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Construction Management Option



Baldwin High School

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TECHNICAL ASSIGNMENT #3

Construction Project Management

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Executive Summary

This technical assignment focuses primarily on the issues which were discussed at the annual Pace Roundtable Convention and also considers topics regarding my final thesis proposal. In the breadth of this document you will find Critical Industry Issues, Critical Issues Research Method, Problem Identification, and Technical Analysis Methods.

The summary begins by discussing the two sessions I attended at the roundtable, which were "Green Buildings" and "Building Information Technology". During these sessions group discussions further elaborated on the implementation of these topics into the construction industry. Points of view were heard from both the negative and positive sides of the spectrum.

The subsequent sections take the topics discussed at the Pace Roundtable and apply them to the analysis I plan on conducting for my Thesis presentation. These sections act as a preview, which will look into what will be next spring semester's thesis proposals. The report also looks more closely at a critical industry issue which was cascaded from the ideas that were introduced at the Roundtable.

The technical assignment finishes up by addressing actual issues that arose on our own construction projects. We identified the criteria for these problems and then gave a preliminary synopsis of what could be done to prevent them. In essence, this document ultimately acts as an outline and initial draft for a more detailed study on our selective topics for thesis proposals. A weight matrix was also added so that the reader would be aware of the level of commitment I am planning to invest, regarding each individualized research topic.

Critical Industry Issues

**Pace Roundtable
(Thursday October 12, 2006)**

Introduction:

The Pace Roundtable is a biannual event that was held at the "Penn Stater", in State College Pennsylvania. Groups of industry professionals, 5th year students, and grad students met to discuss the construction market and where it is headed. A wide diversity of companies attend this event; which in turn, allows each individual to learn a little from the others. Topics on green buildings, building information modeling, and teamwork were some of the main points addressed during the conference.

Session 1 (Green Buildings)

In the first session, I chose to move to the breakout room where green buildings in the industry were being discussed. Conversation, on critical industry issues of green buildings, involved a large number of viewpoints. The question was asked, "How effective will the usage of green buildings be, when compared to the maintenance required to sustain them?" This brought subsequent questions directed to higher upfront costs of green buildings and whether or not the life-cycle costs would payoff. Many also felt that there were procurement challenges when incorporating green systems into buildings. This included debate on the usage of green roofing and mechanical system sensors and how both may affect a schedule over the long-haul.

As discussion continued, the group talked of some trends now happening with green building construction. Points were made that more products are becoming available and that the maintenance schedule plays a predominant role for system effectiveness. It was noted, that when green building criteria is written into sub-contracts, the site becomes cleaner and safer. Another strong viewpoint, that people who get involved with LEED rated projects continue to pursue using recyclable materials on most other projects, also added to the group's knowledge base.

As the conversation came to a close, it was eminent that a few lessons had been learned. First, sub-contractors associated with LEED rated systems performed better. Also, an early start to evaluate LEED points would be crucial for most circumstances. Primarily, because you don't want to tell an owner that they will have a LEED certification and then not have enough points to provide it in the end. In summary, more education about how certain products will utilize specific aspects is needed as well as people weighing the options of life-cycle costs verses upfront costs.

Session 2 (Building Information Technology)

In the second session, I chose to move to the breakout room where building information technology was being discussed. This centered on building design and documentation methodology. I learned extensively about how a central database, process information, and parametric objects were used for analysis and decisions. Incorporating BIM was discussed as being very useful, especially for highly complex projects. It can save money and give accurate estimates by being able to "bid" on complexity. The process allows for more adequate pricing during bidding phases of the project. It also permits material suppliers to make mock-ups to the most precise dimensions. Building Information Technology and its applications are becoming more and more useful to the construction industry each and every day.

Some challenges that may result from BIM were also brought to the table. Primarily, the challenge of communicating the 3D information BIM creates, to jobsite personnel. Another was eliminating conflicts before they get to the field and identification of any possible cost-savings. Recognition that this technology is not beneficial for all delivery methods, such as design-bid-build projects, was also discussed. It was noted that being accountable for model accuracy was of concern for every party using this method. The conference wrapped up with the common viewpoint that BIM is an innovative and helpful technological methodology if used correctly on the right project.

Summary

My interaction, with industry professionals, played a significant role in learning more about the construction sector of my Architectural Engineering major. It enhanced my knowledge base on green buildings and the applications needed to produce LEED certifications for these buildings. The time spent, discussing building information methodology, also gave me incite on a relatively new technology that I knew little about. I feel that by attending this conference, I will be better prepared to address some of these critical industry issues during my senior thesis proposal.

Key Contacts

During the Pace Roundtable Convention many industry professionals aided to the discussion of some of the critical issues facing today's construction industry. The members defined problems and brainstormed alternative methods for cost effective steps during the construction process. Conversation led me to further enforce contact with Dr. Riley and Dr. Messner, as both of them sat in on each of my respective sessions. Previous interaction with, Greer Hayden, architect from HHS DR Architects and Engineers has provided me with an extensive amount of project specific information. Further communication with, Bill Mauer of Davis Construction and Joe Brennan of PJ Dick Construction, has also provided a means for further development of possible thesis criterion. Also, Jason McFadden, a PSU grad student and TA; has put forth an extra effort to provide any help he has been able to offer to every one of our 5th year

students. Each party, at both the Roundtable Meeting and at the Career Fair, has been more than willing to share their knowledge and expertise in any way possible.

Critical Issues Research Method

Problem Statement

The construction industry is a diversified market that utilizes the contributions of a large number of participants to actively complete tasks. The industry is built on the needs of the world's inhabitants to provide shelter, harness energy, and create public spaces and historical monuments. The cooperation of builders, owners, and contractors is needed to effectively manage and complete each project at hand. However, widespread debate asks the question, "What methods should be used to provide the most efficient building processes?" One of the more common answers to this question, partnering, remains a viable topic to be considered.

Overview

Partnering is a managerial tactic to improve organizational relations and increase project performance. If your company partners with a customer or supplier, it means that you have a joint commitment to succeeding together and that you will remain separate businesses, but will work closely together so that each can be more profitable over the long run. This idea of group "commitment" is being tossed around the construction economic sector. This sector, which is primarily driven by cost, sees continual fluctuation in its performance needs. An article written on partnering says, "Most parties are normally independent firms and organizations, with separate goals and objectives and different operation procedures. This standpoint is the reason why many problems exist in the building industry. These problems are caused from a lack of communication and coordination on projects, which usually leads to changes and alterations during the building process. This lack of adequately conveying ideas, as well as improper managing procedures, causes disputes, rising costs and reduced performance and quality on projects.

Research Goals

The concept of "partnering in the construction industry" possesses substantial value engineering ideas through the utilization of teamwork. The breadth of my assessment will focus on illustrating this methodology and answering a multitude of questions pertaining to its effectiveness. More specifically, the research which will be conducted will analyze the benefits of partnering and will determine the effect of these benefits upon project completion. The scope of my studies will cover the general viewpoints on the influence partnering provides during a construction project. Industry representatives may use this report to gain knowledge of a strategic approach that may produce more effective quality based projects. The Pennsylvania State University's architectural engineering department may also utilize my findings for reference purposes.

Many building industries around the world are developing an ever increasing interest with quality on projects. This idea has been prompted from both within and without construction based organizations. However, understanding the relationship between quality and culture is needed to insure the success of partnering. Developing these team-working behavioral patterns and values is sometimes difficult to distinguish in a company. I plan on taking a closer look at how, changing the organization's culture, may establish the initial mindset of partnering acceptance. I also plan on elaborating on "The Seven Pillars of Partnering", which is a strategic guide that exemplifies strategic actions to be taken in a partnering atmosphere. They are designed to improve the design and delivery of construction projects through partnerships between the construction industry and its clients. Cost analysis has determined that an average of 25% cost savings occurs on the trades engaged in partnering with this strategic basis. I hope to gain further knowledge in these areas and convey there possible benefits to my audience.

Research Methodology

1. Research current books and periodicals, to receive a better understanding of how partnering has been implemented on projects and the benefits it has provided on those projects.
2. Prepare a list of interview questions, which are directly correlated with my research findings, to ask industry representatives.
3. Research what companies have used this partnering type of delivery style and contact them via email or telephone.
4. Document industry representative's responses and prepare a feasibility study or comparative analysis.
5. Convey ideas to audience via a thesis proposal.

Data Collection Table

Below is a preliminary draft of the questions that I will ask industry representatives upon contacting them. This list may be slightly altered/expanded depending on the criteria that my research findings may present.

Interview Questions for Industry Representatives	
Company Name:	
Representative Name:	
Question	
1	Does your organization use a partnering approach on every project?
2	Do you feel that implementing a partnering strategy was difficult for your company to adapt to?
3	How did you get your entire organization to accept this approach, if they were used to other types of interaction?
4	Did you find it necessary to alter mission statements and company values to emphasize partnering goals?
5	Do you feel that there was a culture change that took place fom within your organization?
6	With partnering have you seen an increased amount of communication between all trades, on your projects?
7	Has partnering increased the quality of your projects?
8	Has partnering shown a decrease in overall cost on your projects?
9	Has partnering provided repeat business between your company, owners, and other contractors?
10	What do you feel are the benefits of partnering when compared to other delivery styles in the industry?

Problem Identification

Introduction

The project in question is the renovation and additions of the new Baldwin High School. Although preliminary analysis of the project had given sub-par thesis topics, I was lucky enough to achieve more detailed information from interaction with a project manager from the CM staff on the project. During this time, more elaborate information on thesis ideas was accumulated via email. Because the project is only on Phase II of a five phase sequence, many problems may have not surfaced yet. However, being that this renovation does deal mainly with phasing operations, reformatting this procedure could be a possible research topic in its own right. Listed below are four topics that may prove viable for a thesis proposal.

1. Excavation and Temporary Facilities

During phase I of the project, unexpected excavation and temporary facility costs accumulated delays and required the drawing of money from the \$1.126 million project contingency fund. This includes utilizing a 68' x 28' trailer to act as a modular classroom by housing 32 computer stations, for a duration of two years. Further interaction on this subject, with the CM, will confirm if this topic is worthy of incorporation into a thesis study. The possibility of better project management may have alleviated this problem and I would like to discover if that necessarily would've been the case.

2. Finishes and Flooring

Upon review of the estimate, it has been noted that \$2,356,976 was spent on finishes (4.5% of the total project cost). This number seems somewhat inadequate and possible research could lead to a decreased cost in this line item. Other possible cuts, that the school board discussed holding off on were; replacing the wooden floor of the gymnasium, and whether to use linoleum in hallways or to switch to a less-expensive floor tile. A feasibility study on the impact of these potential cost savings may be a practical topic.

3. Partnering

I have recently written research and recommendation papers on partnering in the construction industry. Due to some of the initial inconveniences that were encountered on the project, this method of project delivery seems to be utilized primarily in the UK. However, due to the nature of most projects in the United States it has been used sparingly, if at all, here. I feel that this could be a viable research topic and I would communicate with many industry representatives to conduct some sort of feasibility or comparison study.

4. Value Engineering

This project is not a LEED rated project, therefore analyzing what has been put into the renovation and what recycling procedures were conducted, may be in order. Determination, if an adequate number of LEED points have already been awarded and what other actions could be performed to achieve more, could pose possible thesis considerations.

Further Considerations

The main avenue, for the breadth of information on my high school renovation, has come through the architect on the project (HHS DR). However, PJ Dick, the CM Agent on the job, attended the career fair and provided me with additional project specific information. I feel that many CM issues could not be fully addressed by the architect and that my interaction with PJ Dick has given me a better understanding of what they would change if they had the opportunity to do so. I now feel as though I have a more concrete database for thesis topics and have further distinguished inspirations of future thesis considerations.

Technical Analysis Methods

This section further illustrates two of the problems that were identified in the previous section. It describes in more elaborate detail the research that will be used to conduct a proper thesis investigation.

Problem 1

Finish and Flooring Cost

The finish and flooring cost of the Baldwin High School Renovation totaled 4.5% of the overall project cost. This percentage was slightly higher than the school board would've liked and possible alternatives were discussed, but were never implemented. I plan on performing a number of actions that will utilize a comparative cost analysis, which will ultimately determine if alternative materials would've been ideal for this project.

I will first prepare an estimate of each individual line activity that comprised this estimate for the CM agent on the project. Next, I will use industry representative opinions accompanied by estimating software (preferably RS Means) to comprise a second estimate of interchangeable solutions. Comparing both of these estimates will then give an accurate comparison of which method was the better choice.

Although this strategy seems relatively simple and easy to conduct, other areas of construction will also have to be examined. The effects of altering building components can have adversarial effects on both the schedule and phasing sequences of the renovation. Determining if these alternate components are feasible will require analysis of material delivery time and costs, procurement and float time, and whether or not the sub-contractors on the project have the ability to perform the work involved.

Problem 2

LEED Certification Attainability

Baldwin High School's construction package was not designed to achieve a LEED certification. However, some of the materials and processes used during construction accommodate point values needed for recognition. Since this is a school building; the idea of LEED certification imposes great significance to not only the environment, but also the construction team and school district. I plan on using the "U.S. Green Building Council's website" to identify LEED® Rated projects. I will use this information to determine what points have been and still need to be achieved in order to receive a rating. Since this project is publicly funded and is a high school, contacting the owner to ask questions about LEED certification goals, may be a difficult task. Therefore, I will impose further contact with the CM Agent on the project, PJ Dick. I plan on

forming a series of questions which will serve as a reference base of preliminary project considerations for making this project a LEED certified project.

Weight Matrix

The following table is designed to illustrate how I plan to distribute my effort among the different analyses that were proposed.

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Temp Facilities Concerns		5%	2.5%	2.5%	10%
Partnering	20%	15%			35%
Floors and Finishes		8%	8%	4%	20%
LEED Certification	25%	7%	1.5%	1.5%	35%
Total	45%	35%	12%	8%	100%