’s representatives, and the Wilcoxon Rank-Sum test is performed to determine if there is any statistical significance.

### 4.2.5.1 Correlation between Budget Performance and Owner’s Representatives

The first comparison performed is between the decision to hire an owner’s representative and the budget performance of the project. One of the considerations for owners to hire owner’s representatives is because they believe it will keep at or under budget. The result of this question is broken down below in Table 4.6 and Figure 4.4 to show the results from the survey sent out to owners and facility managers.
Table 4.6. Budget Performance of Projects with and without Owner’s Representatives

<table>
<thead>
<tr>
<th>Budget Performance</th>
<th>Yes Owner’s Representative</th>
<th>No Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Responses</td>
<td>Percentage of Responses</td>
</tr>
<tr>
<td>Much Lower than Budgeted</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Moderately Lower than Budgeted</td>
<td>9</td>
<td>8.0%</td>
</tr>
<tr>
<td>Slightly Lower than Budgeted</td>
<td>16</td>
<td>14.2%</td>
</tr>
<tr>
<td>About the Same as Budgeted</td>
<td>43</td>
<td>38.1%</td>
</tr>
<tr>
<td>Slightly Higher than Budgeted</td>
<td>23</td>
<td>20.4%</td>
</tr>
<tr>
<td>Moderately Higher than Budgeted</td>
<td>11</td>
<td>9.7%</td>
</tr>
<tr>
<td>Much Higher than Budgeted</td>
<td>9</td>
<td>8.0%</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 4.4. Budget Performance Boxplots of Projects with and without Owner’s Representatives

(1 = Much lower than budgeted, 7 = Much higher than budgeted)
From Table 4.6 and Figure 4.4 above, it is visually apparent that whether a project has an owner’s representative or not, the budget performance does not differ by much. This is also looked at statistically with the Wilcoxon Rank-Sum test. The result of the Wilcoxon Rank-Sum test gives a p-value of 0.1017, which is not significant at the 95% confidence interval. Thus, it can be concluded that whether an owner’s representative is hired or not, there is not significant impact on the budget performance of a project.

4.2.5.2 Correlation between Schedule Performance and Owner’s Representatives

Another reason why owners decide to hire owner’s representatives is because they can keep track of the schedule. Owners are likely to use owner’s representatives to create or review the schedule. Schedule is shown as an important role for owner’s representatives in the opinions of the owners, so it is important to see if there is any significant impact on schedule when an owner’s representative is hired for the project. Table 4.7 and Figure 4.5 show the relationship between having an owner’s representative or not and the schedule performance of the project.
Table 4.7. Schedule Performance of Projects with and without Owner’s Representatives

<table>
<thead>
<tr>
<th>Schedule Performance</th>
<th>Yes Owner’s Representative</th>
<th>No Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Responses</td>
<td>Percentage of Responses</td>
</tr>
<tr>
<td>Much Shorter than Scheduled</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Moderately Shorter than Scheduled</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Slightly Shorter than Scheduled</td>
<td>6</td>
<td>5.4%</td>
</tr>
<tr>
<td>About the Same as Scheduled</td>
<td>62</td>
<td>55.4%</td>
</tr>
<tr>
<td>Slightly Longer than Scheduled</td>
<td>17</td>
<td>15.2%</td>
</tr>
<tr>
<td>Moderately Longer than Scheduled</td>
<td>19</td>
<td>17.0%</td>
</tr>
<tr>
<td>Much Longer than Scheduled</td>
<td>6</td>
<td>5.4%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 4.5. Schedule Performance Boxplots of Projects with and without Owner’s Representatives

(1 = Much shorter than scheduled, 7 = Much longer than scheduled)
As with budget performance above, it is visually apparent that the schedule performances of projects with and without owner’s representatives are similar. Most projects perform either on schedule as or slightly behind schedule. To verify this assumption, the Wilcoxon Rank-Sum test is used to determine any statistical significance. The p-value obtained from the Wilcoxon Rank-Sum test is 0.8001 which is not significant at the 95% confidence level. The conclusion from both the visuals and statistical test prove that there is not significant impact on schedule whether an owner’s representative is hired or not.

### 4.2.5.3 Correlation between Change Performance and Owner’s Representatives

In the results of the survey, a large number of owners decided to hire owner’s representatives to oversee the approval of change orders. Owners may believe that hiring owner’s representatives will reduce the number of changes during a project, so the comparison is made between projects with and without owner’s representatives and the amount of changes on the project. Both Table 4.8 and Figure 4.6 show the amount of changes with and without owner’s representatives.

<table>
<thead>
<tr>
<th>Change Performance</th>
<th>Yes Owner’s Representative</th>
<th>No Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Responses</td>
<td>Percentage of Responses</td>
</tr>
<tr>
<td>None at All</td>
<td>10</td>
<td>9.0%</td>
</tr>
<tr>
<td>A Little</td>
<td>47</td>
<td>42.3%</td>
</tr>
<tr>
<td>A Moderate Amount</td>
<td>41</td>
<td>36.9%</td>
</tr>
<tr>
<td>A Great Deal</td>
<td>5</td>
<td>4.5%</td>
</tr>
<tr>
<td>A Lot</td>
<td>8</td>
<td>7.2%</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
<td>100%</td>
</tr>
</tbody>
</table>
Visually there are not many differences between the amount of changes with and without an owner’s representative. This is also proven using the Wilcoxon Rank-Sum test with a p-value of 0.4284. It is statistically proven using this data that there is not a significant difference between the amount of changes on a project whether or not an owner’s representative is hired.

**4.2.5.4 Correlation between Owner Satisfaction and Owner’s Representatives**

The comparison between hiring an owner’s representative and the owner’s satisfaction with a project is evaluated to see if projects with an owner’s representative have higher satisfactions. This is imperative to compare because whether an owner is happy or
unhappy with the final result of their project is important. If hiring an owner’s representative makes owners more satisfied than owners who do not hire owner’s representatives, the construction industry as a whole should know. Again, visual representations of the data are presented below in Table 4.9 and Figure 4.7.

Table 4.9. Owner’s Satisfaction of Projects with and without Owner’s Representatives

<table>
<thead>
<tr>
<th>Owner’s Satisfaction</th>
<th>Yes Owner’s Representative</th>
<th>No Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Responses</td>
<td>Percentage of Responses</td>
</tr>
<tr>
<td>Extremely Dissatisfied</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Moderately Dissatisfied</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Slightly Dissatisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Neither Satisfied nor Dissatisfied</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Slightly Satisfied</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Moderately Satisfied</td>
<td>30</td>
<td>26.5%</td>
</tr>
<tr>
<td>Extremely Satisfied</td>
<td>77</td>
<td>68.1%</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100%</td>
</tr>
</tbody>
</table>
Both Table 4.9 and Figure 4.7 show similar results for owner’s satisfaction of projects with and without owner’s representatives. The Wilcoxon Rank-Sum statistical test is again used, resulting in a p-value of 0.3541 which is not significant at the 95% confidence level. This result shows that there is not a significant difference between the owner’s overall satisfaction of a project with or without an owner’s representative.

4.2.5.5 Correlation between User Satisfaction and Owner’s Representatives

The last comparison to make between project performance and the decision to hire an owner’s representative or not is with the overall users’ satisfaction of the project. This is important to analyze separately than the owner’s satisfaction because there are different
desires and expectations between the owners and users. A successful construction project will ultimately have satisfied owners and users. The question is whether an owner’s representative creates higher user satisfaction than projects without owner’s representatives. The comparison of this data can be seen in Table 4.10 and Figure 4.8.

Table 4.10. Owner’s Satisfaction of Projects with and without Owner’s Representatives

<table>
<thead>
<tr>
<th>User’s Satisfaction</th>
<th>Yes Owner’s Representative</th>
<th>No Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Responses</td>
<td>Percentage of Responses</td>
</tr>
<tr>
<td>Extremely Dissatisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Moderately Dissatisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Slightly Dissatisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Neither Satisfied nor Dissatisfied</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Slightly Satisfied</td>
<td>3</td>
<td>2.7%</td>
</tr>
<tr>
<td>Moderately Satisfied</td>
<td>31</td>
<td>27.4%</td>
</tr>
<tr>
<td>Extremely Satisfied</td>
<td>77</td>
<td>68.1%</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100%</td>
</tr>
</tbody>
</table>
The users’ satisfaction with and without owner’s representatives is almost identical to the comparison of owner’s satisfaction with and without owner’s representatives. The Wilcoxon Rank-Sum test revealed a p-value of 0.1691 which is not significant at the 95% confidence level. It can be statistically confirmed from this data that there is no significant difference in users’ satisfaction of projects with or without owner’s representatives.

4.2.5.6 Summary of Owner’s Representative Impact on Project Performance

The findings this section show that there is no significant impact of hiring an owner’s representative on project performance. This can be seen in Table 4.11 where there are no
significant p-values at the 95% confidence level. This shows that some of the reasons why owners hire owner’s representatives may not be adequate reasons.

Table 4.11. Significance of hiring an owner’s representative compared to project performance

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.1017</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.8001</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.4284</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.3541</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.1691</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The final result of this section shows that whether an owner hires an owner’s representative or not the final outcome of the project will be fairly similar. The budget of the project in the end will likely be on or slightly above budget, the schedule of the project will likely be on or slightly longer than scheduled, and the amount of changes will likely range between a little and a moderate amount. Another major conclusion from this section is that regardless of hiring an owner’s representative, the owner and the users are typically satisfied with the project. There are a few outliers present in this data, so while there is no guarantee that projects will be successful, overall most projects reported in the owner’s representative survey were successful regardless of hiring an owner’s representative.
4.2.6 Summary of Project Characteristics Impact on Project Performance

Using statistical analyses, Section 4.2 shows that there few overall project characteristics that show a statistical significant difference between the characteristics and project performance, however a few stand out. Out of the five performance metrics, budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction, few are influenced by the project characteristics. These characteristics include delivery method, project type, project owner, project size, and the decision to hire an owner’s representative. Table 4.12 shows any significance the project characteristics have on the five different project performance metrics.

Table 4.12. Summary Table of Significance of Project Characteristics on Project Performance

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>Delivery Method</th>
<th>Project Type</th>
<th>Project Owner</th>
<th>Project Square Footage</th>
<th>Project Cost</th>
<th>Owner’s Rep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

As shown above in Table 4.12 there are only two characteristics that have significance at the 95% confidence level: project owner influence on user satisfaction and project cost on change performance. This shows that users of publicly (government) owned projects are slightly more satisfied than users of privately owned projects, and larger projects in terms
of cost are more likely to have more changes on a project than smaller (lower cost) projects.

The most important information found from this section for this paper is the lack of significance of owner’s representatives on project performance. This shows that ultimately when deciding to hire an owner’s representative or not, there is not a significant difference in how the project will perform schedule, budget, or change wise, and the owner and users will be happy in the end. The main conclusion is that most people are happy at the end of their project regardless of having an owner’s representative or not.

4.3 Owner’s Representatives Impact on Delivery Methods

It is found above in Section 4.2.5 that there is not a significant difference between project performance of projects with and without an owner’s representative. However, the question still remains if in each particular delivery method, are owner’s representatives more likely to help the project succeed. Each delivery method is different, which changes the owner’s relationships with the other key players (An Owner's Guide to Project Delivery Methods, 2012). Of the six different delivery methods; DBB, DB, CMR, CMA, MP, and IPD, they can be individually evaluated to see if owner’s representatives are having impacts on project performance.
4.3.1 Owner’s Representatives Impact on Design-Bid-Build Project Performance

It can be argued that the DBB delivery method is one of the more risky options for the owner, even though it is the most common delivery method in use today. Because of the added risk, owner’s representatives have the potential to mitigate this risk from the owners. A construction manager may not always have the owner’s best interest if he/she works for the general contractor, especially with hard bid jobs, the general contractor is focusing on their personal cost savings. Owner’s representatives can be a resource for owners, but it is still uncertain if they are significantly impacting the project performance.

To see if there is a significant correlation between DBB projects with and without owner’s representatives and the five project performance metrics, first boxplots are created to visualize these relationships. Figure 4.9 shows the relationship between DBB projects with and without owner’s representative and the overall budget performance of the project. The remaining four boxplots for the different project performance metrics can be found in Figure C.13 – Figure C.16 Appendix C.
From Figure 4.9 above, there does not appear to be much difference between the budget performance of DBB projects with an owner’s representative and DBB projects without an owner’s representative. This same similarity is visible between the remaining four project performance metrics. To test statistically if there is any significance between the project performance metrics and the decision to hire an owner’s representative specifically of DBB projects, the Wilcoxon Rank-Sum test is used. The p-values and corresponding significance of these tests can be found in Table 4.13 below.
From Table 4.13 above, it can be concluded that specifically on DBB projects, there is not a statistical significance of project performance with or without an owner’s representative. This means that for owners using the DBB contract style, there is not a significant impact of hiring or not hiring an owner’s representative on the project performance.

### 4.3.2 Owner’s Representatives Impact on Design-Build Project Performance

DB projects can potentially be much less risky for the owner comparatively to DBB projects. If the owner trusts the DB team, and feels comfortable with the construction project, it may be unnecessary for the owner to hire an owner’s representative, but owners may still feel the need to hire one for additional security. Owners can have different degrees of involvement on a DB project, and can determine whether their level of involvement necessitates hiring an owner’s representative (Cavignac, 2012).

It can be determined if hiring an owner’s representative has significant impact on the different project performance metrics for DB projects. To see if DB projects are more
successful when hiring an owner’s representative or not hiring an owner’s representative, boxplots have been created to visually see the difference in project performance. Figure 4.10 shows the relationship between the decision to hire an owner’s representative on DB projects along with the budget performance of those projects. The remaining four project performance metrics can be found in Figure C.17 – Figure C.20 in Appendix C.

![Boxplot of Budget Performance of DB Projects with and without Owner’s Representatives](image)

**Figure 4.10. Budget Performance Boxplots of DB Projects with and without Owner’s Representatives**

(1 = Much lower than budgeted, 7 = Much higher than budgeted)

From Figure 4.10 above, there is a substantial difference in the budget performances of DB projects with and without owner’s representatives. It appears that when an owner decides to hire an owner’s representative on DB projects, the project cost is more likely to be less than budgeted than when they do not hire an owner’s representative. There does
not appear to be any substantial differences between the other project performance metrics and the decision to hire or not hire an owner’s representative for DB projects. To test if these differences are significant statistically, the Wilcoxon Rank-Sum test is used. The summary of p-values and corresponding significance can be seen below in Table 4.14.

Table 4.14. Wilcoxon-Rank Sum Correlation Test With and Without Owner’s Representatives on DB Projects and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.02153</td>
<td>Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.9862</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.1342</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.6143</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.731</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

As is seen in Figure 4.10 the difference in budget between DB projects with and without owner’s representatives is substantial, and Table 4.14 above shows that there is a statistical significance at the 95% confidence level that DB projects with an owner’s representative have better budget performances than DB projects without an owner’s representative. This is important because it shows that there is a significant benefit for owners who are selecting the DB delivery method, that when they decide to hire an owner’s representative, their budget performance is likely to be better than when they do not decide to hire an owner’s representative.
4.3.3 Owner’s Representatives Impact on Construction Management at Risk Project Performance

For CMR projects, the owner passes some of his/her own risk to the construction manager. This is beneficial to the owner, as the construction manager has the best interest of the owner at the forefront of every decision. If a construction project were to not go as planned, it financially would not affect the owner as significantly. For this situation, the decision to hire or not hire an owner’s representative may be determined based on what tasks the owner is responsible for and what tasks the construction manager is responsible for. A lot of the decision making can come from the contract language between the owner and construction manager, but ultimately will depend on how comfortable the owner is, their past experiences, knowledge, and time.

To see if there are any differences in the project performances of CMR projects with and without an owner’s representative, boxplots have been made. Figure 4.11 below shows the relationship of budget performance of CMR projects with and without owner’s representatives. The remaining four boxplots which show the relationships of the other project performance metrics can be found in Figure C.21 to Figure C.24 in Appendix C.
As shown in Figure 4.11 there does not appear to be any differences in the budget performance between CMR projects with and without owner’s representatives. In the remaining four boxplots, these differences are also small and there does not appear to be any large differences between project performances. To test this statistically, the Wilcoxon Rank-Sum test is used to find any correlations between the project performance metrics and the decision to hire or not hire an owner’s representative on CMR projects. The results of this test can be found below in Table 4.15 where it shows the p-values and corresponding significance of the project performance metric correlations.
Table 4.15. Wilcoxon-Rank Sum Correlation Test With and Without Owner’s Representatives on CMR Projects and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.8359</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.6788</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.4582</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.7992</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.7347</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

From Table 4.15 and the corresponding boxplots, it can be determined that there is no significant difference in project performance of CMR projects with and without owner’s representatives. This is important as it shows when owners choose the CMR delivery method, the overall project performance is not significantly affected by hiring or not hiring an owner’s representative.

4.3.4 Owner’s Representatives Impact on Construction Management – Agent Project Performance

In CMA projects, the owner retains the risk financially of finishing the project on time and under budget. However, an agent and an owner’s representative are two similar roles on a construction project. The decision of an owner to either hire or not hire an owners’ representative may depend on the contract language, or what roles and responsibilities the construction manager and the owner are each performing. An owner’s representative could mitigate some of the risk an agent could not, so this must be a consideration when deciding on hiring an owner’s representative on CMA projects.
It can be evaluated if the decision to hire an owner’s representative or not on CMA projects has a significant impact on the overall project performance. Visually these relationships are shown in boxplots, one of which is shown in Figure 4.12 below, where it shows the relationship between budget performance and the decision to hire or not hire an owner’s representative on CMA projects. The remaining four boxplots of the other project performance metrics can be found in Figure C.25 to Figure C.28 in Appendix C.

Figure 4.12. Budget Performance Boxplots of CMA Projects with and without Owner’s Representatives
(1 = Much lower than budgeted, 7 = Much higher than budgeted)

From the boxplot above, it appears that there might be a slight difference in the budget performance between CMA projects with and without an owner’s representative.
However, there does not appear to be any significant differences in the remaining four relationships. To test if any of the relationships have significant correlations, the Wilcoxon Rank-Sum test is used. The summary of the correlation p-values for the relationship between having an owner’s representative or not on CMA projects and the five different project performance metrics can be seen below in Table 4.16.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.2923</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.3629</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.1905</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.3289</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.6514</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

From Table 4.16 it can be concluded that there are no significant differences between project performances of CMA projects with an owner’s representative and CMA projects without an owner’s representative. This is important for owners who are choosing the CMA delivery method, as their decision to hire an owner’s representative or not is not significantly likely to affect the project performance. However, this analysis was completed using sample sizes of 12 and 9 for CMA projects with and without owner’s representatives respectively, so in order to obtain a more validated conclusion, more data needs to be obtained.
4.3.5 Owner’s Representatives Impact on Multiple Prime Contractors Project Performance

MP is a similar delivery method to DBB, but the owner contracts directly with the different trade contractors, rather than having one contract with a single prime contractor. This can be risky for an owner if he/she is unknowledgeable because he/she is not in charge of one contractor, but multiple contractors. If no one is in charge of leading and coordinating the project, there is an higher risk of increased budget, schedule, and the possibility of claims. When owners hire owner’s representatives, it places the responsibility onto them to manage the contractors. This can be advantageous for the owner and prime contractors to ensure a well informed and coordinated project team if the owner is unwilling or unable to perform this coordination themselves.

To see if when owners using the MP delivery method projects hire an owner’s representative or not affects the overall project performance, boxplots are created. These boxplots show how the project performs with and without owner’s representatives. Figure 4.13 shows the boxplot of the relationship between MP projects with and without owner’s representatives in relationship with the budget performance of a project. The remaining four boxplots of this relationship with the other project performance metrics can be found in Figure C.29 to Figure C.32 Appendix C.
Figure 4.13. Budget Performance Boxplots of MP Projects with and without Owner’s Representatives
(1 = Much lower than budgeted, 7 = Much higher than budgeted)

Figure 4.13 seems to show a significant difference between projects with and without an owner’s representative and budget performance of MP projects, but it needs to be noted that the sample sizes of these projects are 5 and 4 for projects with and without owner’s representatives respectively. This means it is difficult to obtain an extensive analysis, however the Wilcoxon Rank-Sum test was used to see if there is significant differences in the small sample size that has been collected. Table 4.17 shows these p-values and significance respectively.
Table 4.17. Wilcoxon-Rank Sum Correlation Test With and Without Owner’s Representatives on MP Projects and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.1925</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.6873</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>1</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>1</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.5023</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

As seen in Table 4.17, there are no significant differences between MP project performances with and without owner’s representatives, but in Figure 4.13 there does seem to be some shift between budget performances. To adequately analyze this relationship more data points need to be collected. No conclusion can be drawn from this data above without additional input for owners.

4.3.6 Owner’s Representatives Impact on Integrated Project Delivery Project

Performance

The last project delivery method is IPD. With IPD projects, an integrated team composed of key players collectively manages and shares information. This contract allows the owner to create a risk pool, which incentivizes all key players to work together to share the risk and reward contingency. There are still many of unknowns with IPD projects for owners as it is still a relatively new delivery method, but it is argued to be one of the least risky delivery methods for an owner (Knapp et. al., 2014). For owners with IPD projects, the decision to hire an owner’s representative will likely come to the conclusion of knowledge, time, and experience, but also the trust he/she has in the project team.
From the data collected, it cannot be determined if the decision of hiring an owner’s representative has a significant impact on the project performance because out of the ten respondents who used IPD, all of them decided to hire an owner’s representative. To get a better understanding of this reasoning, more data points need to be collected. The main assumption as to why most IPD projects decide to hire an owner’s representative is because of the relative unfamiliarity of IPD to the industry. This fairly new delivery method can be confusing to the owner, or they may not fully trust the project team. Regardless of each individual owner’s opinions and reasons to hire an owner’s representative, it is apparent that from the data that owners who chose IPD are likely to decide to hire an owner’s representative.

4.3.7 Summary of Owner’s Representatives Impact for Delivery Methods

The decision of which delivery method to choose on a project is one of the biggest decisions an owner will make on a construction project. This decision affects the entire project lifecycle, and presents different amounts of risk to an owner. The decision of an owner to hire an owner’s representative may depend on what type of delivery method they select. In this section it is investigated if an owner’s representative has an impact on the project performance in each individual delivery method. The six delivery methods looked at are DBB, DB, CMR, CMA, MP, and IPD. Table 4.18 below shows the impact hiring an owner’s representative or not hiring an owner’s representative has on each delivery method.
Table 4.18. Summary of Impact of Hiring or Not Hiring an Owner’s Representative Has on Project Performance for Each Delivery Method

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>DBB</th>
<th>DB</th>
<th>CMR</th>
<th>CMA</th>
<th>MP</th>
<th>IPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Unknown</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Unknown</td>
</tr>
<tr>
<td>Change Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Unknown</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Unknown</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

The only significant value found above is when an owner is using the DB delivery method approach, when an owner hires an owner’s representative the budget performance is likely to be better than when they do not hire an owner’s representative. For the CMR, CMA, and MP delivery methods, more data should be obtained to have a more extensive analysis of these impacts.

One of the biggest conclusions drawn from this section is that owners are typically hiring owner’s representatives for IPD projects. The best assumption as to why this is the case is because IPD is still a relatively new delivery method and owners are unsure about how to manage these types of projects.

4.4 Influences on Owner’s Decision to Hire an Owner’s Representative or Not

A question many in the construction industry have is: why do owners decide to hire an owner’s representative? The opinions of owner’s representatives vary in the industry. It is not uncommon to hear contractor’s mixed feelings about owner’s representatives.
However, the ultimate decision to hire an owner’s representative lies with the owner. So, what goes into the decision to hire an owner’s representative? Are there any project characteristics that are likely to affect the decision to hire an owner’s representative?

The following sections considers several project characteristics including: delivery method, project type, project owner, project location, project size, experience with general contractor in the past, owner’s experience with construction, and if there are any special conditions on the project. Correlations are looked for between the project characteristics and the decision owners make to hire or not hire an owner’s representative.

4.4.1 Delivery Method

Different delivery methods have different risks associated with them for the owner. The type of delivery method selected may influence the owner’s decision to hire an owner’s representative depending on the amount of risk present. Using the data obtained from the survey, a comparison is made between the selected delivery method and the decision to hire an owner’s representative or not.

The statistical test used for this comparison is Pearson’s chi-square test, to see if there is a relationship between two categorical variables. In this scenario, the two categories are delivery method selected, and whether or not an owner’s representative was hired (“Chi-Square Test for Association”, 2017). The data collected from the survey regarding this
relationship is shown below in Table 4.19. Those respondents who selected “Other” for delivery method were removed from this analysis.

Table 4.19. Number of Responses for Relationship between Delivery Method and Owner’s Representative

<table>
<thead>
<tr>
<th>Delivery Method</th>
<th>Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>DBB</td>
<td>52</td>
</tr>
<tr>
<td>DB</td>
<td>25</td>
</tr>
<tr>
<td>CMR</td>
<td>20</td>
</tr>
<tr>
<td>CMA</td>
<td>12</td>
</tr>
<tr>
<td>IPD</td>
<td>10</td>
</tr>
<tr>
<td>MP</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 4.14 is also created to visualize if there are any delivery methods that are more likely to hire or not hire an owner’s representative. This figure uses percentages for each of the delivery methods to better compare between the numbers of responses of owners who hire or do not hire owner’s representatives.
From Figure 4.14, visually it appears that there is a fairly similar spread of project types regardless of whether a project has an owner’s representative or not. The only delivery method that stands out in this chart is IPD because there are not any projects collected with this delivery method that did not also have an owner’s representative.

Statistically the chi-square test is used to verify the results seen in both Table 4.19 and Figure 4.14. After first checking that the expected values are large enough where less than 20% of the values are less than five (Deshpande, 2017), Pearson’s chi-square test revealed a p-value of 0.1806, which is not significant. This confirms what Figure 4.14 shows above, that delivery method does not significantly affect the owner’s decision to hire an owner’s representative.
4.4.2 Project Type

There may be several challenges and risks associated with a project depending on which project type it is. This could potentially be a reason for owners to hire or to not hire an owner’s representative. From the survey data, a comparison is made between the project type and the decision to hire an owner’s representative or not.

The Pearson’s chi-square test is also used to determine if there is a significant relationship between the two sets of categorical data. The data is visually represented in Table 4.20 and Figure 4.15 below. Since there are several projects listed as “Other” in this dataset, those data points have been eliminated to get a better understanding of the major five project types.

Table 4.20. Number of Responses for Relationship between Project Type and Owner’s Representative

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Owner’s Representative</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>52</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>12</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>22</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Healthcare</td>
<td>21</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
It can be seen in Figure 4.15 that there does not seem to be any difference between the percentage of each project type from the responses that have an owner’s representative, and the percentage of each project type from the responses that do not have an owner’s representative. None of the project types specifically stand out from the rest.

After checking that the assumptions are correct, the chi-square test is performed and gives a result of a p-value of 0.7783 which is not significant. This confirms what is seen in Figure 4.15 above, that the type of project being constructed does not significantly affect the owner’s decision to hire or not hire an owner’s representative.
4.4.3 Project Owner

From the survey section asking who the project owner is, either public (government) or private, a comparison can be made to see if the owner type has any impact on the decision to hire an owner’s representative or not. This is questioned as the owner type may influence the decision to hire an owner’s representative based on budgets, contracts, or risk.

The data is visually represented below in Table 4.21 and Figure 4.16, and those owners who responded with a project owner as “Other” were excluded from this analysis. The Pearson’s chi-square test is also used for this analysis between the two types of categorical data to determine any statistical significance.

Table 4.21. Number of Responses for Relationship between Project Owner and Owner’s Representative

<table>
<thead>
<tr>
<th>Project Owner</th>
<th>Owner’s Representative</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Private</td>
<td>94</td>
<td>56</td>
</tr>
<tr>
<td>Public (government)</td>
<td>33</td>
<td>29</td>
</tr>
</tbody>
</table>
Figure 4.16. Percentage of Responses of Having or Not Having an Owner’s Representative and the Project Owner

From Figure 4.16 it appears that privately owned projects are slightly more likely to hire an owner’s representative than publicly owned projects. This difference is fairly small, so Pearson’s chi-square test is used to see if there is any statistical significance. The result from the chi-square test reports a p-value of 0.2619. This reveals that there is no significant difference between projects that are either public or private and the owner’s decision to hire an owner’s representative or not. Whether a project is owned privately or publicly, it cannot be determined if they are more or less likely to hire an owner’s representative.
4.4.4 Project Location

As described in Section 3.3.2.2, the projects are broken up by location, and in particular regions. The goal of this analysis is to determine if certain regions of the country are more or less likely to hire an owner’s representative. Out of the four United States geographical regions: West, Midwest, Southeast, and Northeast, construction, people, and cultural customs change, which may affect the owner’s decision on whether or not they decide to hire an owner’s representative.

Table 4.22 shows the number of responses from each geographical region along with whether they chose to hire an owner’s representative or not. Figure 4.17 breaks this data up into percentages of owner’s representative projects and non-owner’s representative projects and the percentages of respondents in each region.

Table 4.22. Number of Responses for Relationship between Project Region and Owner’s Representative

<table>
<thead>
<tr>
<th>Project Region</th>
<th>Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>West</td>
<td>33</td>
</tr>
<tr>
<td>Midwest</td>
<td>46</td>
</tr>
<tr>
<td>Southeast</td>
<td>32</td>
</tr>
<tr>
<td>Northeast</td>
<td>21</td>
</tr>
</tbody>
</table>
Figure 4.17. Percentage of Responses of Having or Not having an Owner’s Representative and the Project Region

From Figure 4.17 it appears that projects in the Southeast are slightly more likely to not hire an owner’s representative and projects in the Northeast are slightly more likely to hire an owner’s representative. To see if there is any statistical significance between these regions and the likelihood of hiring an owner’s representative, Pearson’s chi-square test is used with a resulting p-value of 0.2183. From this statistical test, it is confirmed that there is no significance between the region a project is being constructed in and the decision to hire an owner’s representative. This means that whether an owner is constructing a project in the Southeast, Midwest, Northeast, or West, they are not significantly any more or any less likely to hire an owner’s representative.
4.4.5 Project Size

How large a project is or how much it costs can have a direct relationship to how difficult it is to construct, and how much risk the owner may experience. This could have an effect on whether the owner chooses to hire an owner’s representative or not. A large range of project square footages and costs are reported in the survey results.

The range of projects square footages and whether or not they had hired an owner’s representative or not can be seen below in Figure 4.18. These boxplots contains several outliers that range between 500,000 to 1,600,000 square which were cropped out of this plot to better show the main distribution of project square footages.
The range of project costs and whether or not they hired an owner’s representative can be seen below in Figure 4.19. There is also a very wide range of project cost, many which are considered outliers.

Looking at Figure 4.18 and Figure 4.19 it appears visually that larger projects in terms of square footage and cost are more likely to hire an owner’s representative. However, the differences between the values are still relatively close, so the Wilcoxon Rank-Sum test is again used to see if there is a statistical significance between the square footage and costs of projects with and without owner’s representatives. The Wilcoxon Rank-Sum test is a nonparametric test which is preferred in this case as the data has several outliers, and it is not normally distributed. The resulting p-values from the Wilcoxon Rank-Sum test are
0.00933 and 0.03924 for square footage and cost respectively, which are both significant at the 95% confidence level.

The significant p-values found reveal that the size of the project in both terms of square footage and project cost have an influence on whether an owner decides to hire an owner’s representative or not. When project sizes are larger, owners are more likely to hire an owner’s representative than when projects are smaller. This is understandable, as projects get larger, they tend to be more difficult and have more risks associated with them.

4.4.6 Owner’s Experience with General Contractor in Past

How much experience an owner has with the general contractor in the past may affect their decision to hire an owner’s representative or not, as owners who do not have any experience with a general contractor may not fully trust them to keep the best interests of the owner at heart and wants the help from an owner’s representative to get the job done with their best interest represented. The question here is: are owners who have not had experience with the general contractor in the past more likely to hire an owner’s representative and owners and facility managers with experience with the general contractor in the past less likely to hire an owner’s representative?

In the survey, it was asked if an owner has had previous experience with the project’s general contractor in the past. Table 4.23 breaks this data up into the number of responses from those who had experience with the general contractor in the past and if they had an
owner’s representative or not. Figure 4.20 visualizes this data in percentages of owner’s representative project or non-owner’s representative projects and the percentages of respondents with and without general contractor experience.

Table 4.23. Number of Responses for Relationship between Experience with General Contractor in Past and Owner’s Representative

<table>
<thead>
<tr>
<th>Experience with GC in Past</th>
<th>Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
<td>81</td>
</tr>
<tr>
<td>No</td>
<td>31</td>
</tr>
</tbody>
</table>

Looking at Figure 4.20 above, it appears that there is no impact on the decision to hire an owner’s representative regardless of if they have past experience working with the
general contractor. To verify this assumption, Pearson’s chi-square test is used with a resulting p-value of 1 which means there is absolutely no statistical significance between the decision to hire an owner’s representative and the past experience with the general contractor.

4.4.7 Special Conditions on Project

Another factor that may have an influence on whether an owner decides to hire an owner’s representative is if there are any special conditions on the project. This is questioned as it could be expected for owners who are experiencing special conditions on their projects to hire an owner’s representative to help avoid any unnecessary risks associated with the special conditions.

The survey asked if there were any special conditions on the project that the owner had concerns with, and the breakdown of the responses can be seen in Table 4.24. This data is also distributed in Figure 4.21 to visualize if there are any differences between projects with an owner’s representative or without an owner’s representative and special conditions.

<table>
<thead>
<tr>
<th>Special Conditions on Project</th>
<th>Owner’s Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
<td>28</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
</tr>
</tbody>
</table>
Considering Figure 4.16 above, it appears that there is not a difference between projects with or without owner’s representatives and the presence of special conditions on the project. Statistically this is tested using Pearson’s chi-square test, and the resulting p-value is 0.9112, which is not significant. This means that whether a project has special conditions are not, there is no statistical significance between the decision to hire an owner’s representative or not.

4.4.8 Owner’s Experience Level with Construction

The last factor considered regarding its effect on the owner’s decision to hire an owner’s representative is the owner’s experience level with construction. One reason an owner’s representative may be hired for the project is because the owner has a lack of experience
with construction, and may need an owner’s representative to help get the job done. This also questions whether an owner with more experience is less likely to hire an owner’s representative because he/she feels they have enough experience to handle the job on their own.

Owner’s ranked their experience between no experience at all and a lot of experience on a five point Likert scale. The distribution of this data from both owners who hired an owner’s representative and those that did not hire an owner’s representative can be seen in the boxplots in Figure 4.22 below.

![Figure 4.22. Owner’s Experience with Construction Boxplots with and without Owner’s Representatives](image)

(1 = None at all, 5 = a lot)
From Figure 4.22, it appears that owners who have slightly more experience with construction are less likely to hire an owner’s representative than those who do not. To test if this is statistically significant, the Wilcoxon Rank-Sum test is used. The resulting p-value from the Wilcoxon test is 0.02408, which is significant at the 95% confidence level.

The significant p-value found reveals that the owner’s construction experience affects his/her decision to hire an owner’s representative or not. When owners have less experience with construction, statistically they will more often decide to hire an owner’s representative. When an owner has more experience with construction, he/she is less likely to hire an owner’s representative. This is understandable as owners with less experience are not expected to know what tasks they need to perform as an owner and how to do them, so they hire an owner’s representative to perform these tasks for them.

4.4.9 Summary

Out of nine project characteristics, delivery method, project type, project owner, project region, square footage, project cost, owner’s experience with the general contractor in the past, special conditions on the project, and owner’s experience level with construction, three of these characteristics are found to be significant in the owner’s decision to hire or not hire an owner’s representative.

Project size in terms of both square footage of a project and overall cost of the project are significant in this decision, as larger and more expensive projects are more likely to hire
an owner’s representative than smaller cheaper projects. Owner’s level of experience with construction is the other factor that is found to influence the decision to hire an owner’s representative or not. The more experience an owner has with construction, the less likely they are to hire an owner’s representative than an owner that has less experience. The resulting p-values between the project characteristics and their correlations with the decision to hire an owner’s representative are shown below in Table 4.25 along with the statistical test used to calculate them.

<table>
<thead>
<tr>
<th>Project Characteristics</th>
<th>Statistical Test</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery Method</td>
<td>Pearson’s Chi-Square</td>
<td>0.1806</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Project Type</td>
<td>Pearson’s Chi-Square</td>
<td>0.7783</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Project Owner</td>
<td>Pearson’s Chi-Square</td>
<td>0.2619</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Project Region</td>
<td>Pearson’s Chi-Square</td>
<td>0.2183</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Square Footage</td>
<td>Wilcoxon Rank-Sum</td>
<td>0.009333</td>
<td>Significant</td>
</tr>
<tr>
<td>Cost</td>
<td>Wilcoxon Rank-Sum</td>
<td>0.03924</td>
<td>Significant</td>
</tr>
<tr>
<td>Experience with GC in Past</td>
<td>Pearson’s Chi-Square</td>
<td>1</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Special Conditions</td>
<td>Pearson’s Chi-Square</td>
<td>0.9112</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner’s Experience with Construction</td>
<td>Wilcoxon Rank-Sum</td>
<td>0.02408</td>
<td>Significant</td>
</tr>
</tbody>
</table>
4.5 When Owner’s Representatives are Hired

When an owner’s representative is hired, there are many roles and responsibilities they may perform. There are also several factors that can contribute to how successful an owner’s representative is on impacting project performance, such as when they are hired, how they are compensated, etc. This section attempts to see what the typical characteristics of hiring an owner’s representative are on the project, and see if any of them have an impact on the overall project’s performance.

4.5.1 Reasons Why Owners Hire Owner’s Representatives

There are many reasons why owners may hire owner’s representatives, several of which are addressed below. However, what matters is why owners feel the need to hire a separate entity to act on their behalf. The survey sent to owners asked if any of the following reasons are why they decided to hire an owner’s representative: improved communication, cost savings, heavy workload, lack of technical knowledge, create budget, create schedule, quality control/quality assurance (QA/QC), avoid conflict of interest, provide value engineering, conduct constructability analysis, control contingency money, and approval of change orders. There was also the ability of owners to write in any additional reasoning they had, several which are: risk management, helping with selection of contractor and architect, oversight management, and assure maintainability.

To figure out what the most significant reasons are for why an owner decides to hire an owner’s representative Table 4.26 is created. This table shows the number of owners who responded “yes” for each reasoning. Figure 4.23 is also created to show this data.
graphically. This figure shows the percentage of owners who responded that they hired their owner’s representative for the above reasons.

Table 4.26. Number of Responses of Owners who Hired their Owner’s Representatives for the Following Reasons

<table>
<thead>
<tr>
<th>Reasons to Hire Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved Communication</td>
<td>100</td>
</tr>
<tr>
<td>Cost Savings</td>
<td>68</td>
</tr>
<tr>
<td>Heavy Workload</td>
<td>91</td>
</tr>
<tr>
<td>Lack of Technical Knowledge</td>
<td>63</td>
</tr>
<tr>
<td>Create Budget</td>
<td>62</td>
</tr>
<tr>
<td>Create Schedule</td>
<td>70</td>
</tr>
<tr>
<td>QA/QC</td>
<td>89</td>
</tr>
<tr>
<td>Avoid Conflict of Interest</td>
<td>32</td>
</tr>
<tr>
<td>Provide Value Engineering</td>
<td>78</td>
</tr>
<tr>
<td>Conduct Constructability Analysis</td>
<td>52</td>
</tr>
<tr>
<td>Control Contingency Money</td>
<td>70</td>
</tr>
<tr>
<td>Approval of Change Orders</td>
<td>85</td>
</tr>
</tbody>
</table>
From both the Table 4.26 and Figure 4.23 above it can be seen the four major reasons why owners choose to hire an owner’s representative are for improved communication, heavy workload, QA/QC, and approval of change orders. However, most of the reasons listed above are still important for a large amount of owners. The only reason above that has less than 50% of owners claiming it as reason they hire an owner’s representative is to avoid conflict of interest.
4.5.2 Concern’s Owners have Before Hiring an Owner’s Representative

Before hiring an owner’s representative, several owners may have concerns. These concerns ultimately are not as significant as the benefits foreseen for many owners as they still decide to hire owner’s representatives. Owners were questioned about cost, finding a qualified representative, afraid to lose control, preferring to keep work in house, and were able to add any other significant concerns they had in the survey. However, owners appeared to not have any additional concerns, as none of them added any comments about other concerns they had. The breakdown of owner concerns before hiring an owner’s representative can be seen below. Table 4.27 shows the number of owners who experienced the concern, and Figure 4.24 shows the percentage of owners who experienced the concern.

<table>
<thead>
<tr>
<th>Owner’s Concerns Before Hiring an Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>68</td>
</tr>
<tr>
<td>Finding a Qualified Representative</td>
<td>57</td>
</tr>
<tr>
<td>Afraid to Lose Control</td>
<td>27</td>
</tr>
<tr>
<td>Prefer to Keep Work in House</td>
<td>41</td>
</tr>
</tbody>
</table>
Figure 4.24. Percentage of Responses of Owners Who Had Concerns Before Hiring an Owner's Representative

The most significant concern that owners have before hiring an owner’s representative is the cost associated with them. Over 60% of owners who hired an owner’s represented reported having this concern, but less than 25% reported they were afraid to lose control. It does not appear that many owners have concerns before hiring an owner’s representative, as less than half of the owners have concerns about finding a qualified representative, losing control, or preferring to keep work in house. The main concern owner’s representatives should be aware of is the cost associated with hiring them.

4.5.3 Roles the Owner’s Representative Perform during the Project

A main goal of this research is to determine what roles owner’s representatives perform on construction projects. The survey sent out to owners asked if owner’s representatives
were performing certain roles during the design and construction phases. There was also the option for owners to fill in any other roles they felt were important.

The percentage of owners who reported that the owner’s representative performed major roles during the construction project can be seen in Table 4.28 below. Table 4.28 shows that the most common role of an owner’s representative during the design phase is to review the schedule, however less than half of the owners reported that the owner’s representative solicited bidders. During the construction phase of the project most owner’s representatives review the schedule, approve progress payments, and track the project program, while slightly more than half produce schedule updates.

<table>
<thead>
<tr>
<th>Role</th>
<th>% Who Performed Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attend Design Meetings for Owner</td>
<td>74.1%</td>
</tr>
<tr>
<td>Propose Value Engineering Ideas</td>
<td>75.7%</td>
</tr>
<tr>
<td>Create the Baseline Schedule</td>
<td>56.5%</td>
</tr>
<tr>
<td>Review the Schedule</td>
<td>85.1%</td>
</tr>
<tr>
<td>Prepare Preliminary Cost Estimate</td>
<td>56.4%</td>
</tr>
<tr>
<td>Create and Manage the Contract</td>
<td>63.0%</td>
</tr>
<tr>
<td>Solicit Bidders</td>
<td>47.2%</td>
</tr>
<tr>
<td>Report Percent Design Complete</td>
<td>60.7%</td>
</tr>
<tr>
<td>Produce Schedule Updates</td>
<td>55.5%</td>
</tr>
<tr>
<td>Review Schedule Updates</td>
<td>93.0%</td>
</tr>
<tr>
<td>Approve Progress Payments</td>
<td>84.2%</td>
</tr>
<tr>
<td>Track Project Program</td>
<td>87.8%</td>
</tr>
<tr>
<td>Approve Change Orders</td>
<td>79.6%</td>
</tr>
<tr>
<td>QA/QC</td>
<td>79.8%</td>
</tr>
</tbody>
</table>
 Owners also reported that owner’s representatives review and complete inspections, prepare project justifications, and develop specification during the design phase, and review cost, review proposals, and help with coordination.

4.5.3.1 Impact of Roles on Project Performance

There are many roles that owner’s representatives can perform on a project, but the question remains: do these roles have an impact on project performance? For example, is the project more likely to stay on schedule if the owner representative reviews the schedule updates. Knowing this information can help owners determine what the best roles owner’s representatives should be performing on a project.

This analysis is done using the Wilcoxon Rank-Sum test on each of the roles listed above that owner’s representatives may perform on a project. Each role is individually compared to each of the five project performance metrics: budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. A summary of the results of this analysis can be seen in Table 4.29 below. In this table, values below 0.05 are significant at the 95% confidence level.
<table>
<thead>
<tr>
<th>Role</th>
<th>P-Value</th>
<th>Schedule</th>
<th>Changes</th>
<th>Owner Satisfaction</th>
<th>User Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attend Design Meetings for Owner</strong></td>
<td>0.4385</td>
<td>0.5977</td>
<td>0.3574</td>
<td>0.4196</td>
<td>0.3153</td>
</tr>
<tr>
<td><strong>Propose Value Engineering Ideas</strong></td>
<td>0.2399</td>
<td>0.5399</td>
<td>0.05749</td>
<td>0.5188</td>
<td>0.8563</td>
</tr>
<tr>
<td><strong>Create the Baseline Schedule</strong></td>
<td>0.1507</td>
<td>0.9774</td>
<td>0.8439</td>
<td>0.6186</td>
<td>0.6291</td>
</tr>
<tr>
<td><strong>Review the Schedule</strong></td>
<td>0.7879</td>
<td>0.7992</td>
<td>0.1787</td>
<td>0.8274</td>
<td>0.79</td>
</tr>
<tr>
<td><strong>Prepare Preliminary Cost Estimate</strong></td>
<td>0.1323</td>
<td>0.3197</td>
<td>0.7082</td>
<td>0.4912</td>
<td>0.963</td>
</tr>
<tr>
<td><strong>Create and Manage the Contract</strong></td>
<td>0.7852</td>
<td>0.6014</td>
<td>0.09435</td>
<td>0.5882</td>
<td>0.4734</td>
</tr>
<tr>
<td><strong>Solicit Bidders</strong></td>
<td>0.813</td>
<td>0.2999</td>
<td>0.3046</td>
<td>0.3847</td>
<td>0.06766</td>
</tr>
<tr>
<td><strong>Report Percent Design Complete</strong></td>
<td>0.3458</td>
<td>0.8642</td>
<td>0.2769</td>
<td>0.5806</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>Produce Schedule Updates</strong></td>
<td>0.8512</td>
<td>0.2574</td>
<td>0.7055</td>
<td>0.6111</td>
<td>0.652</td>
</tr>
<tr>
<td><strong>Review Schedule Updates</strong></td>
<td>0.6552</td>
<td>0.22</td>
<td>0.7634</td>
<td>0.5801</td>
<td>0.8101</td>
</tr>
<tr>
<td><strong>Approve Progress Payments</strong></td>
<td><strong>0.001479</strong></td>
<td>0.7028</td>
<td>0.792</td>
<td>0.1662</td>
<td>0.07106</td>
</tr>
<tr>
<td><strong>Track Project Program</strong></td>
<td>0.981</td>
<td>0.9105</td>
<td>0.1327</td>
<td>0.6972</td>
<td>0.4425</td>
</tr>
<tr>
<td><strong>Approve Change Orders</strong></td>
<td><strong>0.007796</strong></td>
<td>0.3286</td>
<td>0.7784</td>
<td>0.9668</td>
<td>0.6737</td>
</tr>
<tr>
<td><strong>QA/QC</strong></td>
<td>0.8722</td>
<td>0.8463</td>
<td>0.5004</td>
<td>0.4675</td>
<td>0.946</td>
</tr>
</tbody>
</table>

From Table 4.29 above, it can be determined that the two owner’s representative roles that impact project performance most significantly are approving progress payments and approving change orders. Both of these roles are significant at the 95% confidence level.
with having an impact on budget performance. Visually these can be seen in Figure 4.25 and Figure 4.26 below, which show that when owner’s representatives approve progress payments and change orders, the budget is lower than when owner’s representatives do not. This is understandable as an owner’s representative has the ability to track the budget when performing both of these roles and can help prevent any major budget upsets.

Figure 4.25. Budget Performance Boxplots of Projects with and without Owner’s Representatives Performing Approval of Progress Payments
(1 = Much lower than budgeted, 7 = Much higher than budgeted)
From the many roles owner’s representatives are performing on jobs, the two that influence project performance the most are approval of progress payments and approval of change orders. Both of these roles when an owner’s representative is performing them have a positive impact on the budget of the project compared to projects where the owner’s representatives do not perform these roles.

4.5.4 Effectiveness of the Owner’s Representative in Performing Responsibilities

In the survey sent out to owners there were two sets of questions concerning the effectiveness of the owner’s representative in performing certain responsibilities in both
the preconstruction the construction phases. Each owner ranked the effectiveness of their owner’s representative from “Not Effective at All” to “Extremely Effective”.

To gauge if there is any difference between the effectiveness of owner’s representatives in performing these responsibilities, boxplots are made for the responsibilities at both the preconstruction and the construction phases. The preconstruction responsibilities questioned to the owner in the survey are: performance of pre-design services, value engineering, coordination, constructability, performance of design services, and hiring of the general contractor. Owners were also allowed to add any responsibilities they found relevant. A couple of the responsibilities written in included, contract review and evaluation of proposals. The preconstruction phase responsibilities’ effectiveness can be seen in Figure 4.27 below. It shows that there is not a large difference between the preconstruction responsibilities and the corresponding effectiveness at which the owner’s rated their owner’s representatives. The Kruskal-Wallis test is used to see if there is any statistical significance between the responsibilities. The resulting p-value is 0.5908, which means that no responsibility stands out where owner’s representatives or more or less likely to be effective at it.
Figure 4.27. Perceived Effectiveness of Owner’s Representative During Preconstruction Activities

(1 = Not effective at all, 5 = Extremely effective)

The owner’s representative responsibilities during the construction phase of the project that owners were asked to rate the effectiveness of were: public relations effort, avoiding or navigating project crises, assuring the team meets contract obligations, negotiating change orders, facilitating communication of the project, leading the project team, and claim avoidance. Again the differences between the effectiveness of the owner’s representatives is small between these responsibilities, and it can be seen below in Figure 4.28. The Kruskal-Wallis test revealed a p-value of 0.677 which means that there is no significant difference between the effectiveness of the owner’s representative in these construction activities.
It ultimately seems that owners perceive their owner’s representatives to be between “moderately effective” and “extremely effective” at most preconstruction and construction activities. There is not one responsibility that stands out that owner’s representatives are not effective at.

4.5.4.1 Impact of Responsibilities on Project Performance

How effective owner’s representatives are at their responsibilities during the preconstruction and construction phases can have a direct impact on the overall project performance. It can be assumed that owner’s representatives who are extremely effective at value engineering will result in a lower budget of the project, or an owner’s representative who is effective at communication may have a higher owner satisfaction.
To test these assumptions, the Kendall Tau-b test is used to obtain p-values to see if there is any correlation between effectiveness of owner’s representatives and project performance. The result of these statistical test can be seen in Table 4.30 below. Any p-value less than 0.05 is significant at the 95% confidence level.

Table 4.30. Significance of Owner’s Representatives Responsibility Effectiveness on Project Performance Metrics

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>P-Value</th>
<th>Budget</th>
<th>Schedule</th>
<th>Changes</th>
<th>Owner Satisfaction</th>
<th>User Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preconstruction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance of Pre-Design Services</td>
<td>0.03617</td>
<td>0.364</td>
<td>0.3861</td>
<td></td>
<td>0.001629</td>
<td>0.03306</td>
</tr>
<tr>
<td>Value Engineering</td>
<td>0.1981</td>
<td>0.7894</td>
<td>0.0388</td>
<td></td>
<td>0.0005713</td>
<td>0.02882</td>
</tr>
<tr>
<td>Coordination</td>
<td>0.03086</td>
<td>0.3868</td>
<td>0.05507</td>
<td></td>
<td>0.002121</td>
<td>0.01224</td>
</tr>
<tr>
<td>Constructability</td>
<td>0.01759</td>
<td>0.9837</td>
<td>0.4057</td>
<td></td>
<td>0.001576</td>
<td>0.02407</td>
</tr>
<tr>
<td>Performance of Design Services</td>
<td>0.03332</td>
<td>0.68</td>
<td>0.04558</td>
<td></td>
<td>0.00725</td>
<td>0.009993</td>
</tr>
<tr>
<td>Hiring of GC</td>
<td>0.04392</td>
<td>0.5883</td>
<td>0.4382</td>
<td></td>
<td>0.0001792</td>
<td>0.0004115</td>
</tr>
<tr>
<td>Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Relations Effort</td>
<td>0.1935</td>
<td>0.5718</td>
<td>0.155</td>
<td></td>
<td>0.01224</td>
<td>0.03498</td>
</tr>
<tr>
<td>Avoiding or Navigating Project Crises</td>
<td>0.05395</td>
<td>0.2159</td>
<td>0.2082</td>
<td></td>
<td>0.000585</td>
<td>0.003005</td>
</tr>
<tr>
<td>Assuring Team Meets Contract Obligations</td>
<td>0.01276</td>
<td>0.1129</td>
<td>0.5609</td>
<td></td>
<td>0.0001201</td>
<td>0.0001471</td>
</tr>
<tr>
<td>Negotiating Change Orders</td>
<td>0.004581</td>
<td>0.2911</td>
<td>0.09723</td>
<td></td>
<td>0.0001665</td>
<td>0.000008</td>
</tr>
<tr>
<td>Facilitating Communication</td>
<td>0.2683</td>
<td>0.9779</td>
<td>0.2519</td>
<td></td>
<td>0.003681</td>
<td>0.003779</td>
</tr>
<tr>
<td>Leading Project Team</td>
<td>0.5688</td>
<td>0.9765</td>
<td>0.4983</td>
<td></td>
<td>0.001464</td>
<td>0.001546</td>
</tr>
<tr>
<td>Claim Avoidance</td>
<td>0.01956</td>
<td>0.1477</td>
<td>0.2475</td>
<td></td>
<td>0.0001646</td>
<td>0.001365</td>
</tr>
</tbody>
</table>
There are quite a few significant values in Table 4.30 above, showing that the effectiveness of the owner’s representative in the various responsibilities has a direct impact on the overall project performance. The project performance metrics which appear to be the most impacted from owner’s representative effectiveness are owner satisfaction and user satisfaction. Each of the above responsibilities show that as an owner’s representative is more effective at performing the responsibility, the owner and user satisfaction of a project increases. An example of one of these relationships shows that as an owner’s representative is more effective at avoiding or navigating project crisis, the owner satisfaction of the project increases, which can be seen in Figure 4.29 below. The remaining significant relationships between budget performance and schedule performance can be seen in Figure C.33 to C.42 in Appendix C. These trends make sense because as an owner’s representative is more effective, the owner is happy because they are doing the job they are being paid to do.
The other project performance metric that is the most influenced by the effectiveness of the owner’s representative is budget performance. Eight job responsibilities of the owner’s representative have a significant influence on the budget performance of the project at the 95% confidence level; performance of pre-design services, coordination, constructability, performance of design services, hiring of the general contractor, assuring team meets contract objectives, negotiating change orders, and claim avoidance. For all of these correlations, as the effectiveness of the owner’s representative increases, the budget performance also increases, so the cost goes down.
Changes on a project can also be influenced by an owner’s representative’s effectiveness. Value engineering and performance of design services have a significant impact on the amount of changes on a project at the 95% confidence level. For each of these correlations, as the effectiveness of the owner’s representative increases, the amount of changes on a project decreases.

One surprising discovery made during this analysis is the lack of significance of the owner’s representative on the impact of the schedule performance of a project. There are no responsibilities that the effectiveness of the owner’s representative has an impact on the overall schedule of a project. This means that no matter how effective an owner perceives his/her owner’s representative to be, there is not a high statistical significance that the owner’s representative will have an impact on schedule performance.

4.5.5 Effectiveness of Owner’s Representative in Anticipating and Preventing Problems

A reason why many owners choose to hire owner’s representatives is because their experience level typically makes them better at anticipating and preventing problems. This is specifically important for owners who do not have as much experience with construction or the general contractor because they may not have the knowledge or skills to be able to prevent or anticipate the problems themselves.

Most of the owners who rated their owner’s representative on their effectiveness in anticipating and preventing problems, said they were “very effective” or “extremely
effective”. The distribution of ranks can be seen below in the boxplot in Figure 4.30. This shows that owner are generally happy with how effective their owner’s representatives are.

![Boxplot showing distribution of effectiveness ratings](image)

Figure 4.30. Distribution of Responses of Effectiveness of Owner’s Representative at Anticipating and Preventing Problems
(1 = Not effective at all, 5 = Extremely effective)

### 4.5.5.1 Impact of Effectiveness on Project Performance

If an owner’s representative is effective at anticipating and preventing problems on the project, it can be assumed that there will be a positive impact on project performance. An owner may think that as an owner’s representative is more effective at anticipating and preventing problems, there will be fewer changes made to the job, and fewer negative impacts on the schedule and budget.
To test if these assumptions are true, the Kendall Tau-b test is used to see if there is any statistical significance. If any significant p-values are found, then it can be concluded that there is correlation between the effectiveness of the owner’s representative and the project performance. The results of this statistical test can be found in Table 4.31 below.

Table 4.31. Kendall Tau-b Correlation Test between Effectiveness of Owner’s Representative at Anticipating and Preventing Problems and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.00397</td>
<td>Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.04455</td>
<td>Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.01492</td>
<td>Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>6.25x10^-6</td>
<td>Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>1.456x10^-5</td>
<td>Significant</td>
</tr>
</tbody>
</table>

From performing the statistical Kendall Tau-b test, it is found that the more effective the owner’s representative is at anticipating and preventing problems, the better the overall performance of the project is. This relationship can be seen in Figure 4.31 below as the effectiveness of owner’s representative increases, the budget decreases. The remaining four relationships can be seen in Figure C.43 to C.46 in Appendix C.
Figure 4.31. The Relationship between the Effectiveness of the Owner’s Representative at Participating and Preventing Problems to the Owner’s Satisfaction of the Project
(1 = Not effective at all, 5 = Extremely effective)
(1 = Extremely dissatisfied, 7 = Extremely satisfied)

This finding is significant because it shows that who an owner chooses to represent them matters. An owner has the most incentive to choose the most effective owner’s representative. If an owner hires an owner’s representative that is not effective at their job, it effects the overall project performance which can attribute to a large amount of money, time, changes, and the satisfaction of the building.

4.5.6 When the Owner’s Representative Is Hired

When an owner’s representative is hired varies from owner to owner. Whether they hire them before or after the general contractor, or before, during, or after design could have
the potential to impact the project. It is important to understand when the best time to hire an owner’s representative is, so that future owners know when they are most helpful.

Owners were asked two separate questions about when they had hired their owner’s representative, either before or after they had hired the general contractor, or before, during, or after the design phase of the project. Table 4.32 and Figure 4.32 show the number of responses and the percentage of responses of owners who hired their owner’s representative before or after the general contractor respectively. Table 4.33 and Figure 4.33 show the number of responses and the percentage of responses of owners who hired their owner’s representative before, during, or after the design phase of the project.

Table 4.32. Number of Responses of Owner’s Representatives Hired Before and After the General Contractor

<table>
<thead>
<tr>
<th>Before or After GC</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>103</td>
</tr>
<tr>
<td>After</td>
<td>30</td>
</tr>
</tbody>
</table>
Figure 4.32. Percentage of Responses of Owner’s Representatives Hired Before and After the General Contractor

Table 4.33. Number of Responses of Owner’s Representatives Hired Before, During, or After the Design Phase of a Project

<table>
<thead>
<tr>
<th>Before, During, After Design</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>71</td>
</tr>
<tr>
<td>During</td>
<td>31</td>
</tr>
<tr>
<td>After</td>
<td>14</td>
</tr>
</tbody>
</table>
From the tables and figures above, it appears that most owners decide to hire the owner’s representative before the general contractor, and before the design phase of a project. This may be due to several reasons, two in particular might be that the owner’s representative helps with the selection of the general contractor, or the owner’s representative works with the architects and engineers during the design phase.

4.5.6.1 Impact of When Hired on Project Performance

As found above, a majority of owners decide to hire their owner’s representative before they hire their general contractor, and most owners decide to hire their owner’s representatives before the design phase of the project, but it needs to be determined if these tendencies are better for overall project performance.
To test if hiring the owner’s representative earlier in the project is better for project performance, the Wilcoxon Rank-Sum test, and the Kruskal-Wallis test are used. These tests will look for correlations between when the owner’s representative is hired and the project performance metrics. Table 4.34 shows the significance of hiring an owner’s representative before or after the general contractor, and Table 4.35 shows the significance of hiring an owner’s representative before, during, or after the design phase of the project, both related to the five project performance metrics.

Table 4.34. Wilcoxon Rank-Sum Correlation Test between Hiring an Owners Representative Before or After the General Contractor and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.6723</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.3694</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.7</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.261</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.758</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 4.35. Kruskal-Wallis Correlation Test between Hiring an Owners Representative Before, During, or After the Design Phase of a Project and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.4295</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.2548</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.3784</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.7896</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.6034</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
From Table 4.34 and Table 4.35 it is seen that neither hiring an owner’s representative before the general contractor, nor hiring an owner’s representative before the design phase of a project has any effect on the overall project performance. To visualize this, Figure 4.34 and Figure 4.35 below show the boxplots of the relationships between hiring an owner’s representative compared to the general contractor and when hiring in terms of the design phase related to the schedule performance of the project, respectively. The remaining performance metric boxplots can be seen in Figure C.47 to C.54 in Appendix C.

![Figure 4.34](image)

Figure 4.34. Schedule Performance Boxplots of Owner’s Representatives are Hired Before and After the General Contractor
(1 = Much shorter than Scheduled, 7 = Much longer than scheduled)
From these figures above, it is apparent that there is not a significant difference between the schedule performance of an owner’s representative hired before the general contractor or before the design phase, versus after the general contractor and after the design phase. This relationship is very similar for all other project performance metrics as well. This means that it is not statistically significant on the project performance based on when the owner’s representative is hired. Owner’s representatives hired before or after the general contractor or design phase are not significantly more likely to have a better or worse project.
4.5.7 Involvement of the Owner’s Representative in Selection of General Contractor

In Section 4.5.4 above, it is found that a large amount of owner’s representatives are hired before the general contractor. Some owners utilize their owner’s representatives to help selected the general contractor of the project, as it might be expected that owner’s representatives have more knowledge about potential general contractors and their performance records.

In the survey, owners were asked if their owner’s representatives were involved in the selection of the general contractor. Table 4.36 and Figure 4.36 show the number of responses and the percentage of responses of owner’s representatives who were involved in the selection of the general contractor.

Table 4.36. Number of Responses of Owner’s Representatives Involved in the Selection of the General Contractor

<table>
<thead>
<tr>
<th>Involved in GC Selection</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>73</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
</tr>
</tbody>
</table>
Figure 4.36. Percentage of Responses of Owner’s Representatives Involved in the Selection of the General Contractor

It is shown in the table and figure above that most owner’s representatives are involved in the selection of the general contractor. The reason behind this could be the additional knowledge the owner’s representatives have with general contractors.

4.5.7.1 Impact of Involvement on Project Performance

The majority of owners who chose to hire their owner’s representatives before the general contractor also have the owner’s representative involved in the selection of the general contractor. The additional knowledge the owner’s representative may have on the potential general contractors could have an influence on the project outcome.

To see if owner’s representative involvement in the selection of the general contractor has a significant effect on the project performance, boxplots are created. This visually
shows the comparison between owner’s representatives’ involvement and non-involvement of the general contractor selection and project performance. Figure 4.37 shows the relationship between this involvement and owner satisfaction below. The remaining boxplots can be seen in Figure C.55 to C.58 in Appendix C.

The Wilcoxon Rank-Sum test is then used to statistically see if there is any correlation between having an owner’s representative involved in the selection of the general contractor and project performance. This test looks for correlations between involvement and lack of involvement of the owner’s representative in general contractor selection and the five project performance metrics. The significance results can be found in Table 4.37 below.
Table 4.37. Wilcoxon Rank-Sum Correlation Test between Owner’s Representatives Involved in General Contractor Selection and Owner’s Representatives not Involved and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.7686</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.8789</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.5411</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.1711</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.9179</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 4.37 above shows that there is no statistically significant impact of having the owner’s representative involved in the selection of general contractors on project performance. This means that whether an owner’s representative is involved in the selection of the general contractor or not, they are not statistically likely to have an impact on the overall result of a project.

4.5.8 How the Owner’s Representative is Selected

There are five major criteria in which owners were asked how they selected their owner’s representative. These five options include: bidding, negotiated contract, previous contact, recommendation by others, and voting of key people. How these owner’s representatives are selected are important as different processes may lead to different performance.

The distribution of responses of owners on how they selected their owners representatives are below. Table 4.38 shows the number of responses for each selection process, and Figure 4.38 shows the percentage of each selection method in graphical form.
Table 4.38. Number of Responses of How Owner’s Representatives are Selected

<table>
<thead>
<tr>
<th>How Owner’s Representatives are Selected</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidding</td>
<td>20</td>
</tr>
<tr>
<td>Negotiated Contract</td>
<td>33</td>
</tr>
<tr>
<td>Previous Contact</td>
<td>30</td>
</tr>
<tr>
<td>Recommendation by Others</td>
<td>32</td>
</tr>
<tr>
<td>Voting of Key People</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 4.38. Percentage of Responses of How Owner’s Representatives are Selected

No method of how owners select their owner’s representatives that stands out as the primary method owners are using to select their owner’s representatives. It does appear that most owner’s representatives use their relationships with owners to get jobs. Most owner’s representatives are chosen by negotiated contract, previous contact, or recommendation by others, but bidding is also popular as well. The least popular method of selecting an owner’s representative is by voting of key people.
4.5.8.1 Impact of How Hired on Project Performance

How the owner’s representative is selected can have an impact on the overall project performance. For instance, if an owner’s representative is hired from previous contact, they may have already proven to be successful, or if an owner selects an owner’s representative from bidding that may mean they are looking at cost over quality.

Relationships between the different owner’s representative selection methods and the five project performance metrics have been graphically demonstrated in Figure 4.39. Figure C.59 to C.62 show boxplots of these selection methods in relationship to the remaining project performance metrics.

Figure 4.39. Budget Performance Boxplots of Relationship to How an Owner’s Representative is Selected
(1 = Much lower than budgeted, 7 = Much higher than budgeted)
For budget performance, which can be seen above in Figure 4.39 and all other project performance metrics, there is little difference between the performances of the different owner’s representative selection methods. To test if this is statistically correct, the Kruskal-Wallis correlation test is used. The results of this test can be seen below in Table 4.39.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.727</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.7838</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.5822</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.604</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.4101</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The data presented in Table 4.39 shows how an owner’s representative is chosen does not have a significant impact of the overall project performance. This confirms what is seen in Figure 4.39 and the remaining boxplots of these relationships. It can be concluded that whether an owner’s representative is chosen by bidding, negotiated contract, previous contact, recommendation by others, or voting of key people, it does not have a significant impact on project performance.

### 4.5.9 How the Owner’s Representative is Compensated

Depending on how the contract is drawn up, there are several different ways in which an owner’s representative can be compensated. These methods include lump sum, time and
materials, unit price, fee, cost plus fixed fee, cost plus percent fee, guaranteed maximum prices, negotiated, along with a few others. How an owner’s representative is compensated may have an impact on the project as the different payment methods may incentivize owner’s representatives in different ways.

The breakdown of how owner’s representatives are paid can be seen in Table 4.40 from the results of the owner’s representative survey. There are several other methods of payment that owners reported, including hourly and percentage of overall cost. These were eliminated from any analysis due to the small sample size of the other types of projects, and to prevent any impact on the other major compensation types. Figure 4.40 shows the percentage of each type of compensation type as reported from the survey.

<table>
<thead>
<tr>
<th>Compensation Type</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>23</td>
</tr>
<tr>
<td>Time and Materials</td>
<td>16</td>
</tr>
<tr>
<td>Unit Price</td>
<td>4</td>
</tr>
<tr>
<td>Fee</td>
<td>17</td>
</tr>
<tr>
<td>Cost + Fixed Fee</td>
<td>10</td>
</tr>
<tr>
<td>Cost + %Fee</td>
<td>6</td>
</tr>
<tr>
<td>Guaranteed Maximum Price</td>
<td>7</td>
</tr>
<tr>
<td>Negotiated</td>
<td>24</td>
</tr>
</tbody>
</table>
From the above table and figure, it can be seen that the most popular methods of compensation for an owner’s representative are lump sum and negotiated. Fee is also a popular method for owner’s representatives to be compensated. The lowest methods of compensation are unit price, cost plus percent fee, and guaranteed maximum price.

**4.5.7.1 Impact of How Compensated on Project Performance**

How an owner’s representative is compensated could have an impact on the project performance of a project. For example, if an owner’s representative is compensated with a percentage based on the overall project cost, their incentive to keep project cost low
may not be as great as an owner’s representative that is being compensated from a negotiated contract.

Each of the major compensation types for owner’s representative as reported by owners is compared to the overall project performance metrics to see if there is any impact. Figure 4.41 shows the budget performance of each of the different compensation types. The remaining boxplots can be seen in Appendix C, in Figure C.63 to Figure C.66.

From Figure 4.41, it can be seen that some of the compensation types vary slightly, but most are still around the same as budgeted. To test statistically if the compensation types...
do vary significantly between one another on project performance, the Kruskal-Wallis correlation test is used. The result of this analysis can be found in Table 4.41 below.

Table 4.41. Kruskal-Wallis Correlation Test between How Owner’s Representatives are Compensated and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.4605</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.2614</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.3307</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.1974</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.3582</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

It is found statistically that the different compensation methods do not have a significant impact on the project performance of any of the five performance metrics. This concludes that no matter how an owner’s representative is compensated, it will not have a significant impact on how the overall project will be performed.

4.5.10 Incentives Offered to Owner’s Representatives

When an owner offers incentives to their owner’s representatives, it encourages the owner’s representative to have a more successful project. These incentives are added on to the overall payment of the owner’s representative. The breakdown of the amount of owners offering incentives to their owner’s representatives can be seen below in Table 4.42, and Figure 4.42. These show both the number of respondents who offered incentives and the percentage of respondents who offered incentives to their owner’s representative.
Table 4.42. Number of Responses of Owners Offering Incentives to their Owner’s Representative

<table>
<thead>
<tr>
<th>Incentives Offered to Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>103</td>
</tr>
</tbody>
</table>

From the data collected, it is seen that owners are not very likely to offer incentives to their owner’s representatives. Almost 90% of respondents reported that they did not offer incentives to their owner’s representative, while only slightly more than 10% reported that they did offer incentives. This could be a result of overall industry standards, or personal preferences of the owners.
4.5.10.1 Impact of Incentives on Project Performance

If owners are offering incentives to their owner’s representatives, they should expect the owner’s representative to work harder to have a more successful project so they can receive the incentive. These incentives have the ability to increase project performance metrics, if the owner’s representatives are striving for a more successful project.

To see if offering incentives to owner’s representatives improves project performance, comparisons are made between the five metrics. Figure 4.43 shows the boxplot of the relationship between offering incentives and not offering incentives and the overall project performance of a project. Remaining boxplots for project performance metrics can be found in Figure C.67 to Figure C.70 in Appendix C.

![Boxplot of Budget Performance With and Without Incentives](image)

Figure 4.43. Budget Performance Boxplots With and Without Owner’s Representative Incentives

(1 = Much lower than budgeted, 7 = Much higher than budgeted)
From Figure 4.43 above, it appears that when owner’s representatives are offered incentives the budget performance of the project is actually higher than budgeted. This analysis contradicts the budget performance which would be expected from offering owner’s representatives incentives. However, incentives do not appear to effect the other project performance metrics. To test of this is statistically significant, the Wilcoxon Rank-Sum test is used. The results of these statistical tests can be found in Table 4.43 below.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.03703</td>
<td>Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.9742</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.4926</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.9863</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.5403</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The result from this data analysis is not what one would typically expect. The data shows that when owner’s representatives are offered incentives, the overall budget performance of the project will get worse, so the final cost will be more than budgeted. It can be concluded that offering owner’s representatives incentives is actually worse for project performance. More research is needed to determine why incentives are causing lower budget performance.
4.5.11 Past Experience with Owner’s Representative

Owners who perform multiple construction projects may develop relationships with their owner’s representatives and decide to hire them again. Relationships, recommendations, and personal opinions are extremely important in the construction industry, and many owner’s representatives end up representing their owners on multiple jobs. From the survey sent out to owners, it was asked if owners have worked with their owner’s representative in the past. The results of this question can be seen in Table 4.44 and Figure 4.44 where it is shows the number of responses and the percentage of responses, respectively.

Table 4.44. Number of Responses of Owners who Have or Have not Worked with their Owner’s Representative in the Past

<table>
<thead>
<tr>
<th>Worked with Owner’s Representative in Past</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>88</td>
</tr>
<tr>
<td>No</td>
<td>49</td>
</tr>
</tbody>
</table>

Figure 4.44. Percentage of Responses of Owners who Have or Have not Worked with their Owner’s Representative in the Past
It is shown that a large percentage of owners are working with owner’s representatives that they have worked with in the past. This is most likely because of the relationships and trust formed between the owner and the owner’s representative from working on past projects together. This was also shown above in Section 4.4.8 as many owners selected their owner’s representatives from previous contact with them.

4.5.11.1 Impact of Past Experience on Project Performance

When owners work with the same owner’s representative that they had in the past, it typically means they had a positive experience with them and trust them to help with another project. It can be assumed that owner’s representatives who are getting contracts with owners they have in the past have already proven their performance and will hopefully perform well for the owners again.

To see if working with the same owner’s representative has an impact on the project performance, boxplots are made to visualize if any differences are present. Figure 4.45 shows the relationship between change performances and if the owner has had an experience with the owner’s representative in the past. The remaining four boxplots can be seen in Figure C.71 to C.74 in Appendix C.
Figure 4.45. Change Performance Boxplots With and Without Past Experience with the Owner’s Representative
(1 = None at all, 5 = A lot)

The boxplot with the biggest difference between having past experience with the owner’s representative or not is with the change performance of a project. It appears that when having hired an owner’s representative that the owner has worked with in the past, the number of changes on a project decreases slightly. To test the statistical significance and see if there is any correlation between past experiences with the owner’s representative or not, the Wilcoxon Rank-Sum test is used. The resulting p-values from these tests, and their significance can be seen in Table 4.45 below.
Table 4.45 Wilcoxon-Rank Sum Correlation Test With and Without Past Experience with the Owner’s Representative and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.5567</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.9177</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.01431</td>
<td>Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.764</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.7861</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

The results from Table 4.45 above shows that the only significant difference in project performance between having experience with the owner’s representative in the past is the change performance. It is statistically significant that when the owner has past experience with the owner’s representative that the number of changes on a project is likely to decrease. This difference shows that with the past experience the number of changes on a project is more likely to be a little, and without the past experience the amount of changes on a project is likely to be a moderate amount.

4.5.12 Competition between Owners’ Representatives

If there is competition between multiple owner’s representatives for a project, the owner has the potential to pick the best owner’s representative for the project. Depending on the competition, owners are at a better position to compare the potential candidates and find an owner’s representative that is most likely to improve the performance on a project. There are also a number of owners who decide not to have competition between owner’s representatives, which may be because of past experience as described in Section 4.4.11. The breakdown of respondents from the owner’s representative survey who had and did
not have competition between multiple owner’s representatives can be seen below. Table 4.46 show the numbers and Figure 4.46 shows the percentage of owners who had and did not have competition between owner’s representatives.

<table>
<thead>
<tr>
<th>Competition Between Owner’s Representatives</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>44</td>
</tr>
<tr>
<td>No</td>
<td>72</td>
</tr>
</tbody>
</table>

Figure 4.46. Percentage of Responses of Owners who Had or did Not Have Competition between multiple Owners’ Representatives

From the data collected, fewer owners have competition between owner’s representatives than those who did not. One reason for this could be that many owners are working with owner’s representatives that they had worked with in the past, so there is no need for
competition to select the best owner’s representative. Another reason may be the owner’s representative’s reputation, and the trust that the owners have in them, or the knowledge of how they performed on other projects.

4.5.12.1 Impact of Competition on Project Performance

The competition between multiple owner’s representatives for the same job can potentially mean that the overall performance of the job will be better. Competition allows the owners to select the best owner’s representatives.

To see the comparison between owners who had and did not have competition between owner’s representatives on their projects, boxplots are made. These visuals show if there are any differences between the five different project performance metrics and if there is competition of owner’s representatives. Figure 4.47 shows the relationship between budget when there is competition and budget when there is not competition. The remaining boxplots can be seen in Figure C.75 to Figure C.78 in Appendix C.
The majority of the comparisons between having and not having competition between owner’s representatives are fairly similar. To test and see if there is any statistical significance, the Wilcoxon Rank-Sum test is used. The summary of these tests p-values along with their significance can be seen below in Table 4.47.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.6503</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.08862</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.3694</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.1821</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.7057</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
There are no significant values found in Table 4.47. It is shown that there is no difference in project performance when there is competition and when there is not competition between owner’s representatives.

4.5.13 Owner’s Satisfaction of Hiring an Owner’s Representative

Owners hire owner’s representatives for many reasons which are described above in section 4.4.1, so owners expect their owner’s representative to perform. For owners it is important if they are spending money on hiring an owner’s representative that they are satisfied with the owner’s representative’s performance. If owners are not satisfied with their owner’s representative, then they are unlikely to hire them again. In the survey, it was asked how satisfied the owners are with their owner’s representatives. This data collected can be seen in Table 4.48 where is shows the number of owners who reported their satisfaction at each level, and Figure 4.48 where it shows this same information as a percentage.

Table 4.48. Number of Responses of Owners Satisfaction Level of Hiring an Owner’s Representative

<table>
<thead>
<tr>
<th>Owner’s Satisfaction of Hiring an Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Satisfied</td>
<td>74</td>
</tr>
<tr>
<td>Moderately Satisfied</td>
<td>23</td>
</tr>
<tr>
<td>Slightly Satisfied</td>
<td>10</td>
</tr>
<tr>
<td>Neither Satisfied Nor Dissatisfied</td>
<td>5</td>
</tr>
<tr>
<td>Slightly Dissatisfied</td>
<td>3</td>
</tr>
<tr>
<td>Moderately Dissatisfied</td>
<td>0</td>
</tr>
<tr>
<td>Extremely Dissatisfied</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 4.48. Percentage of Responses of Owners Satisfaction Level of Hiring an Owner’s Representative

As seen in Table 4.48 and Figure 4.48 above, it is clear that when owners decide to hire an owner’s representative, they are likely to be extremely satisfied in their decision. Over 80% of respondents are either moderately satisfied or extremely satisfied. However, there is always the chance of having a bad experience, which approximately four percent of owners reported to having. This is significant because it shows that when hiring an owner’s representative, majority of owners are satisfied with their decision.

4.5.14 Owner’s Likelihood of Hiring an Owner’s Representative Again

As found above in Section 4.4.13, many owners are satisfied with their decision to hire an owner’s representative. It is assumed that if owners have a positive experience with their owner’s representative, they are likely to want to hire an owner’s representative again. To see if owners are likely to hire an owner’s representative again, Table 4.49 and Figure
4.49 have been created to see the data collected from owners. Table 4.49 shows the number of respondents for each likelihood of hiring an owner’s representative again, and Figure 4.49 represents this data as percentages in graphical form.

Table 4.49. Number of Responses of Owners Likelihood of Hiring an Owner’s Representative Again

<table>
<thead>
<tr>
<th>Owners Likelihood of Hiring an Owner’s Representative Again</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Likely</td>
<td>75</td>
</tr>
<tr>
<td>Moderately Likely</td>
<td>26</td>
</tr>
<tr>
<td>Slightly Likely</td>
<td>9</td>
</tr>
<tr>
<td>Neither Likely Nor Unlikely</td>
<td>2</td>
</tr>
<tr>
<td>Slightly Unlikely</td>
<td>0</td>
</tr>
<tr>
<td>Moderately Unlikely</td>
<td>3</td>
</tr>
<tr>
<td>Extremely Unlikely</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 4.49. Percentage of Responses of Owners Likelihood of Hiring an Owner’s Representative Again
As shown in Table 4.49 and Figure 4.49, owners have a high tendency to want to hire owner’s representatives again. This strongly relates to satisfaction of owner’s representatives. As with satisfaction, over 90% of owners are likely to hire an owner’s representative again. This positively reflects owner’s representatives as they will typically be hired again.

4.5.15 Amount of Overlap from Having an Owner’s Representative

As owner’s representatives act on behalf of the owner, there is likely to be some overlap between the roles and responsibilities of the owner’s representative and either the owner or general contractor. This overlap can be between the owner and the owner’s representative from approving change orders, selection of equipment and owner’s purchased items, or managing contingency. The owner’s representative might also have overlap with the general contractor with QA/QC, safety, schedule management, budget management, subcontractor management, public relations, and contingency management.

To understand what roles experience the most overlap between the owner’s representative and the owner or general contractor, boxplots are created. Figure 4.50 and Figure 4.51 show the amount of overlap of the owner’s representative with the owner and general contractor respectively.
Figure 4.50. Boxplots of Overlap Between Owner and Owner’s Representative
(1 = None at All, 5 = A lot)

Figure 4.51. Boxplots of Overlap Between General Contractor and Owner’s Representative
(1 = None at All, 5 = A lot)
Looking at Figure 4.50 above it appears that there is not a lot of overlap between the owner and the owner’s representative. From the three roles shown, most owners and owner’s representatives average between no overlap at all and a moderate amount of overlap. Looking at Figure 4.51, there is slightly more variation in the amount of overlap between the owner’s representative and the general contractor. These shifts are slight, but subcontractor management seems to be the role there is the least amount of overlap between the owner’s representative and general contractor, while schedule management seems to be overlapped to some degree.

4.5.16 Greatest Benefits Perceived from Having an Owner’s Representative

It has already been discussed why owners hire owner’s representatives and how satisfied they are from hiring them, but each owner has their own benefits they see most from hiring an owner’s representative. It was asked of owners to select their greatest benefits received from hiring an owner’s representative, and many selected more than one. The summary of the number of respondents that selected avoiding or minimizing schedule problems, avoiding or minimizing budget problems, greater accountability to the owner, leadership for the project team, higher quality outcomes, avoiding unpleasant surprises, and implementing technology can be seen below in Table 4.50. This data can also be seen in Figure 4.52.
Table 4.50. Number of Responses for the Greatest Benefit Received from Hiring an Owner’s Representative

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding or Minimizing Schedule Problems</td>
<td>50</td>
</tr>
<tr>
<td>Avoiding or Minimizing Budget Problems</td>
<td>58</td>
</tr>
<tr>
<td>Greater Accountability to the Owner</td>
<td>50</td>
</tr>
<tr>
<td>Leadership for the Project Team</td>
<td>51</td>
</tr>
<tr>
<td>Higher Quality Outcomes</td>
<td>35</td>
</tr>
<tr>
<td>Avoiding Unpleasant Surprises</td>
<td>42</td>
</tr>
<tr>
<td>Implementing New Technology</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 4.52. Number of Responses for the Greatest Benefit Received from Hiring an Owner’s Representative

From Table 4.50 and Figure 4.52 above, it can be seen that the greatest benefit owners receive from hiring an owner’s representative is avoiding or minimizing budget problems, however many other owners report “avoiding or minimizing schedule
problems”, “greater accountability to the owner”, and “leadership to the project team” as their greatest benefits. Of the 116 owners who answered this question the fewest of them responded with “implementing new technology” as the greatest benefit received, and “higher quality outcomes received” as the second lowest number of responses.

4.5.17 Summary of Hiring an Owner’s Representative

Owners hire owner’s representative for a number of reasons, but knowing what makes those owner’s representative more successful at their job is important for owners to have the most successful project they can have. Section 4.5 shows various statistical tests about owner’s representative roles, responsibilities, and characteristics and their effect on project performance metrics.

From the data collected, ten different properties about owner’s representatives are compared to the overall project performance, these include owner’s representatives roles in the design phase and construction phase, effectiveness of the owner’s representative in performing responsibilities during the preconstruction phase and construction phase, effectiveness of the owner’s representative in anticipating and preventing problems, when the owner’s representative is hired, involvement of owner’s representative in selection of general contractor, how the owner’s representative is selected, how the owner’s representative is compensated, incentives given to owner’s representative, past experience with the owner’s representative, and competition between owner’s representatives. Each of the above is compared with the five project performance metrics,
budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. The summary of the results can be seen below in Table 4.51.

Table 4.51. Summary of Significance of Owner’s Representatives Roles, Responsibilities, and Characteristics on Project Performance

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>Roles</th>
<th>Resp.</th>
<th>Anticipating Problems</th>
<th>When OR Hired</th>
<th>Selecting GC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>Significant</td>
<td>Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>How OR Selected</th>
<th>How Compensated</th>
<th>Incentives</th>
<th>Past Exp. w/ OR</th>
<th>Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

There are several factors that do not impact the ability of the owner’s representative to influence project performance including: when the owner’s representative is hired, owner’s representative involvement in selecting a general contractor, how the owner’s representative is selected, how the owner’s representative is compensated, and competition between multiple owner’s representatives. The biggest impact owner’s
representatives can have on project performance are with their roles and their effectiveness at performing responsibilities and anticipating/preventing problems. It is also found that when owners are hiring owner’s representatives that they have worked with in the past, there is a higher likelihood of having fewer changes on a project.

The most surprising finding from this section is that when owner’s representatives are offered incentives for better performance, the overall project budget performance is likely to decrease. More research is needed to determine why incentives are negatively impacting budget on projects.

There are also six characteristics involved with owners hiring owner’s representatives that are not statistically analyzed, but provide insight into what is going on in the industry today. For example, it is found that the major reasons why owners chose to hire owner’s representatives is because of improved communication, heavy workload, QA/QC, and approval of change orders. It is also found that owners are most concerned with the cost of hiring an owner’s representative.

Ultimately one of the biggest findings from this section is that most owners are happy with their decision to hire an owner’s representative, and are likely to hire an owner’s representative again. Owners are having positive experiences with owner’s representatives, so many owners will argue that they are playing an important role in the construction industry.
4.6 An Owner’s Representative Is Not Hired

A lot of companies do not decide to hire an owner’s representative. Choosing not to hire an owner’s representative can be for several reasons including the cost of owners representative, not finding the value in them, or confidence in the company’s ability to represent themselves. When an owner’s representative is not hired, there are different factors that have the ability to impact project performance, such as who represents the company.

4.6.1 Reasons Why an Owner’s Representatives are not Hired

There are many reasons why owners may decide not to hire an owner’s representative. These reasons can include prior experience with the project team, in house capacity to manage project, could not find qualified owner’s representative, did not want to lose control of project, cost/value perceived of owner’s representative, overlap between owner’s representatives responsibilities, and general contractor can perform same tasks. The owners were also encouraged to write in any additional comments they had about reasons they decided not to hire an owner’s representative, which included having a well-qualified senior manager, or an in house project manager on staff.

To determine what the most significant reasons are for why owners decide not to hire an owner’s representative, Table 4.52 is created. This table shows the number of owners who responded yes that they had the particular reason for not hiring an owner’s representative. Figure 4.53 is also presented, where it shows the percentage of owners who responded that they did not hire an owner’s representative for the following reasons.
Table 4.52. Number of Responses of Owners who Did Not Hire their Owner’s Representatives for the Following Reasons

<table>
<thead>
<tr>
<th>Reasons to Not Hire Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Experience with Project Team</td>
<td>31</td>
</tr>
<tr>
<td>In House Capacity to Manage Project</td>
<td>49</td>
</tr>
<tr>
<td>Could Not Find Qualified Owner’s Representative</td>
<td>3</td>
</tr>
<tr>
<td>Did Not Want to Lose Control of Project</td>
<td>28</td>
</tr>
<tr>
<td>Cost/Value Perceived</td>
<td>38</td>
</tr>
<tr>
<td>Overlap Between Responsibilities</td>
<td>18</td>
</tr>
<tr>
<td>General Contractor can Perform Same Tasks</td>
<td>17</td>
</tr>
</tbody>
</table>

From both Table 4.52 and Figure 4.53 it can be seen that the major reason why most owners decide not to hire an owner’s representative is because they have in house capacity to manage the project, with the second highest reasoning being the cost/value.
perceived from hiring an owner’s representative. This shows that companies are less likely to hire owner’s representatives if they feel they can handle the responsibility themselves, and that many owners question how many benefits they receive from hiring an owner’s representative compared to the cost.

### 4.6.2 Who Represents the Organizations other than an Owner’s Representative

Instead of hiring an owner’s representative, a company needs someone to represent themselves and manage the construction process for their own interests. Many companies decide to represent themselves and may even have dedicated employees on staff to handle the representation. However, just because an owner does not have an owner’s representative, does not mean they have to represent themselves. Owners may use either a construction manager or an architect/engineer to represent them instead of an owner’s representative. One owner even reported that they had a consultant representing them instead of an owner’s representative in the survey. To see the frequency of how many owner’s represent themselves compared to construction managers and architects/engineers refer to Table 4.53 and Figure 4.54.

<table>
<thead>
<tr>
<th>Represented Owner</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own Organization</td>
<td>67</td>
</tr>
<tr>
<td>Construction Manager</td>
<td>6</td>
</tr>
<tr>
<td>Architect/Engineer</td>
<td>7</td>
</tr>
</tbody>
</table>
Figure 4.54. Percentage of Responses of Who Represented Organization During Project (Other than Owner’s Representative)

From Table 4.53 and Figure 4.54 above, it is obvious that majority of owners who choose not to hire an owner’s representative chose to represent themselves. This could be due to several reasons including the owner has enough time, experience, and is able to represent themselves, or that the owner trusts the general contractor fully and does not think he/she needs an owner’s representative.

4.6.1.1 Impact of Representation on Project Performance

Depending on who is representing the owner during the construction process, there can be an impact on the project performance. Owners who are confident enough and have enough experience may be the best representation, however many architects/engineers and construction managers also have immense knowledge that may help them better perform on the project.
To see if forms of representation other than an owner’s representative affects project performance, several boxplots are made. These boxplots show differences in the five performance metrics that the representation may effect. Figure 4.55 below shows one of these boxplots of the comparison between representation of the organization and budget performance. The remaining comparison of the project performance metrics can be seen in Figure C.79 to C.82 in Appendix C.

Figure 4.55. Budget Performance Boxplots of Who Represented Organization (Other than an Owner’s Representative)

1 = Much lower than budgeted, 7 = Much higher than budgeted

The biggest change that can be seen in this figure is between the architect/engineer representing company and the construction manager or own organization representing the
organization. To test if this is statistically significant, the Kruskal-Wallis correlation test is used between who represented the organization and the project performance metrics. The result of this analysis can be seen below with p-values and their corresponding significance in Table 4.54.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.006266</td>
<td>Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.2026</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.1779</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.2668</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.1627</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 4.54 shows one significant performance metric which is correlated to who is representing the organization, which is the budget performance. This confirms what is seen in Figure 4.55 in that when the architect/engineer is representing the organization, the budget of the project is more likely to be higher than budgeted. However, the one concern with this analysis is the sample size of projects that are represented by architect/engineers, and to have a more valid conclusion, more data points need to be added to confirm what is found.

4.6.3 Owner’s Representative Hired in the Past

Sometimes owners hire owner’s representatives in the past and then decide not to hire them again. This can be because they feel the owner’s representative did not represent the
organization well, the owner organization did not have the time during the project, or the owner did not trust the general contractor. There are many other reasons why an owner may chose not to hire an owner’s representative when they have had experience in the past.

The breakdown of how frequently owners hired owner’s representative in the past can be seen below. Table 4.55 shows the number of responses from the survey of owners who have and have not hired owner’s representatives in the past when they decide to not hire an owner’s representative for the described project. Figure 4.56 shows this same relationship with percentages.

Table 4.55. Number of Responses of Owners who Have and Have Not Hired Owner’s Representatives in the Past

<table>
<thead>
<tr>
<th>Owner’s Representative in the Past</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>35</td>
</tr>
<tr>
<td>No</td>
<td>46</td>
</tr>
</tbody>
</table>
From Table 4.55 and Figure 4.56 above there is not a large difference between owners who have and have not hired owner’s representatives in the past. In fact, many owners have never had an owner’s representative, but yet several have had one in the past and chosen not to hire one again.

4.6.2.1 Impact of Past Owner’s Representatives on Project Performance

The question with owner’s past experience with owner’s representatives or not is: does past experience with owner’s representatives affect project performance? One reasoning could be that owners who have hired them in the past learned from them and are able to better perform, or owners who have not hired owner’s representatives in the past understand their construction projects well and they are confident in their performance.
To see if there is any difference in project performance between when an owner has hired or has not hired an owner’s representative in the past, boxplots are made, and statistical analysis is performed. One of these boxplots is shown below in Figure 4.57 where it shows the relationship between when an owner has or has not hired an owner’s representative in the past along with budget performance. The remaining boxplots can be seen in Figure C.83 to C.86 in Appendix C. Table 4.56 below shows the statistical Wilcoxon Rank-Sum correlation test to see if there is any significance between when owners hire owner’s representatives in the past or not.

Figure 4.57. Budget Performance Boxplots of When an Owner’s Representative was Hired in the Past
(1 = Much lower than budgeted, 7 = Much higher than budgeted)
Table 4.56. Wilcoxon Rank-Sum Correlation Test of Past Owner’s Representative Experience and Project Performance Metrics

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>P-Value</th>
<th>Significance at 95% Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>0.2207</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>0.739</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>0.6718</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>0.788</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>0.2733</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 4.56 above show that there is no significance in whether an owner’s representative is hired in the past regarding project performance. This means that owners should not worry about the fact they hadn’t hired an owner’s representative in the past, there is a similar likelihood that their project performance will be successful.

4.6.4 Owner’s Satisfaction of not Hiring an Owner’s Representative

As described in Section 4.6.1 above, owners decide not to hire owner’s representatives for various reasons. As owners, they either need to be confident in their own abilities to manage the project, or they need to place their trust in another entity. If owners are not satisfied with their decision to not hire an owner’s representative, it is likely that they will decide to hire one in the future, however if they are satisfied with their decision to not hire an owner’s representative, they are likely to not want to hire an owner’s representative in the future. From the survey sent out to owners, they were asked how satisfied they were in their decision to not hire an owner’s representative. The data collected can be seen below in Table 4.57 where it shows the number of owners who
reported their satisfaction at each level, and Figure 4.58 where it shows this same information in percentages.

Table 4.57. Number of Responses of Owners Satisfaction Level of Not Hiring an Owner’s Representative

<table>
<thead>
<tr>
<th>Owner’s Satisfaction of Not Hiring an Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Satisfied</td>
<td>58</td>
</tr>
<tr>
<td>Moderately Satisfied</td>
<td>17</td>
</tr>
<tr>
<td>Slightly Satisfied</td>
<td>2</td>
</tr>
<tr>
<td>Neither Satisfied Nor Dissatisfied</td>
<td>5</td>
</tr>
<tr>
<td>Slightly Dissatisfied</td>
<td>0</td>
</tr>
<tr>
<td>Moderately Dissatisfied</td>
<td>0</td>
</tr>
<tr>
<td>Extremely Dissatisfied</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 4.58. Percentage of Responses of Owners Satisfaction Level of Not Hiring an Owner’s Representative
As seen in Table 4.57 and Figure 4.58 above, it is clear that when owners decide to not hire an owner’s representative, they are very likely to be extremely satisfied in their decision. Over 70% of owners who responded to this question reported that they were extremely satisfied in their decision. Over 90% of responses reported they were satisfied in some way, and no owners responded that they were dissatisfied in their decision. This shows that owners are generally very happy with their decision to not hire an owner’s representative.

4.6.5 Would the Owner Choose to Hire an Owner’s Representative Again

As found above in Section 4.6.4, most owners are satisfied with their decision to not hire an owner’s representative. It can be assumed that if owners have a positive experience not hiring an owner’s representative, that they are likely to not hire an owner’s representative again. To see if this is true, Table 4.58 and Figure 4.59 have been created to see the data collected from owners. Table 4.58 shows the number of respondents for each likelihood of hiring an owner’s representative again, and Figure 4.59 represents this data in percentages in graphical form.

<table>
<thead>
<tr>
<th>Owners Likelihood of Hiring an Owner’s Representative</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely Not</td>
<td>32</td>
</tr>
<tr>
<td>Probably Not</td>
<td>30</td>
</tr>
<tr>
<td>Might or Might Not</td>
<td>10</td>
</tr>
<tr>
<td>Probably Yes</td>
<td>3</td>
</tr>
<tr>
<td>Definitely Yes</td>
<td>7</td>
</tr>
</tbody>
</table>
As shown in Table 4.58 and Figure 4.59, there is a higher tendency for owners to not want to hire an owner’s representative if they were to redo their project again. However, slightly over 10% of respondents said they would either probably or definitely hire an owner’s representative if they were to complete their project again, even though they were not dissatisfied with their decision to not hire an owner’s representative. Ultimately over 75% of owners would probably or definitely not hire an owner’s representative if they were to repeat their project again.
4.6.6 Summary of Not Hiring an Owner’s Representative

Owners may choose to not hire an owner’s representative for various reasons, but they still need to be represented by someone, whether that is themselves, the architect/engineer, or construction manager. They also may have had an owner’s representative in the past. Section 4.6 shows various breakdowns of what is happening today in the industry, and statistical tests that compare both who is representing the company and if the owner has had an owner’s representative in the past, comparatively to the five project performance metrics: budget performance, schedule performance, change performance, owner satisfaction, and user satisfaction. Table 4.59 below shows the summary table of these statistical tests, and if they are significant.

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>Who Represented Organization</th>
<th>Past Owner’s Representative Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Performance</td>
<td>Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Schedule Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Change Performance</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Owner Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>User Satisfaction</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

There is only one statistical significance found in this section, which is in regards to who is representing the organization. It is found that when an architect/engineer is representing the organization, the budget performance is worse than when the owner is representing themselves or a construction manager is representing them. However, this
The statistical test is done with a smaller sample size and needs to be done with more data to be fully confirmed.

This section also shows some breakdowns in what is happening in the industry in regards to why an owner is not hiring an owner’s representative, their satisfaction of not hiring an owner’s representative, and if they would choose to hire a representative next time. The biggest reason why owners decide not to hire owner’s representatives is because they have in house capacity to perform the job themselves. Another reason is that owners are not seeing the ratio of cost to value perceived as adequate.

Ultimately owners who do not hire an owner’s representative are happy with their final decision, as majority of owners are either moderately or extremely satisfied with their decision. The surprising information found is that there are over ten percent of owners who would likely hire an owner’s representative for their next project, even though they were not dissatisfied by representing themselves. However, most owners who do not hire owner’s representatives are likely to not hire an owner’s representative for their next project.

4.7 Summary

This analysis combines a wide array of responses to many questions in regards to project characteristics; owner’s representatives characteristics, roles, and responsibilities; non-owner’s representatives characteristics; and overall project performance. Chapter 4
relates these responses together and determines tendencies of the industry, along with statistical significance of the impact they have on one another.

In Section 4.2 it is most importantly found that there is a lack of significance of owner’s representatives’ impact on project performance. It is found that when owners decide to hire an owner’s representative, the overall project performance in terms of budget, schedule, change, owner satisfaction, and user satisfaction is not significantly different than when an owner decides not to hire an owner’s representative.

Section 4.3 evaluates each project delivery method with and without an owner’s representative. The only significant finding that could be obtained from the data is that when owners are using the DB delivery method, if they choose to hire an owner’s representative, they are more likely to have improved budget performance than when they do not hire an owner’s representative. Another important conclusion from this section is that all respondents who used the IPD delivery method, decided to hire an owner’s representative. There are no responses from owners with this delivery method without hiring an owner’s representative.

In Section 4.4 it is found that two project characteristics have an impact on owner’s decision to hire or not hire an owner’s representative. These characteristics are project size in terms of square footage and cost and the owner’s experience level with construction. For larger projects, owners are more likely to hire an owner’s
representative. For owners who have more experience with construction, they are less likely to hire an owner’s representative.

In Section 4.5 it is found that several roles of owner’s representatives are more effective in impacting project performance, and it is also found that when an owner perceives his owner’s representative as effective, the overall project performance is improved. The key conclusion from this section that comes as a surprise is that when owners offer incentives to their owner’s representatives, the budget performance of the project is more likely to be higher than budgeted than when owners do not offer incentives to their owner’s representatives. It is also found that owners are generally happy with their decision to hire an owner’s representative and are likely to hire an owner’s representative again.

Lastly, Section 4.6 considers when an owner’s representative is not hired. The main conclusion from this section is that owners do not typically hire owner’s representatives because they have in-house capacity to represent themselves. The second major reason owners decide not to hire an owner’s representative is because they do not see a great enough value from the cost of owner’s representatives. Ultimately most owners are happy with their decision of not hiring an owner’s representative, and are unlikely to hire an owner’s representative again.
CHAPTER 5  SUMMARY AND CONCLUSION

5.1 Introduction

Owner’s representatives are key players in the construction industry as they are involved in many projects. The lack of research regarding owner’s representatives is alarming when compared to the substantial amount of research performed on contractors and architects/engineers. Many owners may assume that hiring an owner’s representative for a construction project will improve the overall project performance of the project, however there is no existing data to confirm if this assumption is true or not. Most of the literature that does exist today is written by owner’s representatives and is naturally full of bias towards why owner’s representatives think an owner should hire them.

Owners deserve to know the value they receive from their investment of hiring an owner’s representative. Owner’s representatives can cost between 3%-5% of the overall project cost (Gainsboro, 2006), which can add up to a substantial amount of money depending on the size of the project. The construction industry as a whole can also benefit from understanding why owners hire owner’s representatives on their projects. This research gives insight into the current use of owner’s representatives on construction projects, the value they provide, and the roles and responsibilities performed.
5.2 Summary of Research

Chapter 1 of this paper presents a background on owner’s representatives in today’s construction industry and the motivation behind this research. It also includes the objectives of this paper, important definitions, and the scope of the research.

Chapter 2 provides a review of existing literature to determine what research has previously been conducted on owner’s representatives. This literature review discusses the role of owner’s representatives along with the inherent bias and lack of data today.

Chapter 3 describes the methodology used throughout this research, including the formulation of the survey distributed to owners along with the distribution of data. The distribution of the data collected from the survey covers projects with and without owner’s representatives, location, project size, project type, year completed, and type of ownership. This chapter also included the methodology of data analysis used in Chapter 4.

Chapter 4 provides an analysis of the data collected from the survey sent out to owners. This data analysis covers project characteristics which influence project success; impact of owner’s representatives on project success; the roles, responsibilities, and characteristics which make an owner’s representative more effective at improving project performance; and characteristics when an owner’s representative is not hired that effect project performance. Correlations between the different variables are discovered using
statistical tests to understand the different effects owner’s representatives have on projects.

5.3 Research Conclusions

From the data collected in the survey and the analysis conducted on the data, conclusions about owner’s representatives can be made for the construction industry. It is found that hiring or not hiring an owner’s representative leads to no significant impact on project performance. However, there are roles, responsibilities, and characteristics of owner’s representatives that do have a significant impact on project performance when an owner decides to hire an owner’s representative. From the analysis completed, the following are conclusions regarding owner’s representatives.

5.3.1 Impact of Owner’s Representatives on Project Performance

When an owner is first considering whether or not to hire an owner’s representative, there should be several factors the owner is bearing in mind. These can include: the owner’s knowledge about construction, the size of the project, the amount of time an owner has to put into the project, trust of the general contractor, quality of the project, value engineering, etc. Many of these reasons are understandable for owner to hire an owner’s representative, however, it is found that whether or not an owner’s representative is hired on a project, there is no significant effect on project performance.

It is recommended that owners understand the reasoning behind hiring an owner’s representative or not, as the investment they are making should be no more than the value
they receive from hiring an owner’s representative. Considerations such as the quality of the project, value added engineering, cost savings, and schedule tracking should be evaluated for the specific project before an owner’s representative is hired, as there is not a significant difference between project performance with and without owner’s representatives. However, it is understood that there are many reasons why an owner may decide to hire an owner’s representative other than purely for the improvement of project performance. Heavy workload or lack of construction knowledge are shown to be major reasons why owners decide to hire owner’s representatives. It is understandable that each owner is different and will have unique circumstances that may influence their decision to hire an owner’s representative or not.

The one circumstance that does show a significant difference in project performance between projects with and without owner’s representatives is the budget performance of design-build (DB) projects. Specifically, when owners are using the DB delivery method, there is a likelihood of improved budget performance when an owner’s representative is hired. However, each project and owner is unique, so projects should be looked at individually to determine the right choice for the owner.

5.3.2 When an Owner’s Representative is Hired

Even though there is a lack of significant difference in project performance between projects with and without an owner’s representative, many owners will still benefit from hiring an owner’s representative for individual reasons. The different roles,
responsibilities, and characteristics of owner’s representatives should also be considered, as they may have a significant impact on the project performance.

5.3.2.1 Owner’s Representatives’ Roles

There are a variety of roles that owner’s representatives can perform during the multiple phases of a project. These roles include attending design meetings for owners, reviewing the schedule, approving change orders, etc. Of the roles that owners were asked if their owner’s representative performed, two of them stood out as significantly impacting the project performance.

The only two roles performed by owner’s representatives that are found to have a significant impact on project performance are approval of progress payments and approval of change orders. These two roles have a significant impact on the budget performance of a project, and when an owner’s representative is performing this task, the project is more likely to be on budget instead of over budget.

5.3.2.2 Owner’s Representatives’ Effective Responsibilities

In the survey sent out to owners about their owner’s representatives, there is a question that asks how effective the owner’s representative is at certain responsibilities during both the preconstruction phase and the construction phase. Several responsibilities stood out as needing to be performed effectively by the owner’s representative for the improvement of project performance.
Unsurprisingly, it is found that having a more effective owner’s representative at all the responsibilities listed improves the owner satisfaction and the user satisfaction of the project. Thus, owners should hire an owner’s representative that is known to be effective at their job. However, there are several responsibilities where the effectiveness of the owner’s representative matters more than others for the remaining project performance metrics.

The order of responsibilities that effect the budget performance of a project the most are negotiating change orders, assuring team meets contract obligations, constructability, claim avoidance, coordination, performance of design services, performance of pre-design services, and hiring of the general contractor. The other responsibilities showed no impact on project performance regarding the effectiveness of the owner’s representative to having an impact on budget performance. There are only two responsibilities found to have an impact on the amount of approved changes on a project: value engineering and performance of design services.

Overall, it is most important to hire an owner’s representative that is effective at their job. Owner’s representatives are hired for a reason, however, if they are not effective at their job, they are not helping, and are possibly hurting the project’s performance. It is most important that if an owner decides to hire an owner’s representative, they select an owner’s representative that is effective at anticipating and preventing problems, as this is the most impactful responsibility of owner’s representatives.
5.3.2.3 Owner’s Representatives’ Characteristics

Several characteristics of owner’s representatives have an effect on the project performance, including: when the owner’s representative is hired, how they are compensated, incentives offered, etc. This section provides details about which of these characteristics owners should look for when hiring an owner’s representative.

*When Owner’s Representatives are Hired*

When the owner’s representative is hired has no significant impact. The owner’s representative may be hired before, during, or after the design phase of a project, and there is not likely to be an impact on the project performance. For an owner to decide when they want the owner’s representative to start on the project, they should determine the roles they would like the owner’s representative to perform, and the times when an owner’s representative is most needed.

*Owner’s Representative Involvement in Hiring of the General Contractor*

An owner’s decision to involve the owner’s representative in the selection of general contractors does not have a significant impact on the project performance. It does not hurt the project performance to have the owner’s representative involved in this decision process, but the cost of hiring an owner’s representative for this task should be considered when assessing the value they provide.
How Owner’s Representatives are Selected

The process by which an owner’s representative is selected has no significant impact on project performance. As long as the owner is confident that they can select an effective owner’s representative, they should select the owner’s representative in whichever way they are most comfortable. This decision is not likely to make an impact on the project performance.

How the Owner’s Representative is Compensated

There is not found to be a correlation between the different compensation types of an owner’s representative and the corresponding project performances. This means the owner and their representative should mutually agree on what compensation type is best for them.

Incentives Given to Owner’s Representatives

When owner’s representatives are offered incentives, there is a correlation with poorer budget performance on a project. Many owners may think that giving incentives to owner’s representatives will improve their performance of a project, however the opposite is more likely to be true. When incentives are given to owner’s representatives, the budget performance of a project can be expected to be worse than when incentives are not given to owner’s representatives.
Hiring an Owner’s Representative from the Past

When working with an owner’s representative with whom the owner has past experience, there is a higher likelihood of having fewer changes on the project. The most important part about this is hiring an owner’s representative that has proven their effectiveness, as it is not wise to hire an owner’s representative that is ineffective at their job since that can have a significant negative impact on project performance as described above.

Competition Between Owner’s Representatives

There is no correlation between competition of owner’s representatives and overall project performance. If an owner is struggling to find an effective owner’s representative, competition may be beneficial, but it may not be necessary if an owner has past experience with an effective owner’s representative, or is confident in the effectiveness of another owner’s representative.

5.3.3 Representation other than an Owner’s Representative

It is found that when owners decide not to hire an owner’s representative, their own organization represents them. It is also found that a project is more likely to perform poorly in terms of budget if the owner is represented by the architect/engineer. There is no significant difference between an owner being represented by their own organization or being represented by a construction manager, but owners are cautioned to be wary of being represented by their architect/engineer.
5.4 Summary of Comments by Owners

At the conclusion of the survey sent out to owners, owners were given the opportunity to share any lessons learned or ways they would change their contracting approach on the next project. The following is a list of these lessons learned and recommendations:

- Use more local contractors to competitively bid. Ensure delivery of thoroughness & quality as was specified.

- We have our own in-house construction managers that perform for the owner. Therefore, we never hire project or construction managers outside of our organization. This has been a long term organizational strategy that has worked well for us in maintaining budgets and generating PM fees that benefit the organization.

- High level involvement on the pricing/subcontractor bidding and approach.

- The project started as a design-bid-build, then we transitioned to a CM at Risk after the first round of bids were over budget. In the future, I would start with a CM at Risk approach, and involve the CM as early as possible in the pre-construction phase.

- Secure funding earlier.

- Managing the project internally as Owners Rep took too much time to do effectively and took away from normal duties. Since it is a small organization with few layers, other duties slipped.

- Potential to move to a negotiated fee for both design and construction services, assuming the initiative moves to the enterprise level.

- Prequalify architect as this was a crucial weak point in the successful delivery of this project.

- This project had many changes during construction as it was being used as a test site for another project. So, I would try and reduce the number of changes after construction began.

- I would change the approach with which the design team was hired and the services throughout the project. This, due to excessive change order requests by architect which are deemed unwarranted.
• Insist that the scope be maintained or, if budget was really an issue, order the material through USG sources to provide to the contractor.

• This project would have gained additional benefits if the construction manager at risk had been hired earlier in the design process- but they still made positive contributions to design constructability and cost estimation prior to the "hard" building construction.

• Separate the bond management from the construction management.

• Start the process sooner.

• Understanding all the equipment needs of the customer so the design of the plans are correct.

• Increase amount of time in planning stages as it pertained to architectural plans being approved.

• Increase emphasis on design quality, pre-project planning, and BIM use during design and construction. Seriously considering going Construction Management at Risk for procurement to give us more GC knowledge and assistance during design.

• Closer attention to detail in drawings and specs.

• Would probably utilized CM at risk. The SD estimate was significantly over budget. Getting the scope and budget to match early would have been better.

• Possibly go with a design/build model to eliminate some of the conflicts.

• I would be more detailed in the Scope of Work and ask for potential GC to give their opinions on how to best save costs during construction.

• Low and/or lowest bid is not a favorable way. Would recommend design-build approach with current known contractors. They are and should be your partners.

• Ideally, it would be better to use known contractors. Unfortunately the challenging market may not always offer that opportunity.

• Allow for more time to review design and bid documents and make adjustments. The schedule to meet deadline to qualify for state's 67% match for construction cost did not allow this and, in that context, the design-bid process was quite successful.
• We would engage an owner’s rep at the onset of the project...i.e. programming phase.

• While CM's contract's typically give the impression that they are looking at the costs for the owner, my experience is that CM's look at their interests only. As long as there is a percentage / fee a CM can make from a change order, they will do everything they can to encourage change orders. CM's will not analyze costs of the change orders as it will reduce the fee that they will incur with each change order.

• We have found the use of an expert in the field to be extremely beneficial considering the additional cost value added.

• Might consider a competitive bid with only approved contractors.

• More clearly define owner's rep and CM roles.

• Any value engineering would need to be more detailed with all draw backs disclosed.

• I would still use a CMAR approach but funnel the project through the owner, and have the owners rep be a direct report to the owner instead of to the project oversight. Our issue is even though the owners rep is supposed to represent us, they often pursued their personal opinions from past projects instead of what the owner wanted and specifically asked for.

• Our project did not have enough inside control and oversight, which we have on our current expansion project.

• I would make the base building owner give greater and more complete description of the deliverable mechanical systems in the lease and require them to hold to the prescribed schedule. I would have greater active role in the selection of the subcontractors and work more collaboratively with the GC, Subcontractors, and the architect to focus on the quality of the final specification, while at the same time benefiting for the cost savings by getting the input on constructability of the finishes and systems.

• I would not hire an owner's rep. They don't have the long term commitment of a new facility as the actual users of the facility. The facilities department must be involved with the project from the beginning.

• Try not to let the project get ahead of you.

• Allow more time for exec. decisions to be made.
• We use Design Build, with IPD-light methods. Very lean internal structure, and leverage Owner Reps to serve as extension of Owner. Focus on fiduciary, budget planning, investment prioritization and return, Business drivers and benefits, organizational change management and communications. Design Builder serves as the Project/Construction Manager -- "Delivery Partner".

• For CM at risk, involve construction team much earlier and have greater buy-in of the construction team in the design process.

• Continue to hire the same Owner Reps. They have been wonderful to work with. We are extremely happy with the outcome.

• Not involve an owner's rep.

• Provide for additional time for closeout services.

• Have a contracted start and end date with penalties and possible early completion bonus.

• Let the Owner's Rep have more responsibility and control.

• I would prefer to engage the owner’s rep earlier in the process (ideally 1st vendor engaged) but this seems to be an expense that is not approved until we have the scope more clearly defined. This is the traditional chicken and the egg scenario.

• Engage the primary parties earlier and with more depth in the early formation of the effort. The more information earlier results in advanced implementation by everyone.

• We would not use a construction manager at all. We used one with past projects, and for setting up the interviews for architects and contractors for this bond, but then we hired a contractor to fill the CM at risk role. There was nothing wrong with our construction manager (he was superb) but his role was redundant with the CM at risk package we set up with the general contractor.

• We may begin considering Design Build using nonunion contractors for smaller projects.

• Closer management of timeline and money.

• Owner’s representative (without adequate internal staff) provides needed resource approach.
• Involving the owner's representative earlier in the project when the major decisions on budgets and schedules are create and promised to the executive level.

• Engage the owner's representative prior to hiring the design build contractor.

• As a regulated company I am required to design/bid/build. I would like to have the opportunity for a design/build model and get the GC involved way earlier to help drive the team to building solutions that are easy and inexpensive to build.

• Secure a stronger owners representative.

5.5 Recommendations for Future Research

This research is beneficial for the construction industry to better understand owner’s representatives and the value they add to a construction project, however, there are many more factors that can be considered for future research. This report looks specifically at the performance of projects with owner’s representatives and without owner’s representatives, but it does not take into consideration some of the major differences between owner’s representatives. The type or size of the company an owner’s representative works for, the amount of experience an owner’s representative has in the industry, and the educational background of owner’s representatives can all have the potential to impact their effectiveness. Additional research can also be conducted regarding the reasons why an owner’s representative is hired or not. It is found that many owners hire owner’s representatives for different reasons, but the impact these reasons have on the owner’s representative effectiveness is not considered. Collecting quantitative data about owner’s representatives and their projects is also an additional research step that can be conducted in the future, as this paper used qualitative rankings for many factors instead of quantitative numbers.
5.6 Conclusion

The purpose of this research is to gain a better understanding into why owner’s representatives are hired, and the impact they have on project performance. This research pursued three goals: have an unbiased point of view, collect data from the owner’s perspective, and to collect data about projects both with and without owner’s representatives. This research was conducted by surveying owners about their specific construction projects, and the experiences they had either with or without an owner’s representative. The data provided made it possible to perform statistical analysis to find trends and correlations between variables. The findings of this research are intended for owners and members of the construction industry to learn more about owner’s representatives and the value they provide to construction projects.
REFERENCES


Glossary definitions from the American Institute of Architects (AIA):

**Construction Management – Agent (CMA)** – In this delivery method the owner contracts separately with an architect, a Construction Manager as Agent (CM-Agent) and—through a competitive bid process—one or more prime contractors. The CM-Agent provides early cost estimating, scheduling and assistance to the owner throughout the bidding and construction phases of the project. Additional cost control and condensed scheduling are the two main benefits of this method. The CM-Agent approach can be beneficial for large, complex projects where construction alternatives and solutions can positively impact the overall budget. The Construction Manager-Agent performs as an additional representative of the owner’s interests (“Understanding Project Delivery”, 2017).

**Construction Management at Risk (CMR)** – In this delivery method the owner contracts separately with an architect and a Construction Manager at Risk. In this vendor form, the construction manager is “at risk” since he provides both contractor services and construction management services for the project. Construction manager services are provided to the owner based on a guaranteed maximum price, fixed price, cost plus or other means of defining a contract. This creates a major conflict of interest since the construction manager is no longer acting as an agent providing professional services to the owner, but now is a vendor delivering a contractually defined product to the owner for a price (“Understanding Project Delivery”, 2017).

**Design-Bid-Build (DBB)** – In this traditional method of project delivery, a design team of architects and engineers is hired to work with an owner to develop plans for a building to fit the goals, budget and aspirations of the owner. Based on completed construction plans, a contractor is selected through a bidding process to build the building for a set price. During the construction period, the architect works to see that the contractor builds according to the plans and specifications, and that the owner meets financial and other obligations to the contractor (“Understanding Project Delivery”, 2017).

**Design-Build (DB)** – In the Design-Build delivery approach, the owner contracts with a single entity for both design and construction. The owner has one contract assigning singlepoint responsibility for the project. The Design-Build entity may be a single organization with both architectural and construction staffs, or a construction
organization that hires or affiliates with an architect as part of a Design-Build team. The
design-build entity usually proposes the design and construction price simultaneously,
and the construction commitment is made. Design and construction may or may not be
fast-tracked (“Understanding Project Delivery”, 2017).

**Integrated Project Delivery (IPD)** – A project delivery approach that integrates people,
systems, business structures and practices into a process that collaboratively harnesses the
talents and insights of all participants to optimize project results, increase value to the
owner, reduce waste, and maximize efficiency through all phases of design, fabrication,
and construction (Cook et. al., 2007).

**Multiple Prime (MP)** - Another project delivery method is Multiple Prime Contracting,
in which the Owner holds separate contracts with Contractors of various disciplines, such
as general construction, mechanical, electrical and plumbing. In this system, the Owner,
or its CM, manages the overall schedule and budget during the entire construction phase
APPENDIX B  SURVEY
Thank you for your interest in taking this survey! This is a project-based survey, so we ask that you use any project your company has recently constructed to answer the following questions.

**Project Name**

**Project Location**

**Which of the following delivery method best describes your project?**
- Design-Bid-Build
- Multiple Prime Contractors
- Design-Build
- Construction Management - Agent
- Construction Management at Risk
- Integrated Project Delivery (IPD)

**The project owner is:**
- Public (government)
- Private

**Which of the following best describes this type of project?**
- Health care
- Education
- Commercial
- Industrial
- Residential

**Other:**
Section I: Project Characteristics

What year was this project completed?

[ ]

Approximately what was the final square footage of this project?

[ ]

Approximately what was the final cost of this project?

[ ]

Section II: Owner's Representative

Did your company work directly with any of the following services?

<table>
<thead>
<tr>
<th>Service</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner's Representative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you worked with this owner's representative in the past?

Yes

No

How positive was your experience with this owner's representative in the past?

Extremely positive

Moderately positive

Slightly positive

Neither positive nor negative

Slightly negative

Moderately negative

Extremely negative

Which of the following best describes how this owner's representative was selected?

Bidding

Negotiated contract

Previous contact
Were any of the following reasons why your company decided to hire an owner's representative?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy workload</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of technical knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality assurance/quality control (QA/QC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid conflict of interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide value engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct constructability analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control contingency money</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approval of change orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Was the owner's representative hired before or after the GC/CM/DB/DBB/IPD*?

*CM = Construction Manager
*GC = General Contractor
*DB = Design Build
*DBB = Design-Bid-Build
*IPD = Integrated Project Delivery

Before
After

Was the owner's representative involved in the selection of the GC/CM/DB/DBB/IPD?

Yes
No

Was the owner's representative involved in the selection of subcontractors?

Yes
No
Was the owner's representative hired before, during, or after the design process of the facility?

- Before
- During
- After

Did the owner's representative have any of the following roles during the conceptual design phase of the project?

<table>
<thead>
<tr>
<th>Role</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attend design meetings on behalf of the owner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propose value engineering ideas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create the baseline schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review the schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare preliminary cost estimate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create and manage the contract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solicit bidders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report design percent complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did the owner's representative have any of the following roles during the construction phase of the project?

<table>
<thead>
<tr>
<th>Role</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce schedule updates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review schedule updates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approve progress payments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track project program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approve change orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Control/Quality Assurance (QA/QC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How effective was the owner's representative for the following responsibilities during the preconstruction phase of the project?

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Not effective at all</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
<th>N/A (Did not perform responsibility)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance of pre-design services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How effective was the owner's representative for the following responsibilities during the construction phase of the project?

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Not effective at all</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
<th>N/A (Did not perform responsibility)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constructability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance of design services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hiring of GC/CM/DB/DBB/IPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How effective was the owner's representative for the following responsibilities during the construction phase of the project?

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Not effective at all</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
<th>N/A (Did not have responsibility)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall public relations effort</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding or navigating project crises</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assuring that the team meets contract obligations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negotiating change orders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitating communication on the project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading the project team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claim avoidance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What amount of duplication of processes between the owner's representative and the owner did your project experience in the following roles?

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>A great deal</th>
<th>A lot</th>
<th>A moderate amount</th>
<th>A little</th>
<th>None at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approving change orders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of equipment and owner's purchased items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing contingency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What amount of duplication of services between the owner's representative and the CM/GC/DB/DBB/IPD did your project experience in the following roles?

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>A great deal</th>
<th>A lot</th>
<th>A moderate amount</th>
<th>A little</th>
<th>None at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>QA/QC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As an owner, how much experience do you have with construction?

- A great deal
- A lot
- A moderate amount
- A little
- None at all

Did your experience level with construction influence your decision to hire an owner's representative?

- Yes
- No

Did you offer any incentives or award fees to the owner's representative for project goals and criteria?

- Yes
- No

If you were to complete another project similar to this one, how likely would you be to hire an owner's representative again?

- Extremely likely
- Moderately likely
- Slightly likely
- Neither likely nor unlikely
- Slightly unlikely
- Moderately unlikely
- Extremely unlikely

How effective was your owner's representative in anticipating and preventing problems?

- Extremely effective
- Very effective
- Moderately effective
- Slightly effective
What do you believe were the greatest benefits received from hiring an owner's representative? *Check all that apply*

- Avoiding or minimizing schedule problems
- Avoiding or minimizing budget problems
- Leadership for the project team
- Higher quality outcomes
- Avoiding unpleasant surprises
- Greater accountability to the owner
- Implementing new technology

Other: ________

---

Did you have any of the following concerns before hiring the owner's representative?

- Cost
- Finding qualified representative
- Afraid to lose control
- Prefer to keep work in-house
- Other: ________

---

Was there competition between multiple owner's representative companies for this project?

- Yes
- No

---

Which of the following best describes how your owner's representative was compensated during this project?

- Lump Sum
- Cost + %fee
- Cost + fixed fee
- Guaranteed Maximum Price (GMP)
- Unit price
- Time & materials
- Negotiated
- Fee

Other: ________

---

How satisfied are you with your decision to hire an owner's representative?

Not effective at all

Were there any special circumstances that influenced your decision to hire an owner's representative? *Examples: abnormal weather, labor or material unavailability, etc.*

Yes
No

What special circumstances did you have on your project?

Did your project have any of the following special project conditions?

- **LEED rating**
  - Yes
  - No
- **Seismic zone concerns**
  - Yes
  - No
- **Restrictive regulatory concerns**
  - Yes
  - No
- **Restrictive environmental concerns**
  - Yes
  - No
- **Site access**
  - Yes
  - No
- **Restrictive safety beyond OSHA**
  - Yes
  - No
- **Other:**
  - Yes
  - No

What type of LEED rating was this project?

- Certified
- Silver
- Gold
- Platinum

What type of site access concern did you have?

- Unlimited
- Limited
- Restricted
- Severely Restricted
Which of the following best describes who represented your organization during this project?

- Your own organization
- Architect/Engineer acted as owner's representative
- Construction Manager/Design Build acted as owner's representative
- Other:

Were any of the following reasons why your company decided to not hire an owner's representative?

- *CM = Construction Manager
- *GC = General Contractor
- *DB = Design Build
- *DBB - Design-Bid-Build
- *IPD = Integrated Project Delivery

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior experience with the project team</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>In house capacity to manage project</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Could not find qualified owner's representative</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Did not want to lose control of project</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Cost/value perceived</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Would result in overlap in other responsibilities</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>GC/CM/DB/DBB/IPD* can perform same tasks</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other:</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

As an owner, how much experience do you have with construction?

- A great deal
- A lot
- A moderate amount
- A little
- None
- None at all

Did your experience level with construction influence your decision to not hire an owner's representative?

- Definitely yes
- Probably yes
- Might or might not
- Probably not
- Definitely not
Have you hired an owner's representative in the past?
Yes
No

Which of the following best describes your satisfaction with owner's representative(s) in the past?
Extremely satisfied
Moderately satisfied
Slightly satisfied
Neither satisfied nor dissatisfied
Slightly dissatisfied
Moderately dissatisfied
Extremely dissatisfied

If you were to complete this project again, would you choose to hire an owner's representative?
Definitely yes
Probably yes
Might or might not
Probably not
Definitely not

How satisfied are you with your decision not to hire an owner's representative?
Extremely satisfied
Moderately satisfied
Slightly satisfied
Neither satisfied nor dissatisfied
Slightly dissatisfied
Moderately dissatisfied
Extremely dissatisfied

Were there any special circumstances on your project in which you had concerns about, or did not have prior experience with? *Examples: abnormal weather, labor or material unavailability, etc.*
Yes
No

What special circumstances did you have on your project?
Did your project have any of the following special project conditions?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED rating</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Seismic zone concerns</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Restrictive regulatory concerns</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Restrictive environmental concerns</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Site access</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Restrictive safety beyond OSHA</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>Other:</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>

What type of LEED rating was this project?

Certified
Silver
Gold
Platinum

What type of site access concern did you have?

Unlimited
Limited
Restricted
Severely Restricted

Section III: Project Description

Team Selection

Which of the following best describes how the CM/GC/DB/DBB/IPD* was selected?

*CM = Construction Manager
*GC = General Contractor
*DB = Design Build
*DBB - Design-Bid-Build
*IPD = Integrated Project Delivery

Open bidding
Prequalified bidding
Negotiated contract
Voting of key people
Other:
Have you had any experience with the selected CM/GC/DB/DBB/IPD before?
Yes
No

How positive was your experience with the selected CM/GC/DB/DBB/IPD in the past?
Extremely positive
Moderately positive
Slightly positive
Neither positive nor negative
Slightly negative
Moderately negative
Extremely negative

Was there competition from other qualified contractors?
Yes
No

Which of the following best describes how the subcontractors were selected?
Open bidding
Prequalified bidding
Negotiated contract
Voting of key people
Other:

Was there competition from other qualified subcontractors?
Yes
No

Project Performance

Which of the following best describes the cost performance of this project?
Much higher than budgeted
Moderately higher than budgeted
Slightly higher than budgeted
About the same as budgeted
Slightly lower than budgeted
Moderately lower than budgeted
Much lower than budgeted
Which of the following best describes the schedule performance of this project?

- Much longer than scheduled
- Moderately longer than scheduled
- Slightly longer than scheduled
- About the same as scheduled
- Slightly shorter than scheduled
- Moderately shorter than scheduled
- Much shorter than scheduled

Which of the following best describes your opinion of the cost of the approved changes during this project?

- None at all
- A little
- A moderate amount
- A lot
- A great deal

Project's Overall Outcome

What is the owner's level of satisfaction with this project?

- Extremely satisfied
- Moderately satisfied
- Slightly satisfied
- Neither satisfied nor dissatisfied
- Slightly dissatisfied
- Moderately dissatisfied
- Extremely dissatisfied

What were the most substantial features that made this project successful to the owner?  
*Check all that apply*

- Completed on time
- Completed on budget
- Functionality in terms of serving its purpose
- Quality in terms of apparent and latent defects
- Safety in terms of zero incidents during construction
- Good collaborative non-adversarial delivery process
- Reputation/Social gains

Other:

What is the user's level of satisfaction with this project?
Please elaborate more on the success this project gave to your organization

How would you change your contracting approach on the next project based on lessons learned on this project?

Would you like to receive a copy of the research report when complete?

Yes
No

Your Company Name

Contact Information (Required if you would like to receive results when complete)

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