

IMPLEMENTATION OF INTEGRATED PROJECT DELIVERY IN THE
CONSTRUCTION INDUSTRY

By

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To my family –

Their support in not only this process, but in my academic career as a whole has been invaluable. From the earliest schooling until the completion of my master's degree they have always filled me with an insatiable desire for excellence and success. Without their support I would not be the man I am today.

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The construction industry has been traditionally structured in such a way that it has fostered adversarial relationships between contracting parties. The industry has also been plagued by a failure to innovate, most notably in the area of project procurement. There has however been a recent effort amongst industry members to address these concerns in order to foster a more cooperative environment amongst contracting parties in the construction process. This effort has manifested itself most recently in the advent of Integrated Project Delivery (IPD). Integrated Project delivery is the newest innovation in construction project delivery. The process involves the equal allocation of risk amongst the owner, designer, and constructor. It is also characterized by a multi-party contract, early involvement of key participants, liability waivers among key participants, collaborative decision making and control, and jointly developed and validated project goals. This new project delivery method is generally accepted as the future of the construction industry.

This study focuses on the rate at which the implementation of IPD will occur, and the extent of the market share that IPD will control. It quantifies the future impact of IPD on the construction industry. To analyze the impact of IPD on the construction industry

in the future a number of factors with possible influence on the implementation of IPD were considered. These impacts included: the current economic climate, insurance and legal issues, industry trends, information technologies, and government involvement in the construction process.

Using these factors a survey was conducted in order to quantify the onset and implementation of IPD in the years to come. Through the survey data collected it was determined that IPD would gain a portion of the construction market within 6 to 10 years. Most industry professionals foresaw IPD as holding around 20% of the market within 6-10 years.

CHAPTER 1 INTRODUCTION

The construction industry as a whole has been one that is traditionally inefficient, wasteful, and plagued by a failure to innovate. The lack of innovation does not come in materials or products but in the operations of the industry as a whole. The construction industry was the only non-farming industry in the United States to see a drop in efficiency over the second half of the 20th century. A large reason for this lack of improvement has stemmed from traditional project delivery methods that foster adversarial relationships between the contract parties.

The consensus of multiple construction industry experts on resolving the conflicts and inefficiencies within the field agree that Integrated Product Delivery (IPD) is the future. IPD is manifesting itself because of multiple reasons. It allows for a more cohesive approach from all contract parties. IPD also allows the owners of a project to become more involved and aware of everyth aspect of their project.

In addition to industry experts touting Integrated Project Delivery as the future of the construction industry owners are also starting to expect, and even demand, that this project delivery method is utilized. The United States Federal Government is the largest consumer of materials in the world. Certain branches are beginning to require certain methods and technologies from a construction project that lend themselves towards the IPD approach. Forms of IPD have also already taken a hold of a large market share in the private sector.

With all these factors to consider, the construction industry must ask itself: how fast will Integrated Project Delivery be the norm? There are many factors to consider when predicting the coming changes to the construction project procurement process.

Some of these include: government regulations, the onset of Building Information Modeling (BIM), the legal aspects of IPD, the makeup of the construction industry as a whole, and the economies of the United States and the world.

This is a study of these factors that will influence the coming changes to the project delivery process in the construction industry. The assumption that the industry will move away from design-bid-build is widely accepted; however, no time table has been established for the coming change. There is currently no accepted opinion as to how sweeping the coming change will become. The design-bid-build process is still the one of the most popular methods for constructing a given project. This study will quantify the extent and quickness of the oncoming change in the project delivery method. It will also quantify the impact of these changes on the players in the construction industry.

Surveys were sent to every type of construction firm in order to gain an accurate representation of the industry's acceptance of IPD. Surveys were also sent to the other major players in the IPD approach. These other players included architects, owners, engineers and subcontractors. These surveys also requested information regarding the factors that would influence the change in the project delivery process. Finally, a conclusion was drawn from the researched information in order to establish a time table and quantify the extent of the changes to the project delivery process in the construction industry. The goal of this study is to enable individual players in the construction industry to prepare for the changes in the industry before these changes actually occur.

The research problem for this study can be broken up into two parts:

1. To what extent will IPD be implemented in the future throughout the construction industry?

2. How long will it take for this implementation to materialize?

The research objectives of this study included quantifying implementation of IPD in terms of market share as well as quantifying the onset of IPD in number of years. This is the first chapter of this study that documents the methods utilized during the research of this study. Chapter 2 is the literature review, which analyzes previous studies on the subject and gives validity to the need of this study. Chapter 3 describes the methodology used to conduct the research. A more in depth discussion of the goals, research objectives, and the procedures followed throughout the study are given in Chapter 4. In Chapter 5, a statistical analysis is done on the given information and a conclusion is reached. Information gained from stratification of the sample is also presented. Finally in Chapter 6 the conclusion is summarized and a recommendation for further study is given.

CHAPTER 2 LITERATURE REVIEW

In order to effectively predict the future of the project delivery process in the construction industry there are two subjects that must be addressed: the proper understanding of Integrated Project Delivery and the history of the delivery process in the United States (along with their respective underlying issues). Understanding these two areas will illustrate both the deficiencies of the industry and how industry leaders are attempting to address these deficiencies. Only after these two subjects are analyzed in their entirety can a prediction of the future of project delivery methods in the construction industry be effectively formulated. This literature review has been formulated to address these issues.

An Overview of Project Delivery

Integrated Project Delivery

The Integrated Project Delivery process (IPD) is the newest and arguably most debated form of project delivery in the construction industry. As defined by the American Institute of Architects IPD is:

“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.” (AIA 2007)

It is important to note that IPD has only been recently defined. The IPD process is still a very young innovation in the construction industry. While there are many aspects to the IPD process there have been multiple agreed upon necessities in order for a project to be considered for IPD. They include:

1. A multi-party contract
2. Shared Risk and Reward Between Contract Parties

3. Early Involvement of Key Participants
4. Liability Waivers Among Key Participants
5. Collaborative Decision Making and Control
6. Jointly Developed and Validated Project Goals (Cohen 2010).

The most important aspects to consider from these necessities include a multi-party contract and early involvement by all involved parties. This essentially means that the constructors are selected before the project is designed, a schedule is agreed upon, or a budget is formulated. In a recent study of IPD projects (Kent and Becerik 2010) it was found that contractors were involved in around 50% of the preliminary design phases. This number then increased to around 70% when the project moves into the early design phase. Architects are involved over 90% of the time in these project phases. Engineers are also involved heavily during these beginning phases of IPD projects.

The concept of shared risk and reward is also essential to the IPD process. It provides for a more collaborative effort between the contracting parties because everyone has a stake in the outcome. The waiving of liability is often but not always included in IPD projects. This agreement forces the contracting parties to collaborate and is aimed at eliminating lawsuits and claims from the construction process. These three major aspects of the IPD process are loaded with implications that have not yet been thoroughly remedied by industry professionals. These implications may hinder the acceptance of IPD and will be discussed more thoroughly later on in the literature review.

There are also multiple aspects that facilitate the successful implementation of IPD such as mutual respect among party members, advanced information technology (such

as Building Information Modeling), and open communication between team members. The owner by necessity must be experienced in the industry and thoroughly involved in the entire project delivery process. This has led to other concerns regarding multiple different aspects of the IPD process (including traditions within the industry and information technology). The stated implications and concerns are the major inspiration for this study.

Before advancing any further it is important to note the similarities and differences of IPD and the design-build delivery process as they can be confused by individuals not familiar with IPD. As stated previously the IPD process unites all parties involved with a specific project, including the owner, in an effort to maximize project success. In other words the IPD agreement is:

“Distinguished by a contractual agreement between a minimum of the owner, design professional, and builder where risk and reward are shared and stakeholder success is dependent on project success.” (AIACC 2010).

This is what sets IPD apart from the design-build project delivery method. Although the two methods are similar design-build still pits the contractor/architect in an adversarial relationship against the owner – even if it is to a lesser degree than traditional project delivery methods (i.e. design-bid-build). There are interesting ties between these two similar delivery methods that have implications for the future of IPD. In a recent study it was found that 85% of firms who utilize design-build stated this was the best business structure in which to implement IPD (Kent and Becerik 2010).

There are also other contributing factors to the underlying thought process for IPD. One of these factors is lean construction. The idea behind IPD is to intensely coordinate the construction process in order to reduce waste and maximize efficiency. This is one way in which the construction industry is trying to emulate industries such as

manufacturing. By trying to implement IPD the construction industry is almost implementing a “Toyota Way” of its own to remedy its inefficiencies.

The History of Construction Project Delivery

The overwhelming influence for the implementation of IPD has been the inefficiencies of the construction industry as evidenced by their specific inclusion in the definition of IPD. This shift towards a more collaborative approach has been influenced by centuries of construction’s project delivery history.

Before the modern era of construction the project delivery process can best be defined as a design-build approach. The design-build process is a concept that has been prevalent throughout history, dating as far back as ancient Mesopotamia where Hammurabi’s Code placed absolute accountability on the individual constructing and designing a project. “Design build is not a new concept. In centuries past it was the only procurement method available” (Songer and Molenaar, 1997). This is particularly relevant given the similarities between design-build and IPD. A single person or company would essentially provide all the needed aspects of the desired project. This continued for centuries until the 1800’s when the delivery method faded away because of problems with litigation and new precedents that were set governing contract laws:

As statutory and case law developed during the 1800s, the separation evolved from functional to legal. Courts determined that architects were only liable in cases of negligence as opposed to the strict liability for which contractors were responsible. As these liabilities became defined, the "traditional" design-bid-build method of project delivery emerged as the primary procurement method.(Natkin 1994).

The Inefficiencies of Traditional Project Delivery

Over the last century the separation of the architect and constructor in the construction process has affected the industry in multiple areas. The main areas of

concern include relationships between contracting parties and the resulting productivity of the industry itself.

The design-bid-build method is a construction delivery process in which an owner enters into two separate contracts in order to receive their desired building or project. The owner hires an architect first who designs the building and eventually represents the owner when dealing with issues pertaining to the contractor. The architect will enter into contracts with structural and mechanical engineers to determine essential design aspects if they are not present within the architectural firm. After the owner has received the design, he will issue an invitation to bid on the proposed project. Contractors will then respond to the invitation to bid and will be awarded the contract based on the owner's evaluation of their bid.

The inherent inefficiencies with this process are abundant. The owner holds two different contracts but maintains a single goal of obtaining a building that will effectively meet their needs. The positioning of the architect and constructor on opposite sides of the project fosters an atmosphere in which goals for each party are in no way shared. This positioning results in two problems: a lack of common devotion to the owner's goals and an admittedly adversarial relationship between the constructor and the architect. During the 1960's the construction-manager approach was implemented in order to try and reduce the adversarial problems associated with the industry. The construction-manager approach still does not address the primary cause of the problems in the industry – the separate contracts that the owner enters into with the architect and the constructor. The resulting effects of this adversarial relationship fosters an atmosphere rich in lawsuits and litigation. IPD attempts to avoid this adversarial

relationship by fostering a project environment based on a waiver of claims and an atmosphere of mutual respect and trust.

The American Institute of Architects (AIA) recognizes the inefficiencies and addresses them specifically in “Integrated Project Delivery: A Guide”. The construction industry has been plagued over the past half century by a reputation for lack of innovation, performance, and efficiency. As stated in the introduction construction is the only non-farming industry to decrease in efficiency since 1964 (Allison 2009). Over this same time period other industry increased their productivity by over 200% (AIA 2007). According to the *Economist*, in the year 2000 around \$200 billion of the \$650 billion dollars spent each year on construction was due to inefficiencies, mistakes, and delays in the construction process. This number constitutes almost one-third of construction spending in the year 2000. The impact could be even greater at this point in time because construction spending topped \$1.3 trillion in the United States in the year 2008 (Allison 2009).

In order to advance the construction procurement process Australia began using a system they called “project alliancing” on infrastructure projects (Noble 2007). The roots of Integrated Project Delivery stem from this Australian system and have manifested themselves in the AIA guide published in 2007. The IPD process aims to remedy the inefficiencies of traditional project delivery as shown in the comparison in Table 2-1:

Table 2-1. Traditional vs. Integrated Project Delivery (AIA Integrated Project Delivery: A Guide 2007)

Traditional Project Delivery	Key Aspects	Integrated Project Delivery
Fragmented, assembled on “just-as-needed” or “minimum-necessary” basis; strongly hierarchical; controlled Linear, distinct, segregated; knowledge gathered “just-as-needed”; information hoarded; silos of knowledge and expertise Individually managed; transferred to the greatest extent possible Individually pursued; minimum effort for maximum return; (usually) first-cost based Paper-based, 2-D; analog Encourage unilateral effort; allocate and transfer risk; no sharing	Teams	An integrated team entity composed of key project stakeholders, assembled early in the process; open, collaborative
	Process	Concurrent and multi-level; early contributions of knowledge and expertise; information openly shared; stakeholder trust and respect
	Risk	Collectively managed; appropriately shared
	Compensation/ Reward	Team success tied to project success; value-based
	Communications/Technology	Digitally based, virtual; BIM (3-4-, and 5-D)
	Agreements	Encourage, foster, promote and support multi-lateral open sharing and collaboration; risk sharing

Table 2-1 illustrates the essence of IPD as defined by the leading members of the industry. As mentioned earlier the key principles involved include a total team based approach that shatters the traditional barriers found in construction project delivery. Key parties are involved from the very onset of a project and risk is shared equally among all party members. This method also requires advanced technological approaches and an industry savvy owner.

Integrated Project Delivery: The Issues and the Future

The Current State of IPD

In order to accurately assess the future of IPD one must understand where the project delivery method stands with the industry today. As has been previously stated IPD is a new methodology that is currently in its beginning stages of implementation. As

determined by Kent and Becerik (2010) less than half of the industry (44.7%) has experience with IPD. Of those individuals who are inexperienced over half (55.1%) are informed about IPD. Additionally, around 25% of the industry does not have experience and is uninformed with the process itself. In order for the industry to effectively implement IPD there must be an attempt to educate individuals about the process and its benefits. Kent and Becerik (2010) also suggested that educational systems be put in place within institutions and vocational programs.

The Benefits of Integrated Project Delivery

Now that the downfalls of the traditional design-bid-build process have been reviewed it is necessary to turn the focus back on the proposed solution. The features of IPD have already been discussed and it is now necessary to illustrate the benefits these features can provide to the construction industry. It is also important to discuss the recent studies that have been conducted on IPD to illustrate the purpose of this research. IPD has been characterized as “the philosophical underpinning to the future” (Allison 2009) of the design and construction industry. There are multiple supporting concepts that reinforce this characterization.

The benefits of IPD are created through the actual methodology of the process itself. The culture of open communications, mutual respect and trust, and early involvement of all key contract members fosters an environment in which tangible benefits are readily seen. These benefits can be quantified through qualifications such as cost, quality, project goals, schedule, and efficiency.

Multiple benefits result due to the early involvement of constructors in the design process. These benefits result in savings for every member of the IPD team. The constructor can provide input as to the constructability of a design before it is finalized.

This also allows for the opportunity to prevent future complications in the field. The American Institute of Architects states that the early involvement of all project players allows for the following benefits:

...strong pre-construction planning, more timely and informed understanding of the design, anticipating and resolving design-related issues, visualizing construction sequencing prior to construction start, and improving cost control and budget management (AIA Integrated Project Delivery: A Guide 2007).

All of these benefits have tangible results in the final outcome of the project. Not only are the owner's goals and objectives more thoroughly understood but they are more efficiently executed (when compared to traditional project delivery methods). This new approach to project delivery is essential when considering the growing complexity of today's construction projects. The integrated approach has been shown to improve schedule, control costs more effectively, improve quality, and consistently satisfy an owner's goals.

The United Kingdom has recently reinforced the benefits that IPD provides to the parties involved in a construction project. They estimate cost savings of up to 30% over a series of construction projects, and anywhere between 2-10% for single projects (AIA Integrated Project Delivery: A Guide 2007). These savings are a result of the integrated approach described above. The approach allows for multiple scenarios which improve the construction process. One of these scenarios is the necessity of providing other team members an open look into one's finances. This "reduces padding costs" (Post and Leonidos 2010); in essence, team members must be modest with their project estimates and fees because of the open-book accounting of the business proceedings.

The IPD process also allows for more involvement from suppliers during the pre-construction phase of a given project. This has multiple effects on the project outcome.

The first of these effects is the increase in prefabrication for building systems. An increase in prefabrication means that the time assembling building systems is drastically reduced - slashing days off the construction schedule. The involvement of the constructors, suppliers, and major contributing subcontractors also increases the constructability of the proposed design. This results in less unforeseen problems during the construction phase as noted in the AIA's *Integrated Project Delivery: Case Studies*. One owner of a project indicated that "change orders were virtually eliminated" (Cohen 2010). In an industry where almost one-third of spending in the year 2000 was a result of inefficient coordination and mistakes, this potential elimination of change orders has monumental implications.

Overall time for project completion has also been shown to decrease with the implementation of IPD. Some critics note that contract negotiations can be lengthy when establishing the multi-party agreement; however, proponents explain that large amounts of time will then be recovered by the lack of the bidding, negotiations, and awards cycle of traditional project delivery methods. The effect on the schedule of a construction project is also impacted by the nature of IPD. Constructors can visualize the construction sequence early on in the project proceedings and establish the best possible methods in advance of the actual construction phase.

The benefits of the IPD process can best be summarized by two recent studies. The first study addressed the attitudes of industry professionals towards IPD (Kent and Becerik 2010). This study established that among those individuals who had previous experience with an IPD project:

“The most commonly observed benefits are fewer change orders 70.3%, cost savings 70.3%, and shorter schedule 69.4%. Fewer request for information is another significant benefit observed by 58.6% of respondents”.

These statistics are evidence of the advantages of IPD over traditional delivery processes. The benefits of IPD are further enforced by another study of actual IPD projects (Cohen 2010). This case study documented the IPD process throughout the life of six individual projects. The results for IPD were encouraging:

In every case these projects met or exceeded the owner’s expectations with respect to budget, schedule, design quality, and sustainability and also met the financial expectations of designers and builders. Every participant interviewed was enthusiastic about IPD and eager to try it again (Cohen 2010).

The methodology and the studies that reinforce the benefits of IPD have established the IPD project delivery method as a viable option for owners of future construction projects. This fact is demonstrated by the attitudes of individuals with regards to IPD. Two-thirds of individuals who have experience with the IPD process believe that IPD will be implemented widely throughout the industry in the future (Kent and Becerik 2010). A majority of informed individuals (58.3%) also agree with the notion that IPD will be widely implemented in years to come. The relatively new method is poised to be the future of the design and construction industry; however, there are factors that will influence its rate and extent of industry adoption. The following discussion will describe these factors and their potential impact on future project delivery.

IPD: Insurance and Legal Issues

The first major hurdle that IPD must overcome in order to be implemented successfully throughout the construction industry is the nature of the insurance process.

Due to the infantile nature of the IPD process there have been no insurance or legal precedents present to remedy any potential problems that could arise between the parties involved. The issue of how to cover general liability, worker's compensation, builder's risk, and professional liability insurance is currently being debated throughout the industry.

The insurance industry has only recently been attempting to remedy the issue of multiparty contracts. As some critics noted:

A big issue is that insurance and multiparty contracts currently don't mix. Liability insurance traditionally has been underwritten and triggered on a basis of claims and fault. But signers of most IPD contracts promise, in writing, not to sue each other or point fingers, which can render liability insurance dysfunctional and inoperative (Post and Leonidos 2010).

A major aspect of the multiparty contracts necessary for the implementation of IPD is the waiver of claims. Insurance companies are attempting to address this issue by drafting solutions with project-specific policies. These policies debuted in mid-2010 and have yet to be proven as effective solutions. There has also been an attempt to remedy the insurance issue through an Owner Controlled Insurance Program. These policies are suggested for larger construction projects and potentially have the ability to save money over the life of the project (when compared to purchasing general liability, worker's compensation, etc.). Subcontractors are instructed to remove insurance costs from their bid by the sponsor of the program. Without these additional insurance costs an Owner Controlled Insurance Program along with a project specific plan has the potential to be an effective tool for an IPD project. The acceptance of IPD in the future will depend upon the rate at which the insurance industry is able to provide an acceptable solution to the IPD process.

The legal framework for IPD has also yet to be implemented due to the fact that it is a recent project delivery method. This fact can be illustrated by the different multiparty contracts currently available for an IPD project. The ConsensusDocs 300 was the first established set of IPD contract documents and is still currently in use on IPD projects (Kent and Becerik 2010). The Integrated Form of Agreement (IFOA) is another set of contract documents that is currently being utilized. The AIA also has the AIA C191 multiparty contract that is available for use on IPD projects. This set of contract documents was released in order to:

Execute a single agreement for the design, construction and commissioning of a Project. C191–2009 provides the framework for a collaborative environment in which the parties operate in furtherance of cost and performance goals that the parties jointly establish. The non-owner parties are compensated on a cost-of-the-work basis. The compensation model is also goal-oriented, and provides incentives for collaboration in design and construction of the project. Primary management of the project is the responsibility of the Project Management Team, comprised of one representative from each of the parties.... (AIA C191).

As stated earlier all of these contract documents insist on the fundamental ideal of shared risk and reward among the contracting members. Critics maintain that these contracts have yet to be tested in the court of law. Their main drawback to the IPD is the shared risk of all members involved. Some parties are not fond of potentially having to pay for another party's mistake. Proponents advocate the fact that since there is more certainty in the process the risk for each party member is lowered as a result of accountability. As stated earlier the IPD process effectively attempts to eliminate the possibility for any litigation between party members. In order for IPD to move forward there must be a readily identifiable legal framework in place to regulate any potential disputes. How quickly this legal framework is set in place will be another determining factor for the rate and extent of acceptance for IPD in the years to come.

Traditions and Industry Trends

IPD is considered to represent the future of the design and construction industry. This has been reinforced in the study by Kent and Becerik (2010) that found that industry professionals see IPD as being widely accepted in the future. There are also other factors regarding the construction industry as a whole that will have an impact on the rate and extent of IPD adoption.

The first industry trend to consider is the current network of proponents for the IPD process. The AIA has already been proven to be a large proponent of IPD. There multiple case studies and published guide to successfully executing an IPD project are evidence of this fact. The Associated General Contractors of America (AGC) has also gone on record as being a large proponent of IPD. The support of two of the most influential professional associations within the design and construction industry implies that IPD has the potential to be widely accepted.

It would be difficult to discuss the trends of the construction industry without addressing the green movement, and more specifically LEED rating system. This system has seen remarkable growth within the industry since its inception in the early 1990's. LEED certified buildings have grown in market share every year since the beginning of the rating system and are projected to continue to grow for years to come (Kibert 2005). The most notable aspect of this industry trend is the increasing involvement of the owner in the construction process. Owners are becoming increasingly sophisticated and are becoming more knowledgeable to their demands for building design and performance. This lends itself perfectly to the IPD process. It allows the project team to establish the LEED goals of an owner before the project starts in

order to more efficiently reach these goals. The ever increasing amount of LEED certified projects indicates IPD will be a large player in the future.

There is also a trend towards a increased complexity of the modern construction project. According to a modern scholar “construction is... a complex, nonlinear and dynamic phenomenon, which often exists on the edge of chaos” (Bertelsen 2002). IPD is aimed at addressing and controlling this chaos in order to effectively manage the outcome of a project. Another major professional association within the industry is attempting to utilize IPD in order to more effectively address both the complexity and LEED requirements of modern construction projects. The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) is trying to meet aggressive goals for energy reduction with the use of IPD. ASHRAE noted that:

As one exceeds a 30% reduction and moves toward even greater reductions, complex interactions of systems and context must be taken into account. Integrated processes are being acknowledged and encouraged in sustainable ratings systems such as LEED®. New energy codes, such as ASHRAE’s Standard 189, include recommendations regarding integrated processes (Cohen 2010).

In other words, to meet the energy demands of the future (as well as LEED standards of today) the move towards IPD is going to be inevitable. The energy issues and complex construction projects will be too large for one member of the construction project to handle.

Another trend that has implications for the rate and acceptance of IPD is the rise of a similar project delivery method – design-build. The rate of implementation of design-build has the potential to illustrate the future rate of acceptance for IPD.

This project delivery process has grown rapidly in popularity since the year 1985 in which the amount of non-residential design and construction only utilized the design-

build method 5 percent of the time. By the year 2000 the design-build process was being utilized in 35 percent of the total amount of non-residential projects. The rate at which the process is used is continuing to grow; it is now at 45 percent and expected to be at 50 percent by 2015. In five years time it will be the most popular method for delivering a construction project. Even with these staggering growth numbers, a large amount of this growth is contributed to the private sector which uses the design-build process around 40 percent of the time. The public sector in comparison utilizes the process a significantly less amount at only 5 percent of its workload in 2004 and about 15 percent of its current workload (DBIA 2005). This growth is illustrated Figure 2-1.

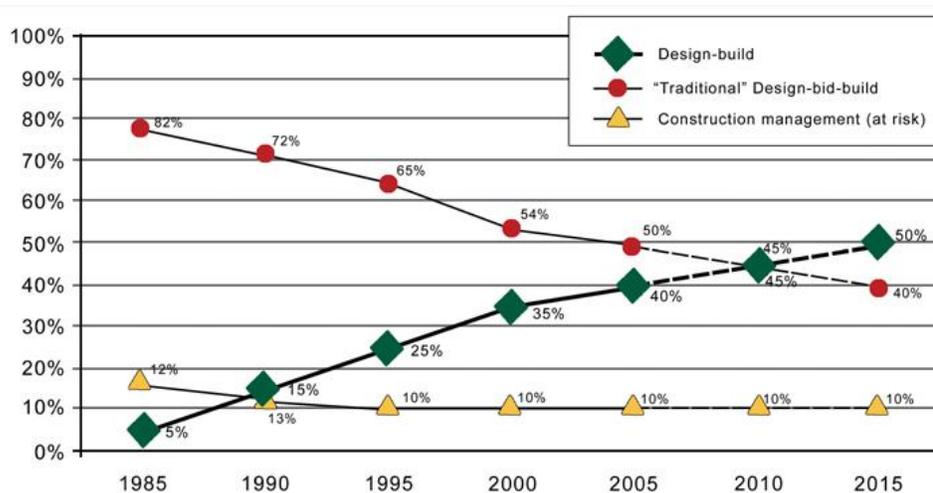


Figure 2-1. Non-Residential Design and Construction in the United States (DBIA 2005)

This remarkable rate of growth is important to consider when discussing the rate at which IPD may be accepted due to the fact that 85.3% of experienced individuals indicated that design-build offers the best business structure for IPD. If design-build continues to grow it stands to reason that IPD will show a similar growth pattern - if not a more rapid pattern. IPD is the next logical step in project delivery for the members of a construction project team. The rapid growth in the design-build process, along with the

similarity of business structures, should foster an industry environment in which IPD is readily accepted in the future.

The makeup of the construction industry is also a determining factor in the future of IPD. The importance of project size has been shown to be an issue when determining whether IPD will be an effective project delivery method. Experts in the industry have stated that IPD would only be an effective delivery method on projects ranging from a minimum of 5 to 20 million dollars (Post and Leonidos 2010). There is also the insurance issue to take in account. If the insurance industry decides Owner Controlled Insurance Programs are the solution to providing effective coverage for an IPD project the lowest threshold for IPD could be as high as \$100 million.

The Current United States Economy

The implementation of IPD throughout the construction industry will be difficult to undertake given the current state of affairs in the United States economy. Due to the worst recession in recent memory the implementation of a new business plan is not appealing to many construction industry members. Given the statistics regarding the entire economy, as well as the construction industry, there must be an economic recovery before any real advancement towards IPD can begin.

There is no doubt as to the severity of the recession in United States economy as a whole with the official unemployment rate hovering around 10% (and the actual rate at around 17%). Much of this grim unemployment data stems from the workforce in the construction industry. According to the Bureau of Labor statistics the construction industry accounted for 20% of the total lost jobs across all industries in the United States during the recession. The industry is still at an unemployment that is consistently around 27.1% according to the AGC. This is the highest level of unemployment the

industry has experienced since the government made the data available in 1976 (AGC 2010).

Given the current recession and economic uncertainty companies are not displaying a willingness to invest in any potential risk. Businesses in the United States are said to be saving as much as \$2 trillion in potential investment money in order to survive the current economic market. The numbers for the construction industry are not any more promising than those for the economy as a whole. As of late 2009 new construction starts had fallen by 28% (McGraw-Hill Construction 2010). The U.S. Census Bureau has also reported disturbing trends in the construction industry. Indicating that the annually adjusted rate of construction spending is \$900 billion – the lowest total in six years. According to the AGC “all but 12 communities saw declines in construction employment from September 2008 to September 2009” (AGC 2009).

What does all of this data imply for the adoption of IPD in the United States? According to the recent study of industry attitudes towards the IPD process many individuals are wary of the “risk of adopting a new system” (Kent and Becerik 2010). Many companies are displaying a hesitation to restructure given the volatile business environment. There will be no advancement towards new business models until the economy of the United States can recover. This process will take an uncertain amount of time. According to the current Obama Administration’s study of the American recovery and Reinvestment Act (better known as the “Stimulus Package”) the national unemployment rate will reach a norm of around 5% by the year 2012. As of this writing, this gives the economy less than a year to reduce national unemployment by about 5%. This rapid reduction in the unemployment rate seems highly unlikely to occur in such a

short period of time (Reidl 2009). Despite all these facts the United States economy is showing signs of a rebound: the Gross Domestic Product is growing (although at a small rate) and private sector jobs have grown consistently for a number of consecutive months. Still some economists are forecasting that the recovery of the United States economy will take between five and ten years. This possible long period of recovery for the economy, and especially the construction industry, will be a strong factor in prolonging the rate at which IPD will be implemented.

Information Technologies

One of the pillars that support the process of Integrated Project Delivery is the increasing inclusion of information technology into the construction industry. These technologies allow the project team to successfully execute the stated goals of IPD: collective management, open communications, and multi-lateral collaboration. The most effect of these information technologies is Building Information Modeling (BIM).

BIM is defined in the National BIM Standard (NBIMS) (2007) as:

The digital representation of the physical and functional characteristics of a building from design through construction and operations. As such, it can serve as the shared information repository for collaboration throughout a building's lifecycle (NBIMS 2010).

The parallels with IPD are evident when discussing BIM. Although it has not been found that BIM is essential to an IPD project (Kent and Becerik 2010) the inclusion of this information technology is a major factor in improving efficiency and communications between members of a project team. According to some industry experts:

BIM is poised to revolutionize the construction industry because of its promise to radically improve collaboration among the wide ranging and expertise needed to design and construct a building and to increase efficiency (Bedrick and Rinella 2006).

This technological revolution within the construction industry has major implications for IPD. The fact that BIM has become almost commonplace throughout the construction industry sets in place another cornerstone for IPD. BIM will only enhance the benefits of IPD, and eventually allow adoption to occur sooner and more extensively.

While the utilization of BIM is a promising aspect to the future of IPD there are still issues with information technology throughout the industry. One of these issues is the legal aspects of BIM itself. There have been legal documents recently put in place to remedy these concerns such as the AIA E202 and the ConsensusDocs301. Other issues include interoperability with other software used in the construction industry. The National Institute of Standards and Technology (NIST) has reported that the lack of Architect, Engineer, and Construction software interoperability costs the industry \$15.8 billion annually (AIA Integrated Project Delivery: A Guide 2007). There are multiple efforts underway to address this problem in the industry. Research on BIM systems is being undertaken in order to integrate more information such as estimate information, links to schedules, links to project videos, and links to safety information.

To address other interoperability issues there is also research being undertaken to remedy the underlying compatibility problems. The issues arise from the fragmented stages of a project as well as the multiple formats in which project information is distributed. Examples of this information come from standard construction documents such as bids, schedules, conceptual cost estimates, and BIM. There is research being undertaken at the Texas A&M University in understanding the semantics of the construction process in order to organize information in a universal form. The goal of

this research is for users to be able to upload information and allow the system to automatically organize the information based on its ontology.

Government Implications

Whenever a discussion arises regarding project procurement and delivery practices that have such industry wide implications as IPD the US Federal Government must be included. Despite the recent downturn in the economy the United States Government is still the largest consumer of products and services throughout the global economic system (Massengale 1991). It has also been shown that healthcare, government, and infrastructure projects are the most suitable applications for IPD (Kent and Becerik 2010). These facts, coupled with the large amount of available federal contract dollars, can have a large impact on the future of IPD in the United States.

There are two major players in the United States when discussing government implications for IPD. They include the General Services Administration (GSA) and the Department of Defense (DOD). One of the biggest property leasing and managing entities in the entire world is the GSA. Both the General Services Administration and the Department of Defense were major beneficiaries from the “Stimulus Package” passed by the federal government in 2009. The estimated total funds for the two organizations include an estimated \$5.5 billion for the General Services Administration and a total of \$7.4 billion for the Department of Defense. These figures represent important opportunities for contractors nationwide (and that does not include the \$48 billion dollars to be spent on transportation projects).

So what do all these figures and IPD have to do with each other, and how will this affect the construction industry? As of the year 2006 the GSA has made the use of BIM mandatory on every project the entity undertakes. Since the GSA implemented this

policy in 2006 they have seen savings in both cost and time throughout multiple projects. The DOD is also starting to require BIM on multiple projects. For example, the United States Army Corps of Engineers has a goal of mandating the BIM process by the year 2012, with 90 percent of their projects requiring the process as of 2010. In relation to the previous discussion on information technology, the BIM process will enable the IPD method to be implemented at a much faster rate throughout the industry. Coupled with the large amount of public sector dollars in the construction industry IPD could become a driving force behind public sector work of the future. This point is reinforced by the recent IPD study which stated that healthcare, government, and infrastructure work are the best suited projects for IPD (Kent and Becerik 2010).

In order for IPD to be effectively implemented on the large amount of public sector work however, there must be a framework of government support for the IPD process. The aforementioned study has pointed out that public agencies cannot secure contracts without open lump sum bidding. In order for an acceptance of IPD by the public sector there needs to be an industry wide effort to lobby lawmakers to make the necessary changes (Kent and Becerik 2010). The timeframe for this change in the governing codes is debatable at best. A parallel example to the lack of public sector innovation could be an indicator of the time frame for the federal government's acceptance of IPD. The design-build delivery method was being widely implemented in the private sector for almost two decades before the federal government instituted laws in the late 1990's allowing the process. A point of optimism can be found in the fact that the federal government commissioned a study (produced by the Department of Transportation) that proved the benefits of project collaboration resulting from the design-build process. As

stated earlier, IPD is the next logical step after design-build and government acceptance should eventually manifest itself following high performance of IPD in the private sector. This process may take an extended amount of time (upwards of ten years) given the precedent set by the design-build regulations.

A Review of the Trends and Underlying Factors

The recent trends in the construction industry lend themselves remarkably well to IPD. The most relevant of these trends include the rise of the LEED movement (and the resulting greater owner involvement) as well as the rise of the similar design-build project delivery method. IPD is ideal for satisfying owner requirements and the design-build model is the most suitable business structure to implement IPD.

In order for the wide acceptance of IPD in the construction industry there must be a resolution to a number of factors that affect the industry as a whole. First and foremost the insurance industry must produce a product that will effectively cover all party members involved in the IPD process. This solution is already underway with the implementation of Owner Controlled Insurance Programs and project specific packages. There must also be legal precedents established that do not hinder the IPD process. Given the fact that these solutions are already being undertaken, one can assume a proper solution will manifest itself within the next 5 years.

The technological innovations of the construction industry continue to grow and impact the industry as a whole. The pervasiveness of BIM lends itself toward the implementation of IPD. Systems are being created and perfected in order to remedy the cost of interoperability between software throughout the industry. All of these trends suggest the ease of acceptance for IPD in the years to come.

The next factors that will affect the rate and extent of adoption of IPD are the economy and the United States Federal Government. The economy must recover in order for businesses to restructure into an entity that can effectively provide IPD services. The United States Federal Government must also establish regulations that will enable the use of IPD. This will open up a large sector of the construction industry to IPD, enabling a larger portion of market share. These processes could take anywhere from 5 to 15 years given the cited precedents.

CHAPTER 3 METHODOLOGY

Study Overview

The goal of this research is to determine the onset and implementation of Integrated Project Delivery (IPD) in the construction industry. There are varying reports on the feasibility and effectiveness of this method of project delivery. Due to the variation in opinions and initial results of the project delivery's usage, this study looks to quantify the future market share of IPD and the amount of time that is necessary for changes to transpire.

The inspiration for this research is derived from multiple industry publications touting IPD as the future of the construction industry. These publications include multiple works by the American Institute of Architects (Bedrick and Rinella 2006, Cohen 2010) and the Association of General Contractors. There are also factions of critics who do not support the project delivery method and insist it will not have a noticeable impact on the future of construction. In order to effectively determine the multiple factors involved with IPD a literature review was completed.

The first phase of this study was the literature review. The literature review consisted of multiple industry publications, industry statistics, economic publications, and previous studies of IPD. The literature review produced a promising outlook for the future of IPD with a number of factors that will determine the onset and acceptance of the delivery method. These factors were determined to include: industry trends, industry technologies, insurance and legal implications, the current state of the economy, and government involvement in the construction industry. In order to effectively assess

these factors an industry survey was then formulated based on the determining factors discovered in the literature review.

The next phase of the research included distributing the survey to a sample population of the construction industry. This survey was aimed at gaining responses from all individuals involved in the construction process from project owners to architects to constructors. This survey was a web-based questionnaire created using Zoomerang™ (www.zoomerang.com) for ease of access and completion by the participants. Emails were sent to a list of individuals in the construction industry with a direct link to the posted survey.

The third phase in this research was to collect data from the survey distributed to industry professionals in order to analyze their responses and produce a conclusion. This conclusion was based on descriptive statistics provided by the answers to the survey. The last and final phase of the study was to determine the onset and future implementation of IPD in the construction industry based upon the data analyzed.

Survey Questionnaire Design

The survey generated for this study can be found in its entirety in Appendix A. The survey was broken down into 7 major sections based upon the findings of the literature review. The sections of the survey include: 1) individual and company demographics, 2) the current economy, 3) insurance and legal issues, 4) industry trends, 5) industry technologies, 6) government involvement in the construction industry, and 7) overall assessment. The survey consisted of a total of 57 questions and an optional opportunity to input an email address in order to receive the results of the study. An Informed Consent Document was also added in order to provide background information to the survey participant and to comply with the University of Florida Institutional Review

Board's (UFIRB-02) confidentiality requirements. The survey was sent out on February 24, 2011 and remained open until March 10, 2011.

Population

In order to effectively analyze the entire construction industry the sample population for the survey included every project participant involved in the construction process. This survey was accessible to project owners, architects, constructors, and specialty trades. The survey was also aimed at gaining responses from individuals holding experience with different project delivery methods. A large variety of study participants was needed in order to gain perspective on the future of the construction industry as a whole to determine the future on project delivery methods. The survey was sent to 1,428 members of the construction industry. This list of members within the construction industry was obtained from a recent design-build conference. A total of 66 responses were received. This indicated a response rate of 4.6%.

Survey Questions

A number of selected questions are explained below in order to show the intent of their inclusion in the study's survey. Those questions which have been deemed self explanatory were not included. The entire survey can be found in Appendix A.

Demographics

This section of the survey was directed at gaining information on both the individual completing the survey and the company for which the individual works. This helps in providing information on the various different players in the construction industry. It also helps to establish connections between company size, location, and structure and their tendency towards implementing IPD.

Question 1: What degree do you hold? – This question is utilized to distinguish the educational background and professional area of expertise of the respondent. This helps in determining the prevailing attitudes towards IPD between the different professionals within the construction industry.

Question 2: How long have you been with your firm? – This question is used to determine the ability of the respondent to convey the values of their firm effectively. The possible answers included: 0-5 years, 5-10 years, 10-15 years, and 15+ years.

Question 3: What type of firm is your company? – This question is utilized to distinguish the values of different types of firms within the industry. It is similar to question 1 in that it attempts to differentiate the opinions of different members of the construction process. Possible answers included: architectural, commercial construction, subcontractor, project owner, and an “other” option which could be completed if needed.

Question 4: What position do you hold within your firm? – This question is meant to gain information provided by members of the construction industry with different levels of experience and company influence. For instance, a decision to restructure the business model to a shift in IPD cannot be made by a new or entry level employee. Possible answers included: owner, architect, superintendent, project manager, and an “other” option.

Question 6: If not, are you aware of the IPD approach? – This question will obtain information on the views of IPD from individuals who are knowledgeable about IPD, but who have yet to gain experience with this process. Their responses to later survey questions show the validity of the factors influencing the acceptance of IPD.

Question 8: Do you believe IPD provides tangible benefits over other project delivery methods? – The presence of tangible benefits is a determining factor on whether IPD will be accepted on a large scale in the future. The reasoning behind this question is as follows: if there are no tangible benefits than there will be no push for acceptance amongst industry members.

Question 10: What is the size of your firm in number of employees? – This question examines if the size of a company within the construction industry has the potential to influence their acceptance of IPD. Possible answers provided include: 0-50, 50-150, 150-500, and 500+.

Question 11: What is the annual contract volume that your firm executes? – This is another question that quantifies the size of the respondents firm. It is similar to the previous question in its attempt to relate the size of a firm with its acceptance of IPD as a viable project delivery method for the construction industry. Possible answers include: \$0-50 million, \$50-25- million, \$250-500 million, \$500 million - \$1billion, and \$1 billion +.

Question 13: In what region of the United States does your firm operate? – During the process of this study's literature review it was found that IPD is being accepted at a greater rate on the west coast than anywhere else in the United States. Answers to this question included: the Northeast (PA, NY, NJ CT RI MA ME, VT, NH), the South (TX, OK, AR, LA, MS, AL, TN, KY, WV, VA, NC, SC, GA, FL DE, MD), the Midwest (ND, SD, NE, KS, MN, IA, MO, WI, IL, IN, MI, OH), and the West (WA, OR, CA, NV, ID, MT, WY, CO, NM, AK, HI). These regions were selected based on the United States Census Bureau's breakdown of the nation.

The current economy

Question 15: What is your assessment of the current economic situation? – This question is aimed at determining the influence of economic conditions on the willingness of industry members to restructure their business models in order to accommodate a new process such as IPD. The possible answers included: poor, below average, average, above average, excellent.

Question 19: How long do you believe it will take before economic conditions permit a change in business model to utilize IPD? – This question aims to quantify the time period in which any given firm is willing to take on new risk and implement an IPD approach. Possible answers included: 0-3 years, 3-6 years, 6-10 years, 10-15 years, 15+ years, and Never. It also includes the possibility that IPD will fail to be implemented on a large scale in the future.

Insurance and legal issues

Question 23: Do you believe project specific insurance policies have the ability to remedy the insurance issues that have been associated with IPD? – This is a topic that has been addressed due to the recent implementation of policies by insurance companies that attempt to remedy concerns with the IPD process.

Question 24: Do you believe Owner Controlled Insurance Programs have the ability to remedy the insurance issues that have been associated with IPD? – This is a similar topic that has been addressed due to the recent implementation of policies by insurance companies that attempt to remedy concerns with the IPD process.

Question 26: Do you believe that Owner Controlled Insurance Programs (OCIPs) and project specific policies can remedy insurance claims during the IPD process? – This question addresses the concerns with insurance policies that have been utilized in

the past by combining the two primary policies that have been used. This combination of policies has been utilized recently and is the latest step in addressing insurance issues associated with IPD.

Question 27: Strictly considering insurance issues, how long after these insurance policies have been implemented and proven will your firm consider implementing an IPD business model? – This question gains information on the amount of time needed to effectively implement IPD without insurance problems hindering industry acceptance. Possible answers included: 0-3 years, 3-6 years, 6-10 years, 10-15 years, 15+ years, and Never.

Question 30: If not, how long will it take for a legal precedent to be established for your firm to consider a move towards IPD? – This question quantifies the amount of time needed after a legal precedent has been set for industry members to implement the IPD process. Possible answers included: 0-3 years, 3-6 years, 6-10 years, 10-15 years, 15+ years, and Never.

Industry trends

Question 33: What project delivery method does your firm consider to be the most effective? – This question addresses the current state of project delivery within the construction industry. It also addresses the level of acceptance of design-build which holds implications for the future of IPD as discussed in the literature review. Choices included: General Contracting, Construction Management, Construction Management at Risk, Design-Build, and Other.

Question 34: Does LEED lend itself towards Integrated Project Delivery? – The collaborative nature of LEED has been shown foster a more cooperative environment

among contracting parties. This cooperative environment also has future implications for acceptance of IPD.

Question 35: Are owners becoming more knowledgeable of the construction process? – The greater sophistication of a project owner has been shown to be beneficial for IPD use. If more owners are becoming more knowledgeable of the construction process as a whole, IPD will see growth in market share.

Question 36: Are owners becoming more aware of their project needs? – This question establishes a basis for the IPD process. A major step in the IPD process is the identification of the owner's needs when constructing a project. The more aware an owner is of his needs, the more effective and common IPD may become.

Question 39: Do you agree with the endorsements of IPD? – This question establishes a basis for the validity of the IPD process within the industry. It addresses the current attitude towards the process and has implications for future implementation.

Question 40: Do complex projects lend themselves toward a more integrated approach? – The nature of the construction industry and its projects is becoming more complex. The answers to this question show the future implications for the advancement of IPD.

Question 41: Is IPD the next advancement of project delivery after design-build? – The trends of design-build and the future of IPD can be equated based on the responses to this question.

Information technologies

Question 43: Does your firm utilize Building Information Modeling (BIM) software?
– In a recent study (Kent and Becerik 2010) of IPD it was determined that BIM is more

readily utilized in IPD applications. The rise in the use of BIM will have implications on the future of project delivery in the construction industry.

Question 45: Will BIM increase the use of IPD? – Even though BIM is more readily utilized in IPD applications it does not necessarily imply a wide acceptance of the process. This question relates the rise in the use of BIM to the future possibility of a rise in the use of IPD.

Question 47: Does a lack of interoperability between software hinder project success? – This question establishes a connection between the ease of operations between software and the success of projects within the construction industry. The results demonstrate the implications of more cohesive construction software and the acceptance of IPD.

Question 49: Will a better integration of project software encourage/enable an implementation of IPD? – This question connects the advancement of industry technology to the advancement of the IPD process. Results have implications for future acceptance of IPD.

Government involvement in the construction industry

Question 50: Are you aware of the BIM requirements for public sector procurement? – As discussed in the literature review, a rise in BIM has implications for the rise in the use of IPD. The larger use of BIM in the public sector (a large sector of the economy) can indicate a larger acceptance of IPD.

Question 54: If the public sector approves governing codes allowing IPD will your firm consider implementing the project delivery method? – The current procurement laws for the federal government do not allow the use of IPD. Given the size of the public

sector, the acceptance of IPD contract procurement laws may have industry wide repercussions.

Overall assessment

Question 55: Rank the following factors from the most influential to the least influential in determining your firm's consideration of implementing IPD. (Use number from 1-8, with 1 being the most influential and 8 the least influential. Please avoid ties between factors). The categories included:

- The current economy
- Technological issues (including BIM)
- Insurance programs
- Legal precedent
- Government involvement
- Industry trends
- Unproven IPD benefits
- Increased allocation of risk

The responses were analyzed to determine the most prevalent issues that impact the acceptance and future of IPD.

Question 56: To what extent (as a % of market share) do you believe IPD will be utilized in the future? – This question analyzes the attitudes of the industry towards the acceptance of IPD given the factors discussed. Possible answers included: 0-20%, 20-40%, 40-60%, 60-80%, and 80-100%.

Question 57: How soon, if ever, do you believe IPD will take hold of a considerable market share in construction project delivery? – This question addresses the rate at which IPD will be accepted within the construction industry in the future. It takes into consideration all the factors previously discussed.

Analysis of Survey Results

The third phase of this research study was to collect the respondent's answers to the associated survey and complete a detailed analysis of the answers. The responses to the survey were stratified against one another in order to determine the relationship between key issues such as experience levels with IPD, company size, and the primary delivery currently used by companies. There were also comparisons between the respondent's current views towards IPD and the onset and implementation of IPD in the years to come. The results of these comparisons were then determined in order to determine the future market share and time frame for the acceptance of IPD.

CHAPTER 4
SURVEY RESULTS AND ANALYSIS

Survey Demographics

Respondent Demographics (Questions 1-4 Appendix A)

The survey for this study was distributed to 1,428 individuals within the construction industry. There were 66 responses received (response rate of 4.6%). This included every member involved in the construction process including constructors, architects, engineers, project owners, and subcontractors. As shown in Figure 4-1, the majority of the respondents (27%, 18) held a degree in architecture. The next highest number of respondents (26%, 17), held either a bachelor's or master's degree in construction. The results are shown in Figure 4-1.

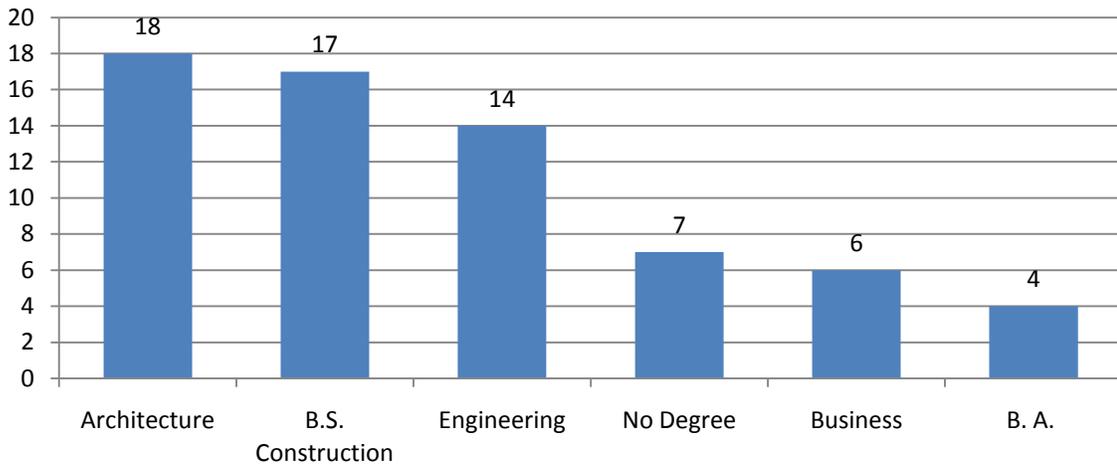


Figure 4-1. Degree earned by respondents

Most of the respondents had been with their firm for over 15 years, with 35% (23) of the respondents selecting this response. The majority of all individuals surveyed 50% (33) were from upper management. Project managers were the next highest number of respondents at 24% (16). The results are shown in Figure 4-2.

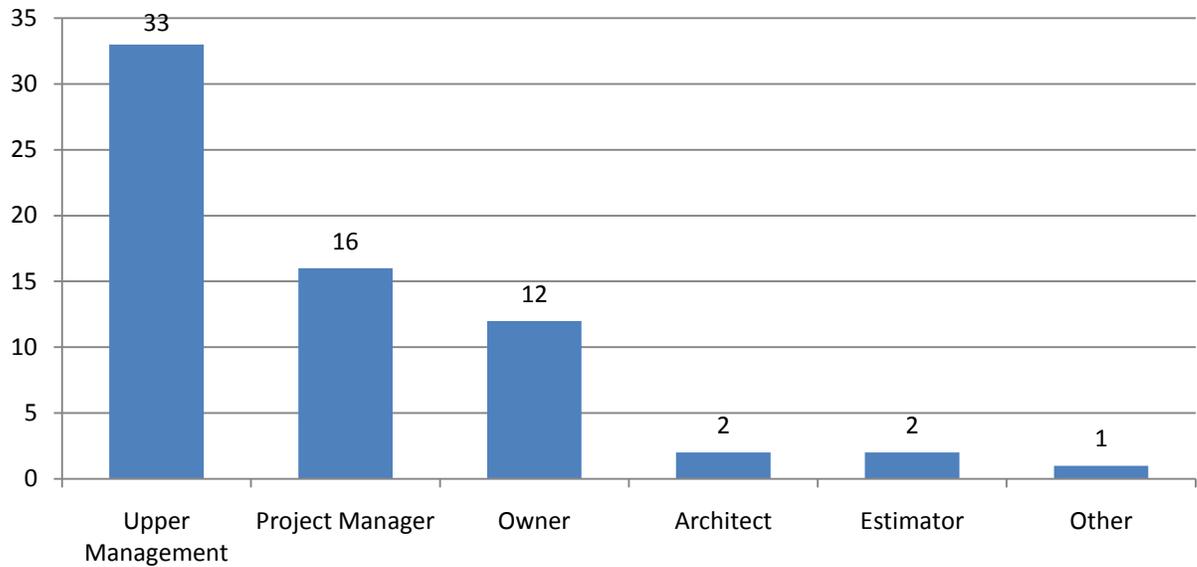


Figure 4-2. Position held by respondents within their firm

The majority of the surveys were completed by individuals in upper level management positions (vice presidents, chief operating officers, regional presidents, etc.). Thus this data provides relevant insight into the perceptions of IPD by individuals who hold influence over major business decisions.

Experience With IPD (Questions 5-9 Appendix A)

In a previous study of IPD (Kent and Becerik 2010) it was found that one reason for a hesitation towards accepting the IPD process was the lack of awareness among industry professionals. This section of the survey was meant to address this issue and ascertain whether individuals in the construction industry were becoming more aware of and more experienced with the IPD process.

This survey found that 65% (43) of all the respondents had experience with the IPD process. It also found that 86% (20) of those respondents who did not have experience with IPD were aware of the IPD process. Overall, 95% (63) of all the individuals surveyed indicated that they were aware of the IPD approach. Over 90%

(60) of all individuals surveyed stated that they were aware of the benefits offered by IPD. A majority of all the individuals surveyed (77% , 51) indicated that IPD provided tangible benefits over other project delivery methods and that IPD is the future of construction project delivery (67%, 42).

Represented Companies (Questions 10-14 Appendix A)

The types of companies that responded to the survey included commercial construction, industry associations, design-build firms, suppliers, consulting firms, project owners, subcontractors, architecture, and engineering firms. Of the completed surveys 43% (28) represented a commercial construction firm. Design-build firms were next with 22% (14) of the total respondents.

The next section of the demographics portion of the survey addressed the size of the firms represented by the individual respondent. This was addressed in order to determine the willingness to accept IPD based upon the size of firms within the industry. The sizes of the firms were derived from two quantifiable measures: number of employees and annual contract volume. The most responses came from firms with over 500 employees (53%, 35). The next largest group of companies represented companies that employed between 0 and 50 and 50-150 individuals (both at 17%, 11). The largest number of respondents represented firms which executed over \$1 billion per year (33%, 21). The next largest group of firms represented were those with \$0-50 in annual contract volume (22%, 14).

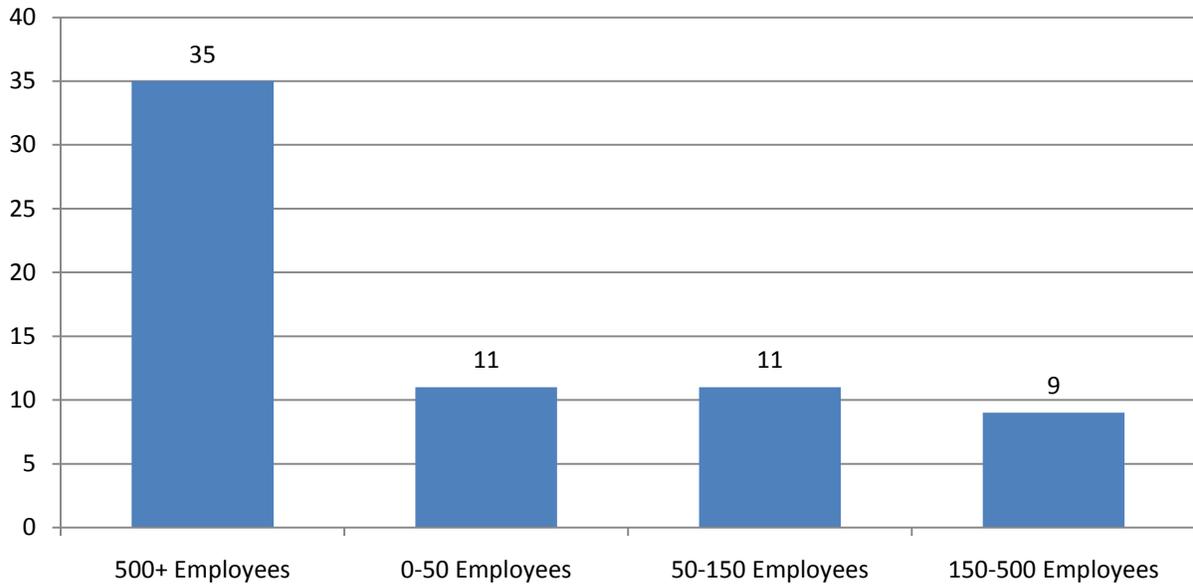


Figure 4-3. Size of firms represented by number of employees

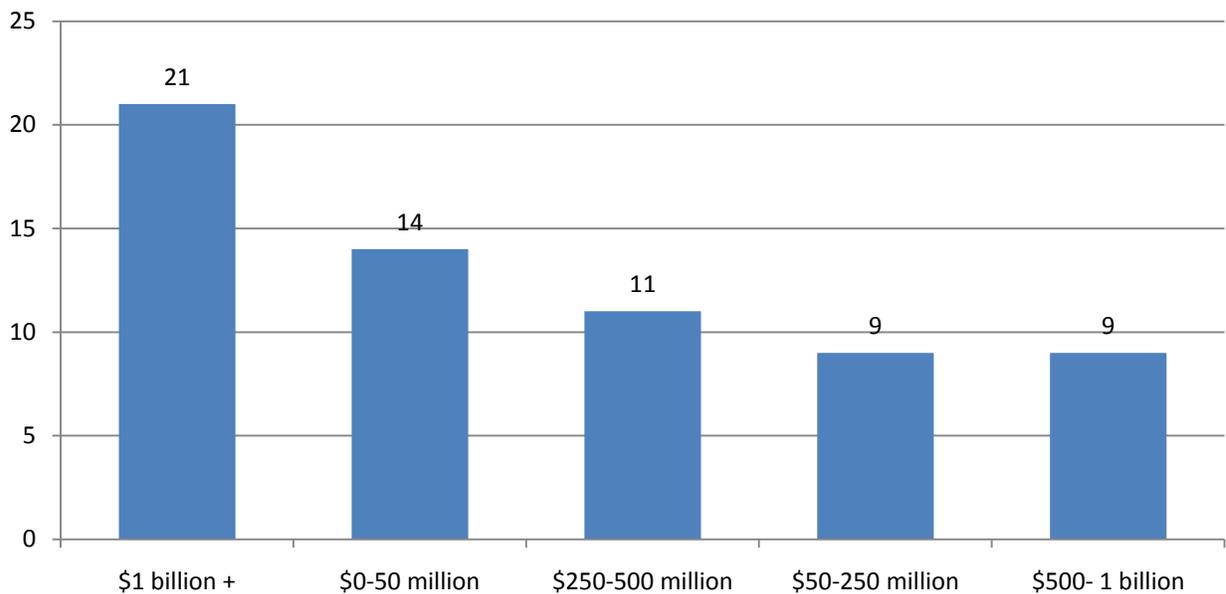


Figure 4-4. Annual contract volume

The average contract size of the firms represented by the respondents was also taken into account. This was utilized in order to assess industry attitudes towards the IPD process based on the size of a company's average project. The average contract

amounts executed by the respondents are shown in Figure 4-5. The response selected the most by all individuals surveyed indicated their firm's average contract size was \$1-10 million (28% or 18). The next highest selection was \$10-25 million, with 23% (15) of all individuals surveyed.

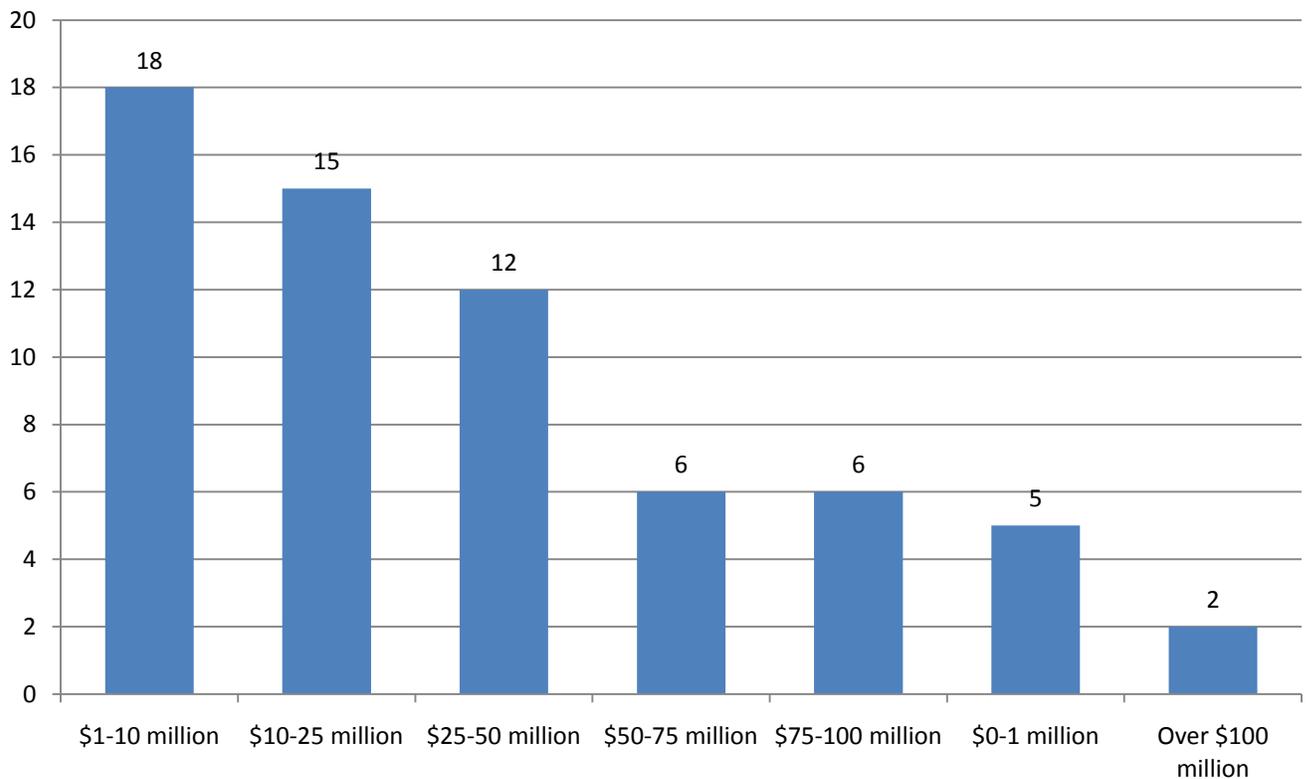


Figure 4-5. Average contract size

The next factor in determining the demographics of the company's represented by the individuals in the survey was region of primary operation within the United States (Figure 4-6) and the type of construction in which the company specializes (Figure 4-7). The Southern United States (45%, 30) was the most represented in the study, followed by the West at 23% (15).

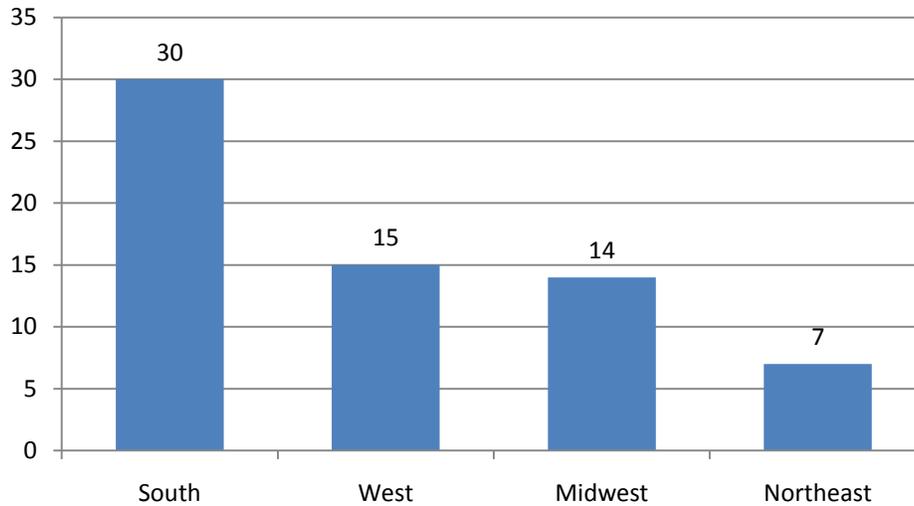


Figure 4-6. Region of primary operation within the United States

The project delivery that was specialized in the most was design-build with 46% (31). The respondents were given the option to select “other” to indicate that they utilized a different approach in their business structure (25%, 17). Those who selected the “other” option all indicated that they used all three of the provided answers on a project to project basis. The results are shown in Figure 4-7.

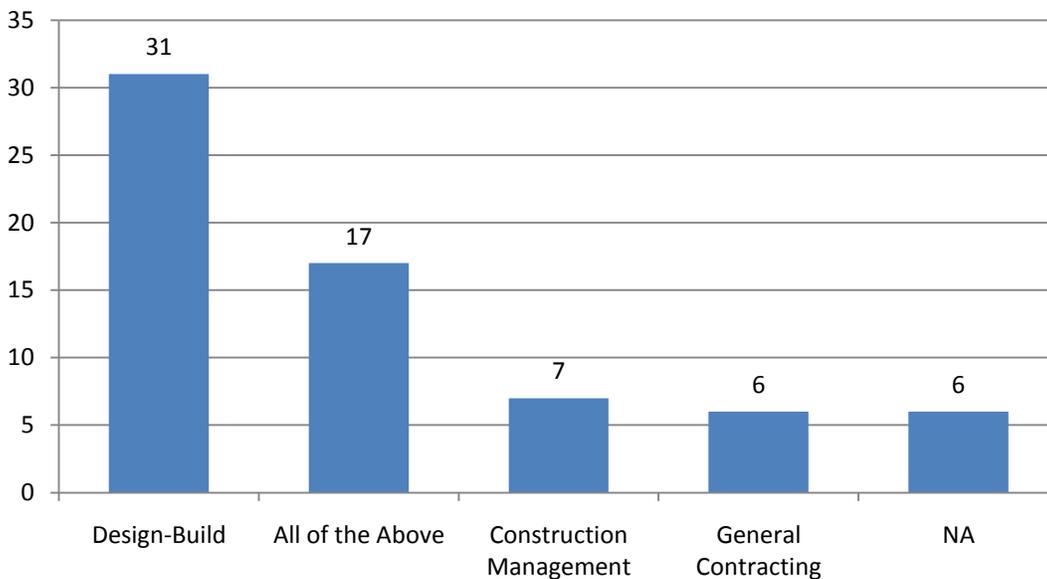


Figure 4-7. Project delivery types used by represented firms

The Current Economy

This section was aimed at determining the influence of the current (as of 2011) economic climate on business decisions, particularly those regarding an adjustment to accommodate IPD. The first topic that needed to be addressed was the overall view of the current economic climate. This provided insight into the industry's willingness to accept IPD. To ascertain this information the survey inquired about the condition of both the overall economy and the construction economy. The results were similar, with the construction economy given a grade of below average or poor more often than the overall economy. The results are shown in Figure 4-8.

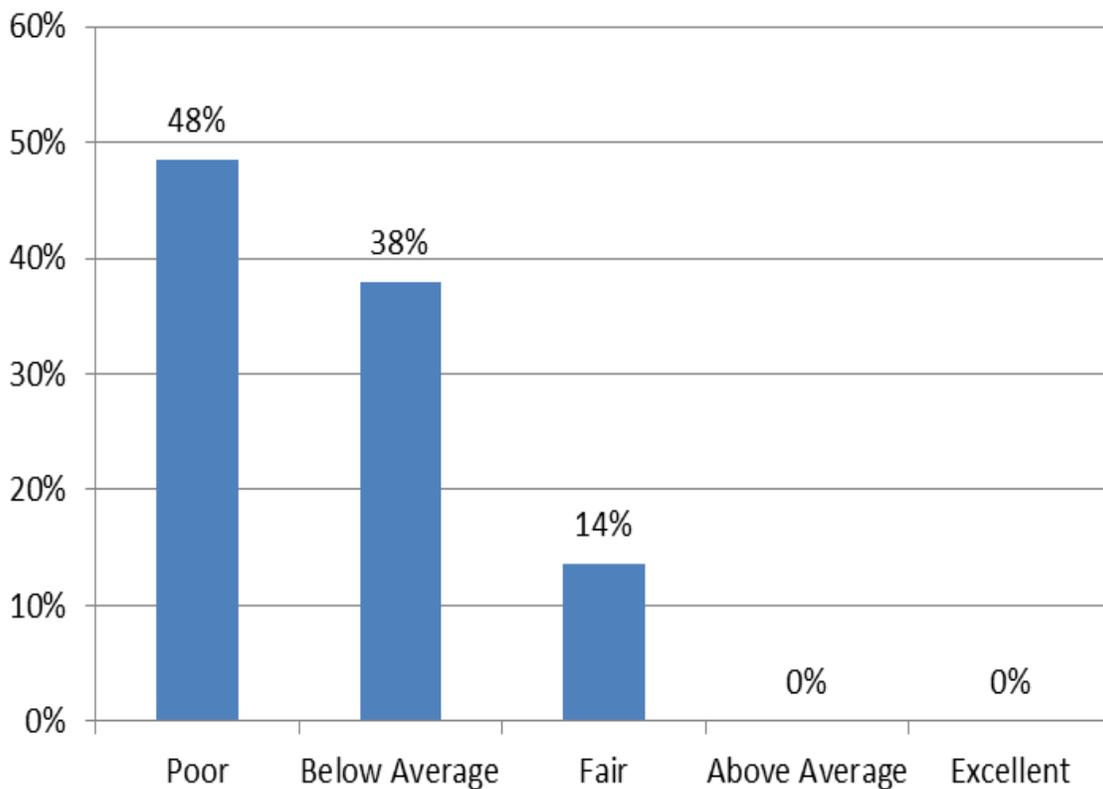


Figure 4-8. Assessment of current construction economy

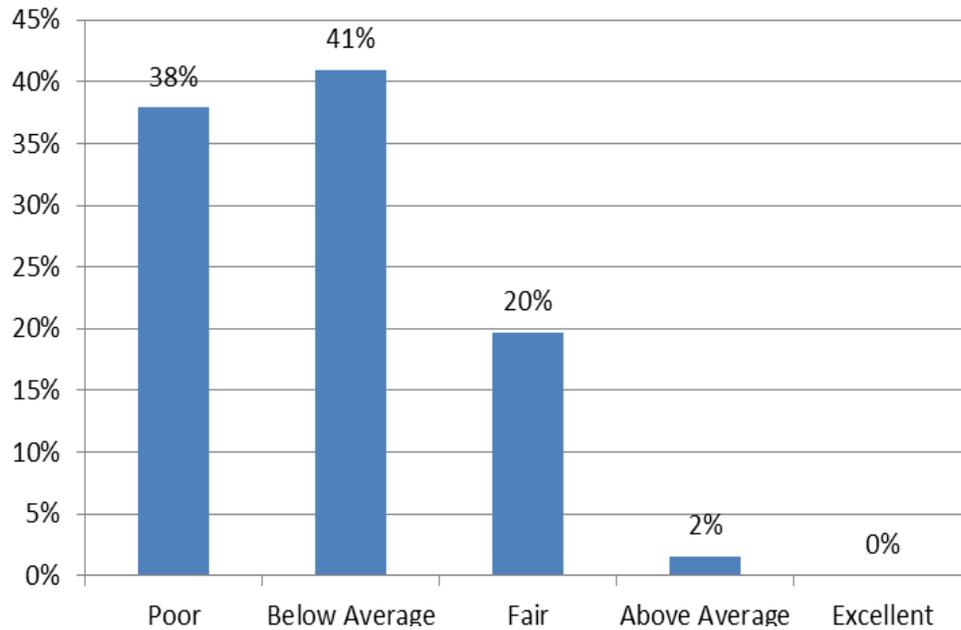


Figure 4-9. Assessment of the current economic situation

Despite these low economic ratings, a large number of all individuals surveyed (62%, 41) indicated that they would consider changing their business model to accommodate IPD given the current economic situation (as of 2011). This number increased in the hypothetical situation of an optimum economic climate (up to 73%). Similarly, the respondents indicated that the current economic climate is not preventing them from investing in improvements for the future (76%, 50).

Given this information it is interesting to note the time frame in which individuals considered a move towards IPD given the current economic situation in the United States. While around 15% of the respondents indicated a move to IPD should never be made (consistent with the similar number that stated IPD was not the future of construction project delivery) the majority of the individuals in the survey indicated that economic conditions could permit a move towards IPD between 0 and 6 years from now (a combination of 71%, 45). The results are shown in Figure 4-10.

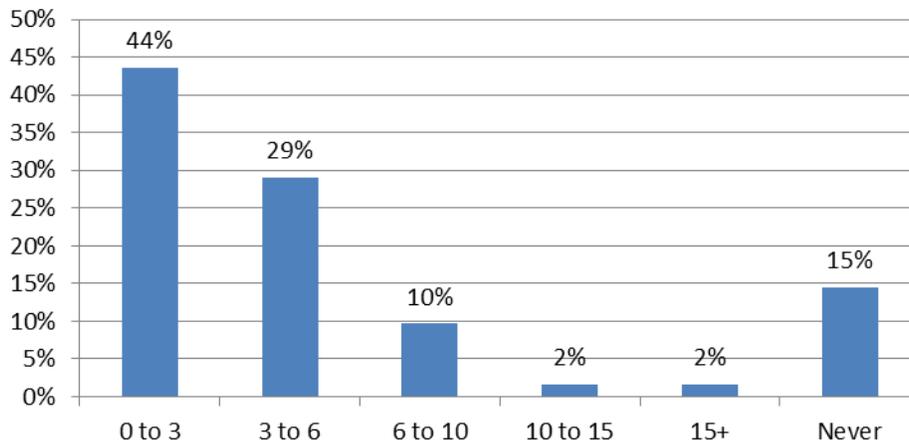


Figure 4-10. Number of years until economic conditions permit change in business model to IPD

Insurance and Legal Issues

Insurance Issues (Questions 21-27 Appendix A)

This section of the survey addressed the insurance and legal products that have been utilized for the IPD process in the construction industry. The most telling of these figures indicated that the current structure, as well as proposed products, is not acceptable for use in the construction industry. The first question asked whether the current insurance structure for IPD is effective. Most of all the individuals who responded (74%, 49) did not believe the current structure to be adequate.

The two newest insurance packages aimed at addressing the allocation of risk amongst contracting party members in the IPD process were also addressed in this industry survey. The first of these insurance packages aimed at addressing the IPD process was project specific insurance policies. The survey indicated that only 50% (33) of all the individuals in the survey believed that the project specific insurance policies adequately addressed the insurance issues associated with IPD. Faith in the second insurance package addressed by the survey was lower. Only 36% (24) of all the individuals surveyed believed that Owner Controlled Insurance Programs adequately

address insurance issues associated with IPD. When these two insurance packages are combined their rate of acceptance was 42% (28). These numbers represent a hurdle that the IPD process must pass before a major industry wide acceptance can take place. There are however many efforts within the insurance industry to address these issues.

The efforts to address the insurance issues associated with IPD led to all the individuals surveyed indicating a possible insurance solution within the next three years. In particular, 63% of all the individuals surveyed indicated that the insurance issues would be resolved sooner rather than later. There was a similar response to those who believed that IPD would never take hold within the industry. The results are shown in Figure 4-11.

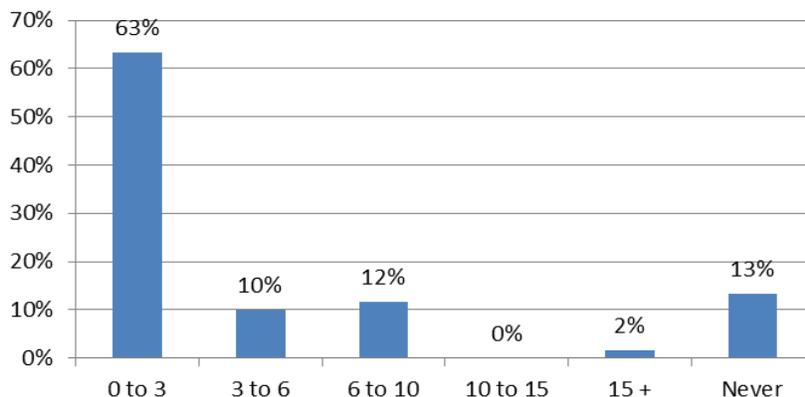


Figure 4-11. Number of years until insurance policies have been implemented and proven to allow of adoption of IPD

Legal Issues (Questions 28 – 30 Appendix A)

The legal issues associated with the IPD process were also addressed in the industry survey. The majority of all the respondents (61%) indicated that the current legal documents governing the IPD process were not adequate, while 83% of all the individuals surveyed also stated that there was not yet a suitable legal precedent in

order to consider IPD. The timeframe for the acceptance of IPD was also addressed. The responses given for this timeframe are shown in Figure 4-12.

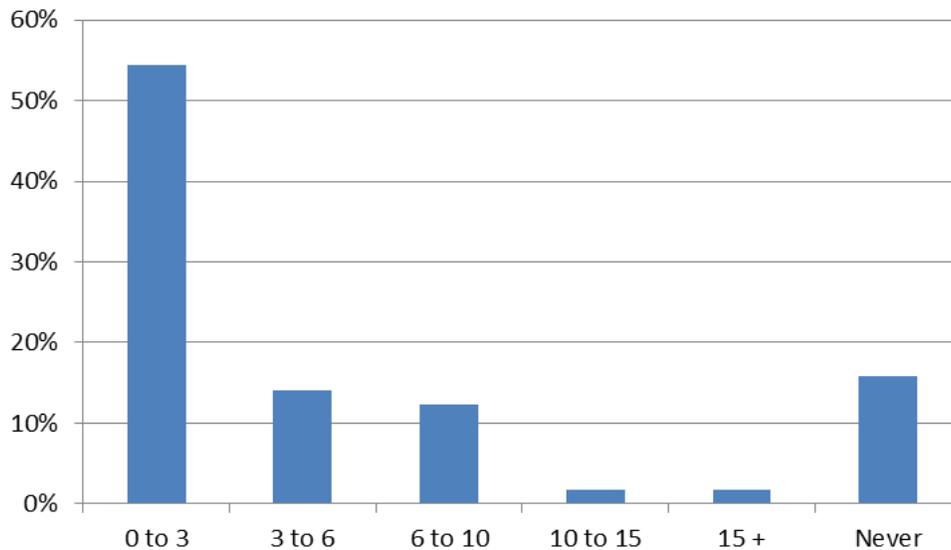


Figure 4-12. Number of years until a legal precedent is set allowing the implementation of IPD

The majority (53%) of all the respondents indicated that a legal precedent would be set within the near future allowing a widespread implementation of IPD. This precedent would have an impact on the concerns for the allocations of risk associated with the IPD process.

Industry Trends

Viability of IPD and Design-Build (Questions 31-33 Appendix A)

These questions also addressed the validity of IPD among industry professionals and their firms. A majority of all the individuals surveyed were aware of the benefits of the IPD process (94%). The viability of IPD was indicated by the responses for Question 32 which indicated that 82% of the individuals surveyed accepted IPD as a viable option for construction project delivery. The individuals who validated the viability of IPD (68%) tended to see design-build as the most effective current method of project delivery. This

indicated that the growth in design-build could forecast a similar growth in the use of IPD as indicated by the responses to the last question in the Industry Trends section of this survey. Sixty-seven percent of all the respondents indicated that an increase in the utilization of design-build led to a similar growth in IPD. The individuals who selected design-build as the most effective method of project delivery indicated a potential for similar growth in IPD at a rate of 58% (22). It is also important to note that a slight majority of all the individuals surveyed indicated that IPD was the next advancement in project delivery after design-build (52%). This indicated that IPD and design-build would share a piece of the construction industry market.

Owner Awareness and Leadership in Energy and Environmental Design (LEED) (Questions 34-42 Appendix A)

The growth of owner project awareness is also a factor that can contribute to the implementation of IPD in the future and one that was addressed in the survey. The increased knowledge of the construction process, their needs, and integration among contracting party members were all selected at a rate of above 75% by all the respondents. These factors are instrumental in the implementation and onset of IPD because owners are the determining party when deciding which project delivery method to utilize. Coupled with the collective effort to establish effective insurance policies and legal precedents, an owner's increased sophistication as was demonstrated by this industry survey indicated a future growth in IPD. This is especially true when considering Question 37 which indicated that 85% of all individuals who were surveyed believed that owners were demanding more integration among construction project participants. The growing trend toward LEED is also indicative of the growth in

IPD. Responses to Question 34 indicated that 85% of all the individuals surveyed felt the LEED process lended itself towards IPD.

The endorsements of IPD by the AIA and the AGC also indicated an increased level of support within the construction industry. These powerful industry associations have the ability to influence the onset and implementation of IPD. This was demonstrated by the responses to Questions 38 and 39 which indicated that 75% of the total respondents were aware of and 68% of all individuals agreed with the two industry associations' endorsements of IPD.

Information Technologies

The relatively recent rise in the use of information technologies within the construction industry has had a major impact on the project delivery process. The two areas of information technologies addressed in this study with regard to IPD were Building Information Modeling (BIM) and the interoperability between software. While a majority (83%, 40) of all individuals surveyed indicated that their firms utilized BIM only 51% (25) of individuals indicated BIM would increase the use of IPD. A total of 48 respondents answered this question. It was noted that BIM created a more integrated project among contracting parties (96%, 47). These indicated that BIM will increase the use of IPD but is not the most important factor in the onset and implementation of the process in the future.

The same conclusion can be made with respect to the integration of information technologies in a given project. A majority of the 45 respondents (71%, 32) had experienced a lack of interoperability between construction software. Eighty-Seven percent (40) of the respondents believed that better integration of project software would lead to a more successful project. When asked if the integration of project

software would encourage the implementation of IPD 59% (27) of the 46 respondents answered positively.

Government Involvement in the Construction Industry

The industry trends discussed in the previous section (Questions 31-33 and 43-49) of the survey were again addressed in this section with an emphasis on their characteristics in the public sector. 83% of all individuals surveyed indicated that they were aware of the public sector BIM requirements. This helped to reinforce the case for the use of IPD in the public sector. The other major trend that was noted in this study was the rise of design-build, in this case in the public sector. As noted earlier, the increase in the use of design-build indicated a similar trend for IPD in the years to come. This was especially true given the results provided by Question 54 which addressed a firm's willingness to implement IPD if the public sector adopted governing codes for the process. The responses to this question indicated that if the public sector governing codes allowed IPD, 87% (40) of the 46 respondents to this question thought that their firms would consider implementing the IPD project delivery method.

It is important to note a couple key factors when analyzing this section of the survey. The first is the length of time that passed before the federal government allowed the use of design-build for public sector projects. This delivery method has only been utilized for around 15 years in the public sector. It was only allowed after a more than 30 years of proven viability in the private sector. If the industry trends noted in this study persist, IPD would not be implemented in the public sector for decades. It is also important to note that some individuals who responded to the survey felt IPD would never be implemented in the public sector. The future market share for IPD will surely

reflect these sentiments, as the public sector construction ranged from 35-40% of the value of construction put in place in 2010 (US Census Bureau 2011).

Overall Assessment

The results of the survey indicated that the IPD process would be utilized at a rate of 0-20% of the total market share within the construction industry. This answer was selected by 65% (31) of the 48 respondents to this question. The next closest market share to be selected was 20-40% by 21% (10) of the respondents. According to all the 48 respondents to the question the onset of IPD was expected to occur within the next 6 to 10 years in the construction industry (38%, 18), with a market share of around 20%. Additionally, the respondents indicated that the most important factors that affected these selections included insurance and legal issues and the allocation of risk.

Stratified Sampling of Survey Results

In order to gain a better understanding of the survey results a series of stratified samples addressing key topics were addressed. These included the belief in IPD as the future of construction project delivery (Question 9), the future market share of IPD (Question 56), and the amount of years until IPD will gain the indicated market share within the industry (Question 57). Other topics that were addressed were the responses of those with experience with IPD, insurance and legal issues, and average contract size.

The belief in IPD as the future of project delivery was addressed in order to determine industry attitudes towards the acceptance of IPD. The first issue that was addressed was the degree held by the respondents who answered positively to this question. The results are shown in Figure 4-13.

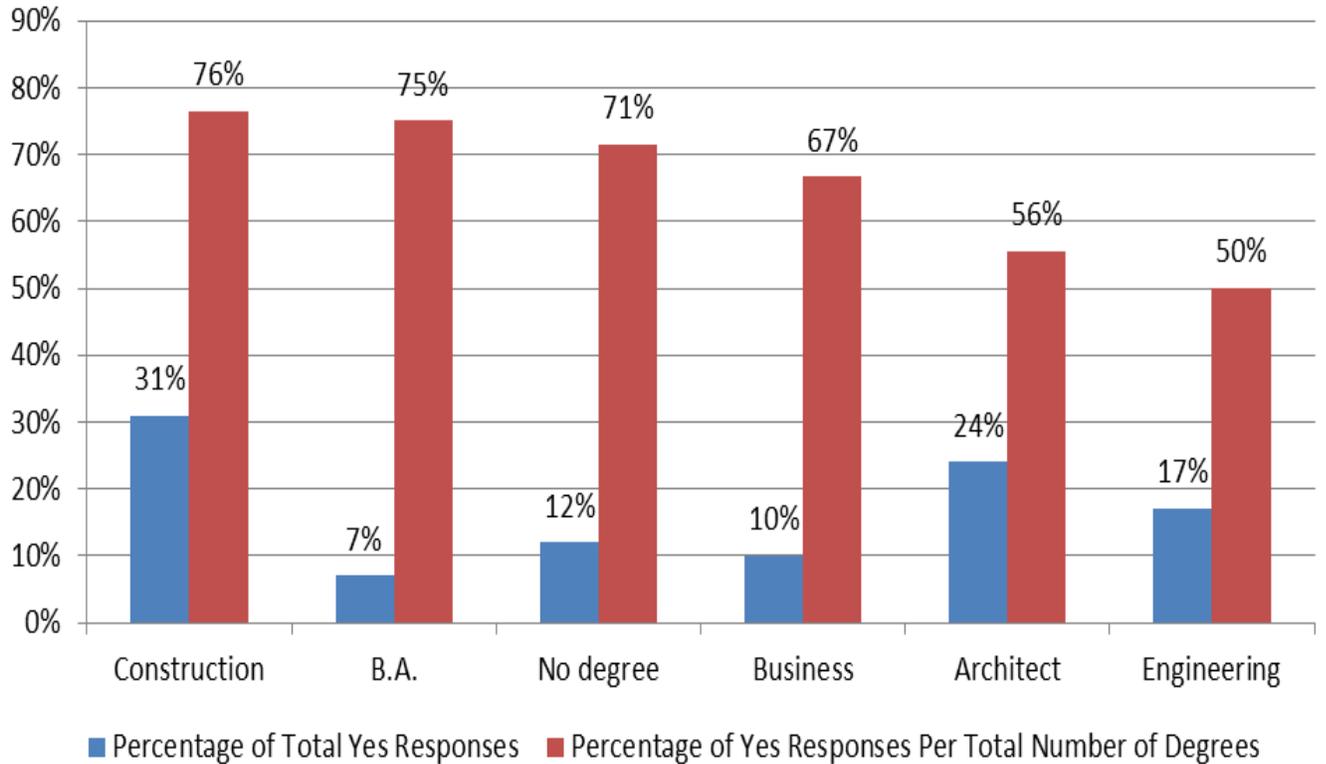


Figure 4-13. Question 9 – Do you see IPD as the future of construction project delivery? Percentage of positive responses by degree held

Of the 42 respondents who viewed IPD as the future of construction project delivery, 31% (13) held construction degrees. Architects were the next highest with 24% (10). Individuals with construction and bachelor of arts degrees responded positively to this question at the highest rates of 76% (13 out of 17) and 75% (3 out of 4) respectively. Individuals with architecture and engineering degrees both responded positively at a rate of 56% (10) and 50% (7) respectively. There was a total of 42 responses to this question.

The position the respondents held within their companies was also addressed after the survey revealed that the majority of respondents represented upper level management positions. Figure 4-14 shows the results of the stratified sample.

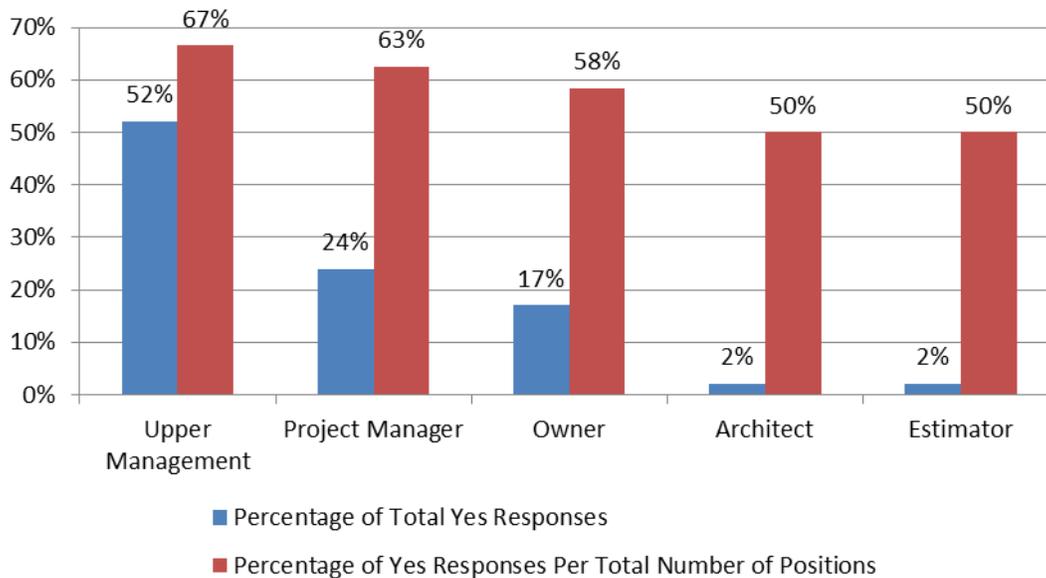


Figure 4-14. Question 9- Do you see IPD as the future of construction project delivery? Percentage of yes responses by position

Of the 43 respondents who saw IPD as the future of construction project delivery 52% (22) held upper level management positions. This indicates that the decisions needed to change a business model in order to accommodate IPD can be made in the future due to its acceptance by individuals in upper management positions (these individuals responded positively at a rate of 67% (22)).

Individuals who represented firms that specialize in design-build and those who represented a firm which utilized multiple project delivery methods represented the largest amount of individuals who see IPD as the future of construction project delivery. It is important to note that individuals who represented general contractors were a small portion of the sample, and they responded negatively to Question 9 at a rate of 67%. While individuals who represented construction management firms represented a small portion of this sample they responded positively to Question 9 the majority of the time (86%). The results are shown in Figure 4-15. The category NA represents the respondents who represented suppliers, fabricators, or consulting firms.

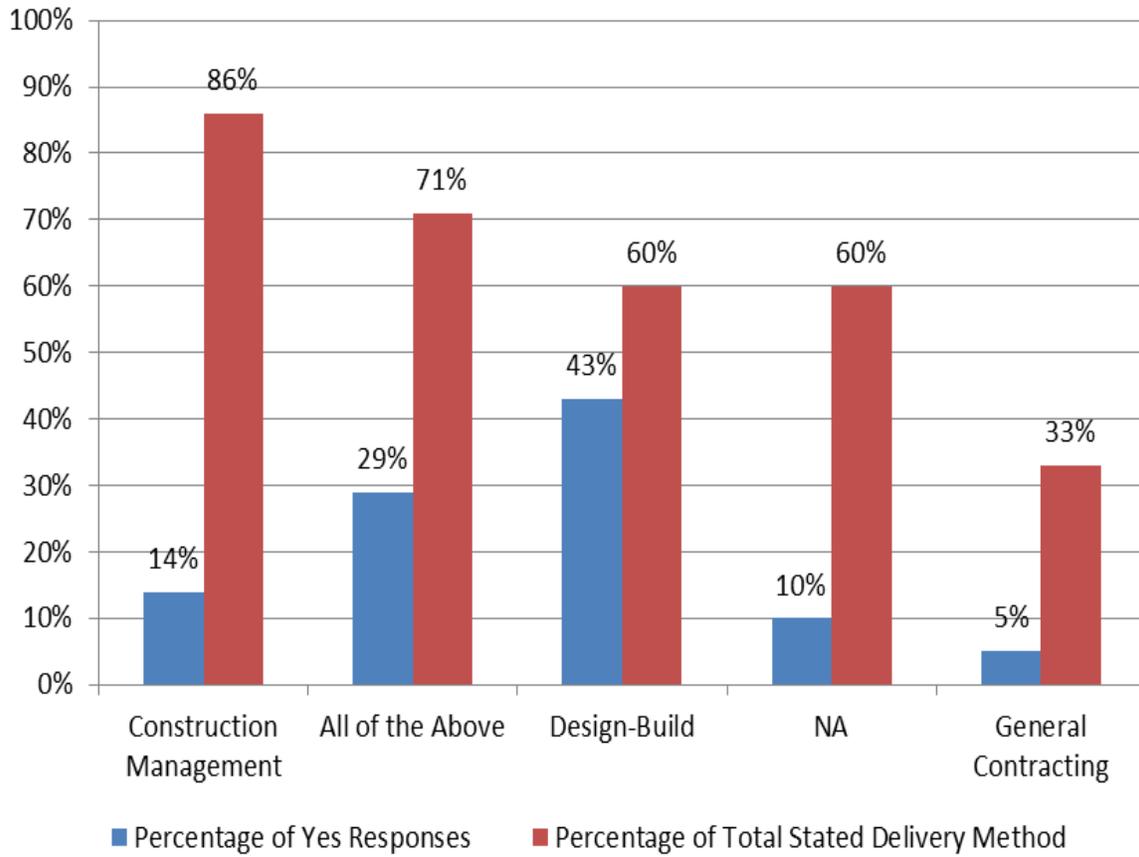


Figure 4-15. Question 9 - Do you see IPD as the future of construction project delivery?

Market Share and Number of Years Until Acceptance

The individuals (48%, 14) who responded by stating they saw IPD as the future of construction project delivery indicated it will hold a 0-20% market share. A total of 30 respondents answered both of these questions. The breakdown of this information is shown in Figure 4-16.

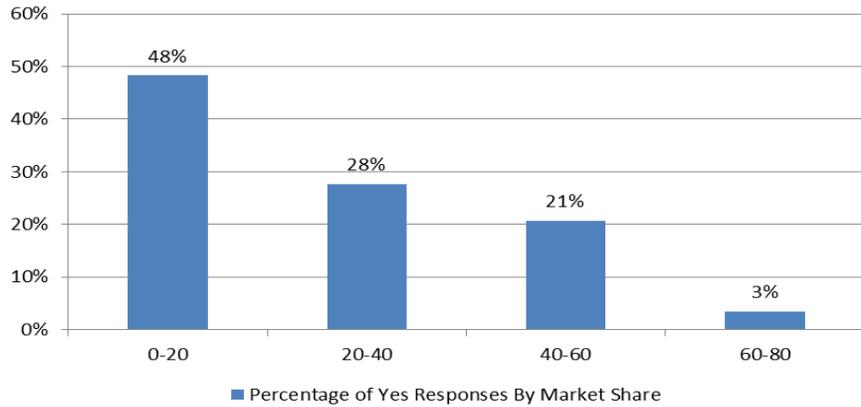


Figure 4-16. Question 9- Do you see IPD as the future of construction project delivery? Percentage of market share for positive responses

An analysis of the future market share of IPD was also addressed by determining which individuals comprised the most popular 0-20% selection. Individuals with architecture degrees represented the most number of individuals who chose this selection. The individuals most represented after those with architecture degrees were those with construction degrees. The results are shown in Figure 4-17.

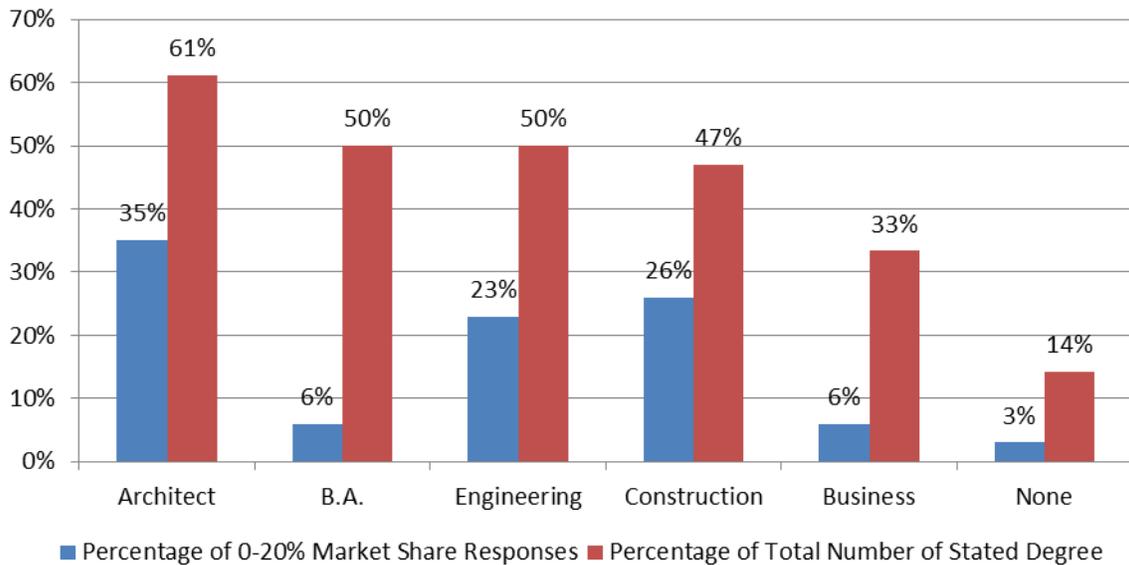


Figure 4-17. Question 57 – To what extent (as a % of market share) do you believe IPD will be utilized in the future? Percentage of 0-20% responses by respondent’s degree earned

The number of years for this market share (selected at the highest response rate) was also addressed in terms of the individuals who responded positively to Question 9. Fifty-five percent (16) of the 30 respondents to this question indicated that IPD will gain a market share of 0-20% in six to ten years the most frequently. These individuals indicated that IPD will likely take hold within the industry in the near future, with only 10% indicating a period of over 15 years. The results are shown in Figure 4-18.

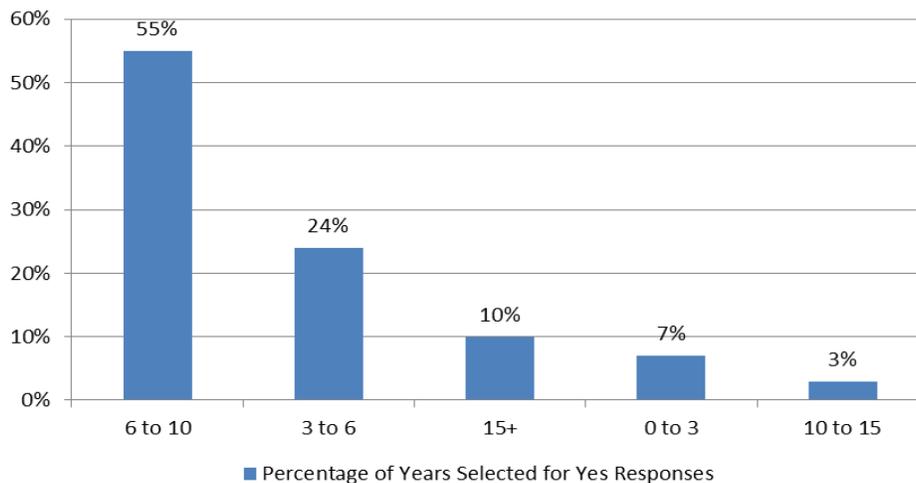


Figure 4-18. Question 9 - Do you see IPD as the future of construction project delivery? Percentage of years selected for yes responses

The number of years until IPD holds a market share of 0-20% was also addressed by determining the makeup of the individuals who responded to the most popular response of 6-10 years. Of the respondents who selected the response of 6-10 years 44% held construction degrees and 33% held architecture degrees. The individuals who held engineering degrees selected the selected the response of 15+ years the most often (at a rate of 42% of said respondents). The results are shown in Figure 4-19.

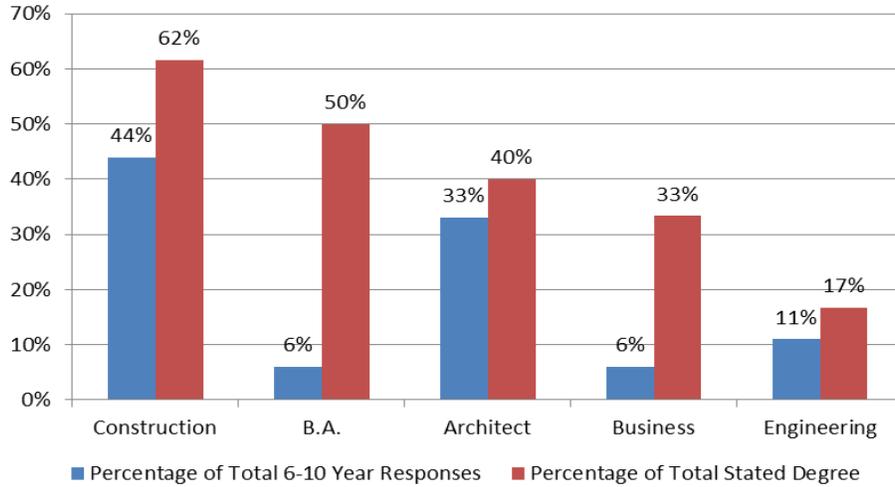


Figure 4-19. Question 57 – How soon, if ever, do you believe IPD will take hold of a considerable market share in construction project delivery? Amount of 6-10 year responses based on degree earned by respondent

In order to determine the overall assessment made from the survey a comparison of the most popular market share response and the prediction for the number of years until adoption was assembled. The positive responses to Question 9 were utilized in this comparison. The results of the comparison are shown in Figure 4-20.

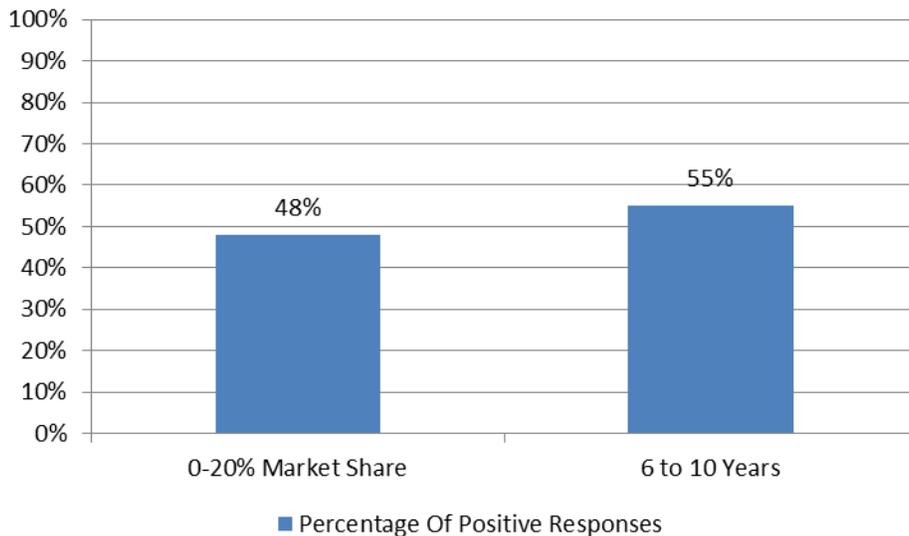


Figure 4-20. Question 9 - Do You See IPD as the future of construction project delivery? Overall assessment based on positive responses

Industry Experience With IPD

Of the individuals who did not have experience with IPD or who left the question blank, only three were unaware of the IPD process (13.6%). These individuals were three out the five individuals of the group who were unaware of the benefits of the IPD process. Of the respondents who indicate that they had experience with IPD 12% (5) indicated IPD did not provide tangible benefits over other project delivery methods and 29% (12) indicated that they did not see IPD as the future of construction project delivery.

Those respondents with experience in IPD (65%) agreed that IPD is the future of construction project delivery at a rate of 70% (30 out of the 43). Those aware of the IPD process (95% of the respondents) indicated that IPD is the future of the construction industry 63% of the time. These numbers represent an opportunity for the construction industry and those involved in the IPD process to raise awareness among their colleagues. Due to the fact that the majority of those who had experience with IPD believed in its tangible benefits, and with 97% of individuals who had not yet worked on an IPD project interested in participating in the process (Kent and Becerik 2010), the opportunity for growth is enormous.

These figures are important because they address and affirm the underlying purpose of this study. The validity of the vision of IPD as a prevalent construction project delivery method is essential to the establishment of a time period and market share for the future of the industry. This acceptance of IPD as shown by the individuals surveyed is still prevalent despite the current issues facing IPD. Individuals who had experience with IPD indicated a future market share of over 20% at a rate of 58%

Insurance and Legal Issues

Of the individuals who did not believe that the insurance structure was adequate (74% of respondents) 69% believed that the allocation of risk is hindering the industry from adopting IPD. Of the individuals who have experience with IPD in the past 63% believed that the allocation of risk is hindering industry adoption of IPD.

The remedies for IPD insurance issues were also stratified against the results for individuals who had experience with IPD. Roughly half (53%) of the survey participants who had experience with IPD believed that project specific insurance policies were adequate for the IPD process. 37% (16 of 43) of those experienced with the IPD process believed that Owner Controlled Insurance Programs (OCIPs) have the ability to effectively remedy the insurance problems associated with IPD. The prediction for the timetable of adoption of IPD was also discussed. Of the individuals who responded “never” to the adoption of IPD because of insurance issues (15% of all respondents surveyed) all but one responded that the allocation of risk was hindering the adoption of IPD.

Average Contract Size

A total of 14 of the 41 (34%) survey respondents who represented a company with an average contract size of over \$10 million dollars responded that they did not believe IPD was the future of construction project delivery. This is similar to the overall number of respondents who indicated they did not see IPD as the future of construction project delivery. This indicates a willingness to accept IPD as a viable project delivery method by companies with average contract sizes above \$10million. Eight out of the 22 respondents who represented a firm with an average contract size under \$10 million responded similarly (36%).

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A majority of respondents recognized the benefits of IPD and saw the process as the future of construction project delivery. This statement was not limited by the size of a firm or the average contract size which the firm executed. There was an increase in both the awareness and experience with IPD by the individuals surveyed when compared to earlier studies. Individuals with construction degrees tended to be more experienced and accepting towards IPD than those with architecture degrees. Both groups held the same opinions of its impact on the future of the construction industry. The number of upper level management individuals among respondents indicated that individuals who held influence over business decisions were accepting towards IPD. All of these factors indicated a promising future for IPD within the construction industry.

Despite the current economic climate there was not a hesitation in accepting IPD as a viable method for project delivery by a majority of the respondents. The major hurdle for IPD to clear was indicated as the allocation of risk among party members and the attempts to remedy this concern. These attempts included adequate insurance products and acceptable legal precedents. The respondents expected these concerns to be addressed in the near future (0 to 3 years). This would allow for the advancement of IPD after solutions to the apprehensions associated with risk allocation have been found.

The construction industry and construction projects are becoming more complex and sophisticated. There has been an increase in the sophistication of owners and the knowledge of the construction process as indicated by the survey respondents. This

would indicate an increase in the use of IPD in the future. The increasing trend toward LEED implementation was indicated to also have a positive impact on the future of the project delivery method. The individuals surveyed also suggested that IPD would undergo a growth similar to that seen in the design-build project delivery method.

Information technologies play an important role in the IPD process as indicated through this study. The survey respondents indicated that information technology trends such as BIM and increased interoperability between construction software would increase the use of IPD in the future; however, it was not noted as the most important factor.

The last area of focus for this study was government involvement in the construction industry. This area of focus is relevant in the fact that it has the potential to impact the market share of IPD in the years to come. If IPD does follow a similar growth pattern to design-build as indicated by the individuals surveyed, then the public sector will not allow the process to be utilized for an extended period of time (30+ years). There were individuals surveyed who stated they did not believe IPD would ever be accepted by public sector procurement laws. If this were to happen, a large majority of individuals indicated their firm (87%) would consider implementing the IPD process.

These factors indicated a market share (following a similar growth pattern to design-build) of around 20% for IPD. The individuals surveyed indicated that this market share would occur within the next 6-10 years.

Comparison to Past Studies

Overall the number of individuals surveyed indicated they were more experienced and more aware of the IPD process than in past studies. Experience in the Kent and Becerik (2010) study was indicated to be at 44%. The responses to this survey

indicated an experience level of 65%. The awareness level of individuals also increased from 77% in the Kent and Becerik study to 95% in the responses to this study. These increases in awareness and experience may be attributed to the characteristics of the sample population used in this study. A large number of individuals surveyed by this study indicated they were representing a firm that utilized design-build most often.

It is also important to note that this study differed from the Kent and Becerik study when addressing the economy and the adoption of IPD. This study indicated that the current economy is not hindering the acceptance of IPD as a project delivery method. This is contrary to the findings of the previous study. This may be attributed to the overall economic conditions improving during the time between the two studies.

Recommendations for Future Study

Due to the nature of IPD and the design-build processes it may be beneficial to study the two processes comparatively. An issue to look at is the industry's understanding and perception of the true nature of IPD as compared to design-build. There are current opportunities to address concepts that have been associated with IPD in the past. One of these concepts is the utilization of lean construction in the industry. There is also an opportunity to study the impact of the IPD process on the effectiveness of a project's LEED program, as this was rarely mentioned in the review of literature for this study.

Another opportunity for future research includes completing an up to date review of multiple IPD projects throughout the industry. This could be utilized to understand how the process has improved in the first few years of its development. This could also address the intricacies of the prevailing concerns and solutions available with respect to

IPD insurance and legal issues, as this study took a broad approach in looking at these concerns.

APPENDIX A SURVEY QUESTIONS



Integrated Project Delivery

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Integrated Project Delivery

Page 1 - Heading

The objective of this survey is to determine the impact that Integrated Project Delivery (IPD) will have on the future of project delivery in the construction industry. After a review of recent studies and articles a list of factors has been compiled that may influence the rate and extent of the onset of IPD. A series of questions will first ascertain the demographics of the respondents. A series of questions will then address the factors that may possibly affect IPD and construction project delivery.

Page 1 - Heading

Demographics

Page 1 - Question 1 - Open Ended - Comments Box

What degree do you hold?

.....

.....

.....

Page 1 - Question 2 - Choice - One Answer (Bullets)

How long have you been with your firm?

- 0-5 years
- 5-10 years
- 10-15 years
- 15+ years

Page 1 - Question 3 - Choice - One Answer (Bullets)

What type of firm is your company?

- Architectural
- Commercial Construction

- Subcontractor
 - Project Owner
 - Other, please specify
-

Page 1 - Question 4 - Choice - One Answer (Bullets)

What position do you hold within your firm?

- Owner
 - Architect
 - Superintendent
 - Project Manager
 - Other, please specify
-

Page 1 - Question 5 - Yes or No

Do you have any experience with the Integrated Project Delivery (IPD) approach?

- Yes
- No

Page 1 - Question 6 - Yes or No

If not, are you aware of the IPD approach?

- Yes
- No

Page 1 - Question 7 - Yes or No

Are you aware of the benefits of IPD?

- Yes
- No

Page 1 - Question 8 - Yes or No

Do you believe IPD provides tangible benefits over other project delivery methods?

- Yes
- No

Page 1 - Question 9 - Yes or No

Do you see IPD as the future of construction project delivery?

- Yes
- No

Page 1 - Question 10 - Choice - One Answer (Bullets)

What is the size of your firm in number of employees?

- 0-50
- 50-150
- 150-500
- 500+

Page 1 - Question 11 - Choice - One Answer (Bullets)

What is the annual contract volume that your firm executes?

- \$0-50 million
- \$50-250 million
- \$250-500 million
- \$500million - \$1 billion
- \$1 billion +

Page 1 - Question 12 - Choice - One Answer (Bullets)

What type of construction does your firm specialize in?

- General Contracting
 - Design-build
 - Construction Management
 - Other, please specify
-

Page 1 - Question 13 - Choice - One Answer (Bullets)

In what region of the United States does your firm operate?

- Northeast (PA, NY, NJ CT RI MA ME, VT, NH)
- South (TX, OK, AR, LA, MS, AL, TN, KY, WV, VA, NC, SC, GA, FL DE, MD)
- Midwest (ND, SD, NE, KS, MN, IA, MO, WI, IL, IN, MI, OH)
- West (WA, OR, CA, NV, ID, MT, WY, CO, NM, AK, HI)

Page 1 - Question 14 - Choice - One Answer (Bullets)

What is the average construction contract size executed by your firm?

- \$0-1 million
- \$1-10 million
- \$10-25 million
- \$25-50 million
- \$50-75 million
- \$75-100 million
- Over \$100 million

Page 1 - Heading

The Current Economy

Page 1 - Question 15 - Choice - One Answer (Bullets)

What is your assessment of the current economic situation?

- Poor
- Below average
- Fair
- Above average
- Excellent

Page 1 - Question 16 - Choice - One Answer (Bullets)

What is your assessment of the current construction economy?

- Poor
- Below average
- Fair
- Above average
- Excellent

Page 1 - Question 17 - Yes or No

Would your firm consider changing your business model to accommodate Integrated Project Delivery given the current economic situation?

- Yes
- No

Page 1 - Question 18 - Yes or No

After evaluating the benefits of IPD would you consider implementing IPD if economic conditions were optimum?

- Yes
- No

Page 1 - Question 19 - Choice - One Answer (Bullets)

How long do you believe it will take before economic conditions permit a change in business model to utilize IPD?

- 0-3 years
- 3-6 years
- 6-10 years
- 10-15 years
- 15+ years
- Never

Page 1 - Question 20 - Yes or No

Is the current economy preventing your firm from investing in improvements for the future?

- Yes
- No

Page 1 - Heading

Insurance and Legal Issues

Page 1 - Question 21 - Yes or No

Do you believe the current insurance structure for IPD is effective?

- Yes
- No

Page 1 - Question 22 - Yes or No

Do you believe the allocation of risk in an IPD project hinders the industry from adopting IPD?

- Yes
- No

Page 1 - Question 23 - Yes or No

Do you believe project specific insurance policies have the ability to remedy the insurance issues that have been associated with IPD?

- Yes
- No

Page 1 - Question 24 - Yes or No

Do you believe Owner Controlled Insurance Programs (OCIPs) have the ability to remedy the insurance issues that have been associated with IPD?

- Yes
- No

Page 1 - Question 25 - Yes or No

Do you believe an effective insurance policy precedent has been set by past IPD projects?

- Yes
- No

Page 1 - Question 26 - Yes or No

Do you believe that Owner Controlled Insurance Programs (OCIPs) and project specific policies can remedy insurance claims during the IPD process?

- Yes
- No

Page 1 - Question 27 - Choice - One Answer (Bullets)

Strictly considering insurance issues, how long after these insurance policies have been implemented and proven will your firm consider implementing an IPD business model?

- 0-3 years
- 3-6 years
- 6-10 years
- 10-15 years
- 15+ years
- Never

Page 1 - Question 28 - Yes or No

Do you believe the current IPD contracts (ConsensusDocs 300, AIA C191, and the IFOA) effectively govern the IPD process?

- Yes
- No

Page 1 - Question 29 - Yes or No

Has there been a suitable legal precedent established in a court of law that has remedied an IPD contract issue for your firm to consider IPD?

- Yes
- No

Page 1 - Question 30 - Choice - One Answer (Bullets)

If not, how long will it take for a legal precedent to be established for your firm to consider a move towards IPD?

- 0-3 years
- 3-6 years
- 6-10 years
- 10-15 years
- 15+ years
- Never

Page 2 - Heading

Industry Trends

Page 2 - Question 31 - Yes or No

Is your firm aware of the benefits of IPD?

- Yes

- No

Page 2 - Question 32 - Yes or No

Does your firm accept IPD as a viable option for project delivery?

- Yes
- No

Page 2 - Question 33 - Choice - One Answer (Bullets)

What project delivery method does your firm consider to be the most effective?

- General Contracting
 - Construction Management
 - Construction Management at Risk
 - Design-Build
 - Other, please specify
-

Page 2 - Question 34 - Yes or No

Does LEED lend itself towards Integrated Project Delivery?

- Yes
- No

Page 2 - Question 35 - Yes or No

Are owners becoming more knowledgeable of the construction process?

- Yes
- No

Page 2 - Question 36 - Yes or No

Are owners becoming more aware of their project needs?

- Yes
- No

Page 2 - Question 37 - Yes or No

Are owners demanding more integration among project members?

- Yes
- No

Page 2 - Question 38 - Yes or No

Are you aware of the endorsement of IPD by the AIA and the AGC?

- Yes
- No

Page 2 - Question 39 - Yes or No

Do you agree with the endorsements of IPD?

- Yes
- No

Page 2 - Question 40 - Yes or No

Do complex projects lend themselves toward a more integrated approach?

- Yes
- No

Page 2 - Question 41 - Yes or No

Is IPD the next advancement in project delivery after design-build?

- Yes
- No

Page 2 - Question 42 - Yes or No

Does the increase in utilization of design-build lend itself to a similar growth in IPD?

- Yes
- No

Page 2 - Heading

Information Technologies

Page 2 - Question 43 - Yes or No

Does your firm utilize Building Information Modeling (BIM) software?

- Yes
- No

Page 2 - Question 44 - Yes or No

Does the involvement of BIM create a more integrated project among party members?

- Yes
- No

Page 2 - Question 45 - Yes or No

Will BIM increase the use of IPD?

- Yes
- No

Page 2 - Question 46 - Yes or No

Does your firm experience a lack of interoperability between construction software?

- Yes
- No

Page 2 - Question 47 - Yes or No

Does a lack of interoperability between software hinder project success?

- Yes
- No

Page 2 - Question 48 - Yes or No

Will a better integration of project software lead to a more successful project?

- Yes
- No

Page 2 - Question 49 - Yes or No

Will a better integration of project software encourage/enable an implementation of IPD?

- Yes
- No

Page 2 - Heading

Government Involvement in the Construction Industry

Page 2 - Question 50 - Yes or No

Are you aware of the BIM requirements for public sector procurement?

- Yes
- No

Page 2 - Question 51 - Yes or No

Are you aware of the BIM requirements for the General Service Administration and the Department of Defense?

- Yes
- No

Page 2 - Question 52 - Yes or No

Do these requirements for BIM necessitate a need for integration of team members?

- Yes
- No

Page 2 - Question 53 - Yes or No

Are you aware of the increased use of design-build in the public sector?

- Yes
- No

Page 2 - Question 54 - Yes or No

If the public sector approves governing codes allowing IPD will your firm consider implementing the project delivery method?

- Yes
- No

Page 2 - Heading

Overall Assessment

Page 2 - Question 55 - Ranking Question

Rank the following factors from the most influential to the least influential in determining your firm's consideration of implementing IPD? (Use numbers from 1-8, with 1 being the most influential and 8 the least influential. Please avoid ties between factors)

	1	2	3	4	5	6	7	8
The current economy	<input type="radio"/>							
Technological issues (including BIM)	<input type="radio"/>							
Insurance programs	<input type="radio"/>							
Legal precedents	<input type="radio"/>							
Government involvement	<input type="radio"/>							
Industry trends	<input type="radio"/>							
Unproven IPD benefits	<input type="radio"/>							
Increased allocation of risk	<input type="radio"/>							

Page 2 - Question 56 - Choice - One Answer (Bullets)

To what extent (as a % of market share) do you believe IPD will be utilized in the future?

- 0-20%
- 20-40%
- 40-60%
- 60-80%
- 80-100%

Page 2 - Question 57 - Choice - One Answer (Bullets)

How soon, if ever, do you believe IPD will take hold of a considerable market share in construction project delivery?

- 0-3 years
- 3-6 years
- 6-10 years
- 10-15 years
- 15+ years

Page 2 - Question 58 - Open Ended - One Line

If you would you like to receive a copy of the results of this survey, please enter your company email below.

Thank You Page

Standard

Screen Out Page

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Over Quota Page

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Survey Closed Page

Standard

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BIOGRAPHICAL SKETCH

Trevor Guynes earned his master's degree from the M.E. Rinker, Sr. School of Building Construction at the University of Florida. He also received his undergraduate degree from the University of Florida with a major in building construction and a minor in business administration. His academic interests include the measurable differences in project delivery methods and political influences on the construction industry. In addition to his academic studies, he was the captain of the University of Florida Rowing Team for three years. He was also inducted into Sigma Lambda Chi as an undergraduate and a graduate student.

In the future, Trevor is looking to become a leader in the construction industry. His plan is to work as a leader in a construction firm that allows him to utilize his competitive drive and technical abilities gained through his education at the University of Florida. Trevor is planning to focus on commercial construction.