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CYPRESS CONSTRUCTION INC.: SCHEDULING AND ESTIMATING QUANDARIES FOR SMALL SCALE RESIDENTIAL BUILDS

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CYPRESS CONSTRUCTION INC.: SCHEDULING AND ESTIMATING QUANDARIES FOR
SMALL SCALE RESIDENTIAL BUILDS

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the requirements for the degree of

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Committee:

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ABSTRACT

Dr. Alan Atalah, Advisor

This study evaluates the particular scheduling and estimating challenges faced by Cypress Construction Incorporated, a small, privately owned residential construction company based in Baltimore, Maryland. The study, via the usage of primary data collection in the form of personal interviews and site observations, determines the nature of the scheduling and estimating functions conducted by Cypress Construction Inc.'s owner. This data is then analyzed to ascertain why the scheduling and estimating functions of Cypress Construction Inc. are unique to the firm and are in need of amelioration. Furthermore, the study includes a literature review to compare the experiences of Cypress Construction Inc. to preexisting scholarly data on the subject of scheduling and estimating challenges faced by small residential contracting companies more generally. Lastly the study concludes that while some of the scheduling and estimating challenges faced by Cypress Construction Inc. are the result of the highly divergent nature of niche renovations in historic areas, others are the result of a lack of human capital and organization, and may effectively be addressed by structural changes on the part of Cypress Construction Inc. The study concludes by offering logical and implementable solutions to some of the scheduling and estimating difficulties that hinder the functionality, productivity and profitability of Cypress Construction Inc.

ACKNOWLEDGEMENT

I would like to take the time to personally thank the multiple parties that aided in the completion of this study. First and foremost, I thank Dr. Alan Atalah, who offered continued support and guidance throughout the complex process of completing this thesis effectively.

Furthermore, I thank Mr. Ray Muth of Cypress Construction Inc. who generously opened his doors and his private data for the benefit of this study. In the same vein, thanks are due to both Mr. Jack Stevenson and Mr. Michael Gruber for their participation throughout the course of this project.

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CHAPTER I INTRODUCTION

In the modern practice of both construction and construction management, a relatively heavy reliance on multiple means of scheduling and estimating management is to be expected. Often times, especially when conducting an analysis of large construction companies and their plethora of concurrent projects, it is assumed that scheduling and estimating software, such as the commonly used Primavera 6.0 for scheduling and Sage Timberline for estimating, offer an immediate and overarching solution for the quandaries associated with the everyday complications of these basic construction demands. With this said, it must be acknowledged that a one size fits all solution to the highly divergent nature of construction management amongst construction companies of differing sizes, specialties and philosophies is extremely unrealistic (Stern 332). It cannot adequately be assumed that the same construction management solutions favored by one construction company will automatically ensure resolution for another company of an entirely different background.

It is here that I feel that the particular scheduling and estimating complexities of small, independently owned construction companies deserve direct attention. While it may be assumed that large scale construction organizations incur additional scheduling and estimating difficulties as a result of their size, in actuality, privately owned, small scale construction companies are often faced with additional complexities that fall outside of the scope of traditional methods of scheduling and estimating management (Applebaum 245). Furthermore, the particular scheduling and estimating needs of small scale companies that focus primarily on residential builds in niche markets are frequently under addressed or inappropriately considered.

Objective of the Study

As the scheduling and estimating quandaries experienced by small scale, privately owned construction companies are less frequently or inadequately considered, the objective of this study is analysis of the day to day operations of a privately owned construction company by the name of Cypress Construction Inc. The study focuses on the observation, assessment and analysis of

the day to day operations of Cypress Construction with regard to the firm's scheduling and estimating management. The focus has been as such that the construction management quandaries that its owner, Ray Muth, and his employees grapple with on a regular basis may be effectively determined and addressed. Here, the primary focus on a single, small scale construction firm is intentional, as a direct case study provides the highest possible level of accuracy and factuality. While this study steers clear of broad, overarching generalizations, outside theoretical input is utilized to support the data collected throughout the course of the study of Cypress Construction Inc. Additionally, the study analyzes the potential effectiveness of implementing the usage of scheduling and estimating software to the current operations of Cypress Construction Inc.

Description of the Study

As mentioned briefly above, the study of Cypress construction Inc. is observatory in nature. With this said, this study primarily focuses on the scheduling and estimating functions of Cypress Construction Inc. Here, raw data has been collected via interviews of the company's owner, Ray Muth, and his employees, as well as on site surveillance of the day to day scheduling management, estimating process, and site management of the firm as a whole. These on site observations took place twice throughout the course of the study and addressed

two separate renovation projects. Additionally, throughout the course of the study, secondary data is utilized in order to provide depth, scope, and coherency to the overall climate in which the scheduling and estimating quandaries are rooted.

Furthermore, owner and President, Ray Muth, provided open access to not only his job sites, but his current scheduling and estimating processes. This data was collected via direct interviews as well as the provision of access to Mr. Muth's administrative office and files. Additionally, Mr. Muth provided a personal interview and has openly discussed his company's successes and failures since its inception in 2007. Here, Mr. Muth readily admitted to any and all scheduling and estimating shortcomings or challenges. Additionally, he has allowed the study to determine any additional scheduling or estimating inadequacies that may be negatively affecting the construction management process, and in turn, the firm's financial viability. Lastly, Mr. Muth conducted a demonstration of his scheduling and estimating functions in addition to providing access to the organic scheduling and estimating functions on his job sites.

Limitations of Study

While this study is designed to be both thorough and comprehensive in nature, it must be acknowledged that it is predisposed to certain limitations. The first of these limitations is the lack of physical proximity to Cypress Construction Inc. As this construction firm is located in Maryland and is only operational locally, it must be acknowledged that on site observations for the purpose of data collection have been limited to predetermined visits. While Mr. Muth has offered full disclosure and open access to his job sites, his personal opinions and relevant supporting data, there is always minimal potential for either inflation or de-emphasis. Here, current operations or job sites may have been less organic than usual, as both Mr. Muth and his workers were expecting direct observation on the two scheduled site visits. Additionally, it is

possible that Mr. Muth could have downplayed the severity of his scheduling and estimating quandaries if he felt that openly admitting to them negatively reflects his authority or his capabilities as a business owner or construction manager.

Additionally, it must be acknowledged that this study was limited in time frame. Although the study took place over the course of four months, it is likely that a longer, more in depth study would prove even more informative. This is due to the fact that additional data that accounts for differentials and potential irregularities would likely be collected if the time frame of the study were to be extended. This is not to say that the data collected throughout the course of this study is incomplete or inaccurate. Instead, I suggest that a study of a similar nature designed to take place over the course of a year or more would likely provide a wider data set.

Lastly, it must be acknowledged that this study may be limited in applicability. This is due to the fact that the study focuses on a single construction company. Here, the outcomes of the potential solutions that are provided may not be broadly relevant to the construction industry as whole, as the data and results collected are only directly applicable to Cypress Construction Inc.

CHAPTER II LITERATURE REVIEW

In order to effectively analyze, address, and potentially troubleshoot the variety of difficulties small, privately owned, residential construction companies such as Cypress Construction Inc. face when it comes to scheduling and estimating, an analysis of reputable, preexisting data and literature on the topic is foundational. As the following synthesis will assert, readily available and credible sources address the particular scheduling and estimating challenges faced by small, independent construction companies, who similarly to Cypress Construction Inc., tend to work in demographically static, niche markets.

Lack of Human Capital Resources

While preexisting data and scholars in the field of construction management differ in their understanding of the ways in which small, independently owned, residential construction companies manage their scheduling and estimating functions, many scholars agree that small scale niche contractors are affected by unique scheduling and estimating challenges for a variety of reasons. One of the unique scheduling constraints faced by relatively low volume, independent contracting companies is a relative lack of means. Here, Alan R. Winger asserts, “construction firms of miniscule size are often faced with financial and human capital resources to match” (1999). Therefore, unlike larger firms who have the liquid assets necessary to not only implement expensive software to streamline their company’s scheduling and estimating functions but to front any capital necessary in order to control the scheduling process and avoid overlaps, delays and cancellations, small firms are working with minimal financial resources (Winger,1999). This lack of capital can be seen as necessary in order to adequately secure a job site, hire required subcontractors and prevent scheduling delays via the

application of overtime labor, additional workmen or additional engineers to problem solve in the event of unforeseen delays, all of which are especially challenging tasks to small, residentially based contracting firms of modest financial means.

Furthermore, as is addressed in “Estimating the Volume of Residential Building Construction” it is highly unlikely that independently owned construction companies of minimal size will be offered the external financial backing frequently available to large scale, primarily commercial, construction firms (Foster and Wickens, 1997). Here, the likely absence of private investors or financially salient business partners prevents small scale residential builders from attaining the financial support necessary in order to adequately address scheduling function quandaries.

In a similar vein, the unavailability of the human capital necessary in order to streamline scheduling functions, stay on task, and avoid delays particularly affects smaller construction firms. As is asserted in “Residential Construction: Exploration of the Statistical Series,” most often, small scale firms are composed of modest staffs, comprised of as little as two employees (Page, 1987). Here, it is likely that no one individual is responsible solely for the management of scheduling functions and accuracy which complicates the scheduling process immensely as multiple individuals maintain different relevant schedules and information regarding potential bids, the length and scope of current projects, and the estimated time each of the above mentioned will take to complete fully (Page, 1987).

Additionally, on a foundational level, the lack of human capital faced by many small construction companies with independent owners is highly problematic as no one individual can be two places at once. As Winger makes clear, when a construction company employs fewer men than are needed to individually address required responsibilities, overlaps are

common as humans are limited by their own physicality (1999). For instance, a foreman cannot be physically present at two jobsites concurrently in order to make certain that workmen are operating at full capacity in an efficient and cost effective manner.

Inapplicability of Modern Management Methods

From a more overarching perspective, Herbert Applebaum clearly states in “Construction Management: Traditional Versus Bureaucratic methods” that neither traditionally recognized nor more modern, bureaucratic methods of construction management such, as the usage of advanced scheduling and estimating technology and software, can adequately be applied to small scale construction companies that focus primarily on residential builds (1982). Applebaum states that the traditional method of construction management requires constant face-to-face contact conducted on the job site by project managers, superintendents, or engineers. Here, the project manager is generally given a budget allotment and a time frame in which the project must be completed, but is not provided with the means or the opportunity to implement the support staff necessary to problem solve and troubleshoot. Unlike the constant review process conducted on large scale, commercial projects in which budgets are analyzed, foremen and engineers are scrutinized for falling behind schedule, and the ratio of available funds to uncompleted work is a readily available statistic, small scale residential companies lack the twenty-five to thirty-five man back end teams to adequately manage data acquirement and budget reallocation (1982).

In addition to asserting that traditional methods of construction management are ineffective at addressing the particular quandaries faced by independent and modest construction companies that focus their energies in niche markets, Appelbaum makes clear that more modern bureaucratic scheduling and estimating management techniques are

equally inadequate. Here, the implementation of advanced scheduling and estimating software is deemed not only a prohibitive expense for many small companies, but is also considered much too general in scope to be applicable to the specificities of individualized small scale companies (1982). In this regard, software is viewed as TOO streamlined to apply to the diversified nature of small scale residential building in which materials and projects are relatively unique.

Focusing particularly on the unique estimating quandaries faced by small, primarily residentially focused, independent construction companies, some of the challenges associated with scheduling functions apply. A lack of both human capital and manpower make it difficult for small construction firms to allocate estimating responsibility to a single competent individual or team. Many “fly by the seat of their pants” when it comes to estimating the volume of required materials for residential builds as a result of this disorganization (Tanner, 2002).

Complex, Rare or Specialty Materials

Furthermore, small scale, residentially based construction companies that operate primarily in niche markets are faced with the unique challenge of acquiring complex, rare, or specialty materials that are difficult to estimate accurately prior to acquirement (Foster and Wickens, 1997). When working in historic homes, a means of asserting the true nature, size, malleability, and strength of any necessary material is highly difficult, especially environmentally advanced units or foreign replications designed to mimic international architecture via the usage of specialized cultural material. This may cause small independent contractors to either over order, under-order, or incorrectly order materials that not only cause a financial quandary, but a scheduling delay as well.

Similarly, for low level, independently owned construction firms that work primarily in historic niche markets, it is incredibly difficult to ascertain the underlying condition of antiquated and preexisting structures and materials (Page, 1987). Here, the discovery of rotted, water damaged, termite infested, or lead laden structures and materials are common, but are generally only discovered following the initiation of a project in which scheduling and estimating lead times and volumes have already been predicted. This poses a considerable problem to small scale residential firms who are generally considered to be working within the confines of both tight scheduling and firmly agreed upon budgets provided by independent homeowners. This, combined with the likelihood that additional or different materials will be necessary in order to address the unforeseen structural abnormalities or inadequacies frequently found in antiquated homes, make estimating an arduous and uncertain process for small scale residential builders.

CHAPTER III METHODOLOGY

Phase1:Interviews

In order to effectively determine the scheduling and estimating challenges and complications faced by Cypress Construction Inc. throughout the course of daily operations, this study relies on the collection and analysis of both primary and secondary data. In order to collect the primary data that is most fundamental to determining the scheduling and estimating quandaries of this construction firm, direct, face to face interviews with the company's owner, Mr. Ray Muth, and his employees, Mr. Jack Stevenson and Mr. Michael Gruber, have been especially developed, tailored, administered, and documented. The interview questions have been specifically formulated to address the many diverse facets of modern construction organizations and their internal operational and administrative hierarchies, potential financial structures and stability, personal feelings and opinions, relevant demographic information, and individual and corporate aspirations. These questions have been designed to not only address the many diverse facets of construction management, but to ascertain the true nature of Cypress Construction Inc.'s corporate structure and responsibilities. Here, the particular challenges faced by this construction firm are adequately identified and potential solutions for their amelioration present themselves.

Interview Questions

The interview questions that have been employed in the methodology stage are as follows:

- 1) When was Cypress Construction Inc. founded?
- 2) What are the primary focus areas of Cypress Construction?
- 3) Does Cypress Construction specialize in any particular areas or types of construction?
- 4) What percentage of Cypress Construction's work is remodeling?
- 5) What percentage is new builds?

- 6) What is the ratio of residential to commercial projects?
- 7) What is the management/ corporate structure of Cypress Construction?
- 8) How many employees does Cypress Construction maintain and what are the responsibilities of each?
- 9) As owner, what are Mr. Ray Muth's responsibilities?
- 10) Financially, how has Cypress Construction fared over the last 5-10 years?
- 11) What explains any relevant rises or declines in profit margins?
- 12) What are the primary challenges faced by Mr. Ray Muth?
- 13) What are the primary challenges faced by Cypress Construction employees?
- 14) In what geographical areas does Cypress Construction most frequently conduct business?
- 15) How do the demographics of these areas affect business overall (i.e. available projects/ saturation of other firms in market)?
- 16) How do the demographics of these areas directly affect the types of construction projects bided on and accepted by Cypress Construction?
- 17) How does Cypress Construction currently manage its scheduling and estimating functions?
- 18) What are the most prevalent scheduling challenges faced by Cypress Construction?
- 19) What are the most prevalent estimating challenges faced by Cypress Construction?
- 20) Are these challenges consistent or ever changing?
- 21) Has Cypress Construction attempted to address these challenges?
- 22) If so how? What was the result of these attempts?
- 23) What software if any is used by Cypress Construction to manage scheduling and estimating?
- 24) If software is used, when was it purchased and implemented and why?
- 25) If no software is used, why?
- 26) How does Cypress Construction think changes in scheduling and estimating functions can be implemented effectively?
- 27) What are the ultimate scheduling and estimating goals of Cypress Construction Inc.?
- 28) What is Cypress Construction's eventual desired scale of business?
- 29) How do employees factor into the scheduling and estimating functions (i.e. what are their particular responsibilities with regard to the process)?
- 30) How do employees factor into the challenges faced regarding scheduling and estimating (i.e. are some of the challenges a direct result of their actions)?
- 31) Are any outside parties such as consulting firms involved in streamlining work flow or managing scheduling and estimating functions?

Each of these thirty-one questions has been posed in person to not only owner and CEO Ray Muth, but to Jack Stevenson and Michael Gruber independently, following written permission of Mr. Ray Muth. The permission statement makes clear that his employees were free to disclose information relevant to the approved interview questions and have not been

penalized for their answers, opinions, or suggestions regarding this case study. Additionally, each party was required to and has completed a consent form which states that all information willingly disclosed throughout the course of the interview and subsequent case study have been utilized to develop this case study and will be available externally to faculty and students of Bowling Green State University for evaluation and educational purposes.

As Mr. Muth has designated, one of the specialties of his construction company is residential builds in the niche market of historical restoration and preservation. Thus, the interview questions above focus heavily on the particularly unique scheduling and estimating constraints and quandaries that are associated with this field of concentration. Here, the majority of other posed questions are designed to provide background information on the particularities of Cypress Construction Incorporated or to ascertain the relationship between the policies, conduct, financial stability, and structure of Cypress Construction Inc. and the scheduling and estimating quandaries that the firm experiences regularly.

Phase 1 direct interviews were completed on April 30, 2014 and primary data from all three subjects of the case study were collected, documented, organized, and approved for disclosure by owner and CEO, Ray Muth, as well as employees Mr. Jack Stevenson and Mr. Michael Gruber on or before this date. Additionally, relevant external data had been collected, analyzed, and sorted for application to the overall case study. This secondary data includes theoretical data and relevant, previously conducted studies, demographic information regarding the geography and population of Cypress Construction Inc.'s primary areas of operation, and pointed data regarding the niche market of small, historic residential builds.

Phase 2: On-Site Observations

Furthermore, two on-site observations have been completed; the first on May 21, 2014 and the second on July 5, 2014 with Mr. Muth. Here, the study was provided access to two separate job sites currently contracted by Cypress Construction Inc. Mr. Ray Muth assured the researcher that these on site observations have in no way been orchestrated or modified for the purpose of casting Cypress Construction Inc. in a favorable light. As per the timeline presented in the original proposal for conducting this case study, these observations were conducted in no less than one month intervals, as observations of different projects with different scheduling and estimating functions were necessary to the development of comprehensive results. Each of these on site observations conducted in Phase 2 of the methodology have provided the case study with meaningful and relevant supporting data to the primary data collected in Phase 1 via interviews. Here, the questions addressed in Phase 1 have been displayed in real time, which has aided in asserting their validity and their relevance to the scheduling and estimating challenges faced by Cypress Construction Incorporated. This case study has sought to assure that the combination of Phase 1 and Phase 2 data collection procedures have provided both the study, its participants, and its ultimate audience with a comprehensive and factual landscape of the true nature of scheduling and estimating and the difficulties associated with their management for small, primarily residential construction firms such as Cypress Construction Inc.

CHAPTER IV RESULTS

The process of primary data collection via the implementation of personal interviews with the owner and employees of Cypress Construction Inc. has provided the study with clear and well defined results. First and foremost, the interview conducted with Mr. Ray Muth, owner and CEO of Cypress Construction Inc., offered immense insight into not only the current structure and operations of Cypress Construction Inc., but the scheduling and estimating difficulties faced by his firm.

Phase 1 Results

For the purpose of providing background, Mr. Muth stated that he founded Cypress Construction independently in 2007. He maintains no partners and employs only two workers, his foreman Jack Stevenson, and a sole construction worker by the name of Michael Gruber. While the company maintains an external book keeper, the firm does not employ an office manager or receptionist. Additionally, the firm does not employ any outside consultants or project managers. As a result, Mr. Muth is the sole individual responsible for all of Cypress Construction Inc.'s final scheduling and estimating functions in addition to his responsibilities as CEO.

Throughout the course of his interview, Mr. Muth asserted that while the company is now beginning to experience financial stability (the company showed a notable profit of \$450,000 in 2013), the firm has been plagued with financial uncertainty since its inception. When prompted, Mr. Muth declared that much of this financial difficulty has been due to the firm's inability to successfully manage their scheduling and estimating functions. In fact, Mr. Muth made clear that on more than one occasion, incorrect or insufficient scheduling endeavors have caused the firm to lose bids on prominent projects, which led to financial

losses of nearly \$300,000. This is due to the fact that original scheduling plans suggested an earlier availability date than feasible, angering clients who as a result, chose to work with another contractor.

While the firm has implemented a policy of working on no more than two projects concurrently in an effort to manage scheduling effectively, the firm still regularly experiences scheduling overlaps, which delay project commencement and completion. These delays continue to anger clients, which Mr. Muth feels is hurting his company's chances of retaining them for repeat business.

While he takes full responsibility for scheduling overlaps, Mr. Muth emphasized the fact that many of the scheduling problems he faces are the result of the unique nature of his firm's estimating functions. Mr. Muth affirmed that the majority of his business operations are conducted in historic areas of Baltimore, which pose two prominent challenges to effective estimating. First and foremost, many of the homes in both the city and county of Baltimore are one hundred to two hundred years old, and have been updated or remodeled multiple times before Mr. Muth is contracted. As a result, although many of the homes Mr. Muth remodels look relatively updated, the plumbing and heating systems as well as the drywall and subflooring often times are shoddy, outdated, or completely rotted. As is typical of construction work in general, these issues remain undisclosed and unforeseen until a project has commenced. Mr. Muth asserts that most of the time, he has completed estimations for his project before the discovery of time and material consuming structural problems. He states that he does his best to allow for discrepancies based on the knowledge of the nature of antiquated buildings, but often times faces resistance from clients who are not interested in providing additional funding for potentially necessary materials.

Additionally, Mr. Muth made clear that the historic nature of many of the builds and remodels contracted by Cypress Construction Inc. require highly specialized materials that are difficult to source. As many of Baltimore's historic homes are outfitted with century old hard wood flooring, hand tiled mosaics, marble, ornate moldings and iron ceiling fixtures that are in need of restoration, Mr. Muth proclaims that determining how much of these unique materials are needed to complete refurbishing is not an easy feat, as underlying rot, termite infestation and tile breakage are not easily seen on the surface. As a result, Mr. Ray Muth oftentimes does not order enough of a particular material, or in some cases, orders entirely too much in anticipation of an underlying problem that never presents throughout the course of renovation.

Currently, Cypress Construction Inc. conducts all of its scheduling and estimating functions manually, without the assistance of software or technological intervention. Mr. Muth asserted that when he opened the firm in 2007, he attempted to use ProContractor MX 2.9 to assist in estimating, but found it too complicated. Additionally, he affirmed that the estimates provided by the ProContractor MX software did not provide accurate material estimates, predominantly due to the challenges posed by his operation in a small scale niche market.

Similarly, foreman Jack Stevenson asserted that Cypress Construction Inc. most certainly faces scheduling and estimating challenges that he feels differ from those faced by large scale, corporate construction firms. Mr. Stevenson states that while he feels Mr. Muth is an adept scheduler and estimator in his own right, it appears impossible for him to effectively manage not only the daily operations of the firm and its finances, but also the scheduling and estimating functions. With this said, Mr. Stevenson, who has worked for Mr. Muth since the

company's formation in 2007, asserts that previous attempts to utilize scheduling and estimating software fell flat. Stevenson stated "Ray could use help scheduling and estimating, but software hasn't yet been able to meet our needs. When we tried to use ProContractor in 2007 and 2008, the generated estimates didn't factor in the likelihood that underlying damage or poor infrastructure would require more or even totally different material". With this said, Stevenson stated that while he understood that some of the scheduling difficulties faced by the company were the result of inadequate estimating, he felt scheduling could be streamlined internally. "Ray is a great boss" Mr. Stevenson declared, "but he's got too much on his plate. Some support staff to help handle the scheduling needs of the company would be a definite plus."

Furthermore, Mr. Michael Gruber, a longtime employee of Cypress Construction Inc. asserted that the company most certainly faces interesting scheduling and estimating challenges. He stated that he previously worked for a large scale residential builder, who focused on construction for large, luxury housing developments. During his tenure with his former employer, he stated that all of the firm's scheduling and estimating functions were adequately managed with software, yet he does not feel that the implementation of software would be equally effective for Cypress Construction. Mr. Gruber stated that "it's a different ball game for small residential builders" as larger builders tend to work with more streamlined, readily available materials. "All of those homes were large and built with expensive materials, but they were new and ultimately cookie cutter. If you could figure how long it took to build one, or what kind of materials were necessary to do so, it could be applied across the board." Mr. Gruber made clear that this is most certainly not the case for the small scale, niche builds and remodels conducted by Cypress Construction, as each home

is structurally and architecturally different and has been remodeled many times over the last century.

Lastly, Mr. Gruber made clear that the demographics of historic Baltimore contribute to scheduling and estimating difficulties. He stated that the community in which Cypress Construction Inc. operations is generally upper class, but tends to be unwilling to incur additional expenses in order to improve project time lines. This makes it difficult for scheduling and estimating functions to be concisely managed, as clients are often times unwilling to order additional materials at the project's outset to avoid future delay.

Overall, the interviews conducted with Cypress Construction Inc.'s owner, Ray Muth and his staff, Mr. Jack Stevenson and Mr. Michael Gruber provided the study with significant insight. The testimonials of the above mentioned indicated the firm's scheduling and estimating quandaries are unique to the company, are largely the result of their size and operation in a small scale niche market, and they are unable to find an adequate solution to long existent scheduling and estimating challenges.

Phase 2 Results

While the interviews conducted with Ray Muth and his staff members provided extremely relevant data, collection of primary data via the observation of two of Cypress Construction Inc.'s current job sites provided even more salient information. This is due to the fact that I was able to witness Mr. Muth's daily operations as well as the company's scheduling and estimating challenges in person. While neither of the company's current projects required the historic restoration that the company specializes in, both properties were old houses built in the early 1900's and both jobs utilized specialized materials.

The first job site, located at 1500 North Calvert Street in Baltimore, Maryland is a complete master bathroom renovation. Cypress Construction Inc. is in the process of transforming a small, antiquated bathroom and a small walk in closet into a larger master bathroom space. On this particular job, the clients have chosen to use Carrara marble, which is quarried in the city of Carrara in the province of Massa and Carrara in the Lunigiana, the northernmost tip of modern-day Tuscany, Italy. Not only is this material expensive, causing the clients to insist upon conservative estimating, but maintains a highly variant marbling pattern which requires Ray Muth to spend a notable amount of time on the site matching slabs. In fact, while visiting this job site for a 10-hour period, I watched Mr. Ray Muth engage in multiple telephone conversations with the retailer sourcing the marble, in which Mr. Muth asserted that certain slabs were discolored and would require replacement. As the slabs could not be replaced for two to three days, Mr. Muth's project completion schedule was delayed, causing it to overlap with the schedule for his next project.

This experience highlights the specific scheduling and estimating challenges faced by small residential construction firms working with specialized materials in niche markets. In this particular instance, Cypress Construction Inc. was unable to adequately estimate the necessary materials due to the variance of marbling patterns. Additionally, due to the expensive and specialized nature of the Carrara marble used, Mr. Muth was unable to replace discolored slabs, immediately delaying his schedule.

Furthermore, on my second visit to the 1500 North Calvert Street site, Mr. Ray Muth and his staff were faced with additional scheduling and estimating quandaries. As I witnessed the renovation progress, it became clear that the subflooring of the new master bathroom space would have to be replaced. Due to previous shoddy workmanship, the subflooring was uneven

and had been damaged. Mr. Muth had no intention of removing the subfloor on this project, and as a result was lacking significant necessary materials to replace it. Additionally, the replacement of the subfloor was not in the original project plan and was therefore not accounted for in the scheduled project timeline. As a result, Mr. Muth schedule was delayed an additional week.

Similarly, the second job site, located at 25 North Hope Street in Baltimore, Maryland was equally representative of the specific scheduling and estimating challenges faced by Cypress Construction Inc. as a small residential construction firm operating in a niche market. This second job focused on the renovation of a large kitchen, in which the highly meticulous clients had selected to use custom made and custom ordered cabinetry made of exotic bubinga wood, sourced from Africa.

During my first visit, I witnessed the demolition of the original space, in which the existent cabinets, flooring and tiling were removed. While Mr. Muth expected there to be some structural damage as the kitchen had not been renovated since 1956, he was unaware of the significant water damage present behind many of the kitchen's cabinets. During my visit, Mr. Muth had to arrange for the purchase and retrieval of dry wall, as well as consult an external plumber to determine the nature of the plumbing issues causing the water damage to begin with. Although the rest of the demolition commenced, the project was delayed four days, due to necessary plumbing repairs. Here, Cypress Construction Inc. faced significant estimating challenges due to unforeseen underlying structural issues on the jobsite. Additionally, Cypress Construction was unable to adequately organize their schedule due to unforeseen delays.

Furthermore, multiple scheduling quandaries presented themselves during the second visit to the North Hope Street site. On this particular visit, the specially ordered and measured Bubinga wood cabinets had arrived, and on this day, were being prepared for installation. Halfway through the day, the clients visited the job site and were entirely displeased with the quality of the cabinets. Although they had specifically chosen to source the cabinets through a family friend, they took issue with minor scratches on a few of the cabinet doors, and demanded that they be replaced before installation. While Mr. Muth was able to arrange for new doors to be delivered from a warehouse within two days, they were quite obviously unable to complete the installation on schedule. Additionally, the clients decided that they were interested in adding a center island to their kitchen renovation, which had to then be designed. While the center island was not complete at the time of the observation, Mr. Muth made clear that the design, sourcing of the wood, and the ordering of counter tops would take a significant amount of unaccounted for time, delaying project completion.

CHAPTER V CONCLUSION

The analysis of interviews with Cypress Construction Inc. and the observation of two of the firm's job sites have made clear that Cypress Construction Inc. faces unique scheduling and estimating challenges. Many of the challenges faced are the result of the nature of the firm's specialization in a niche market, in which historical restoration and specialized, imported materials are frequently used. Additionally, in a small firm owned by a single individual, the company's schedule is extremely rigid, due to a lack of human capital. Here, the company is at scheduling capacity when a mere two jobs are on the schedule simultaneously, leaving Cypress Construction with no leeway for unexpected scheduling and estimating delays and complications. While this occurrence is arguably fairly common for small, privately owned construction companies, the lack of manpower poses significant problems for the efficiency of both scheduling and estimating functions.

With this said, it appears that many of the scheduling and estimating challenges faced by Cypress Construction Inc. are due to the company's current structure. The fact that Mr. Ray Muth is responsible for all scheduling and estimating functions in isolation, without the assistance of staff or outside consultants is not only challenging, but also highly disorganized. Additionally, the lack of a regimented scheduling and estimating system through the integration of technical support seems to lead to confusion, costly delays and perturbed customers.

Continuance of Project

Should a future student or Cypress Construction Inc. wish to engage in the continuance of this particular study for either educational or practical purposes, future study would require both deepened and enhanced observation and subsequent analysis of multiple factors

relevant to Cypress Construction Inc. Here, it would be necessary for the individual or group continuing the study to observe and analyze many other Cypress Construction Inc. jobsites in order to determine problematic scheduling and estimating trends and develop a wider data set. This will enable the study to be effectively enriched with relevant data, in order to determine whether or not the occurrences present throughout the course of the study thus far were coincidental, temporary, or ingrained in the processes of Cypress Construction Inc. Additionally, if this study were to be continued by another party, a deeper evaluation of demographic data in which Cypress Construction Inc. operates would be beneficial, as would further research regarding the particular construction quandaries associated with operations in niche markets. Here, a deepened focus on historical restoration and imported materials would benefit the study most relevantly. Lastly, if an individual were to continue this study, continued follow up with owner, Ray Muth and his staff members, Jack Stevenson and Michael Gruber, would be required in order to determine whether or not their personal feelings on the scheduling and estimating quandaries faced by Cypress Construction Inc. have changed or evolved over time.

Recommendations

As a result of all of the information presented above both in this conclusion and throughout the course of the study, it is the recommendation of this study that Cypress Construction Inc. attempt to either hire support staff to aid in the management of scheduling and work site functions, or incorporate the usage of Project Manager and Excel spreadsheets to assist in estimating management and the development of contingency schedules. While not an overarching solution, it is the impression of this study that Cypress Construction Inc. would

benefit from additional scheduling input and the availability of a system to provide organizational capabilities.

Overall, Cypress Construction Inc. adequately displays the unique scheduling and estimating challenges faced by small, independently owned construction firms operating in niche markets. Each job is highly divergent and requires a unique perspective, a notable amount of attention to detail, and a significant amount of time to complete sufficiently. This poses scheduling and estimating challenges that are not generally experienced by large corporately owned firms, who have unlimited resources and an extensive supply of human capital. With this said, it appears that the most suitable approach to addressing the particular scheduling and estimating challenges faced by Cypress Construction Inc. is an increased effort towards organization and the delegation of responsibilities to either internal or external parties.

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APPENDIX A

Interview Questions for Cypress Construction Incorporated

- 1) When was Cypress Construction Inc. founded?
- 2) What are the primary focus areas of Cypress Construction?
- 3) Does Cypress Construction specialize in any particular areas or types of construction?
- 4) What percentage of Cypress Construction's work is remodeling?
- 5) What percentage is new builds?
- 6) What is the ratio of residential to commercial projects?
- 7) What is the management/ corporate structure of Cypress Construction?
- 8) How many employees does Cypress Construction maintain and what are the responsibilities of each?
- 9) As owner, what are Mr. Ray Muth's responsibilities?
- 10) Financially, how has Cypress Construction fared over the last 5-10 years?
- 11) What explains any relevant rises or declines in profit margins?
- 12) What are the primary challenges faced by Mr. Ray Muth?
- 13) What are the primary challenges faced by Cypress Construction employees?
- 14) In what geographical areas does Cypress Construction most frequently conduct business?
- 15) How do the demographics of these areas affect business overall (ie available projects/ saturation of other firms in market)?
- 16) How do the demographics of these areas directly affect the types of construction projects bided on and accepted by Cypress Construction?
- 17) How does cypress construction currently manage its scheduling and estimating functions?
- 18) What are the most prevalent scheduling challenges faced by Cypress construction?
- 19) What are the most prevalent estimating challenges faced by Cypress construction?
- 20) Are these challenges consistent or ever changing?
- 21) Has cypress Construction attempted to address these challenges?
- 22) If so how? What was the result of these attempts?
- 23) What software if any is used by cypress construction to manage scheduling and estimating?
- 24) If software is used, when was it purchased and implemented and why?
- 25) If no software is used, why?
- 26) How does Cypress Construction think changes in scheduling and estimating functions can be implemented effectively?
- 27) What are the ultimate scheduling and estimating goals of cypress construction Inc?
- 28) What is Cypress Construction's eventual desired scale of business?
- 29) How do employees factor into the scheduling and estimating functions (ie what are their particular responsibilities with regard to the process)?
- 30) How do employees factor into the challenges faced regarding scheduling and estimating (ie are some of the challenges a direct result of their actions)?

31) Are any outside parties such as consulting firms involved in streamlining work flow or managing scheduling and estimating functions?

APPENDIX B



DATE:	June 2, 2014
TO:	Thamer Alsayyar
FROM:	Bowling Green State University Human Subjects Review Board
PROJECT TITLE:	[614359-1] Cypress Construction Inc.: Scheduling and Estimating Quandaries for Small Scale Residential Builds
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF NOT RESEARCH
DECISION DATE:	June 2, 2014

Thank you for your submission of New Project materials for this project. The Bowling Green State University Human Subjects Review Board has determined this project does not meet the definition of human subject research under the purview of the HSRB according to federal regulations.

We encourage you to continue to confirm with the HSRB whether future projects of this nature require review.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or hsrb@bgsu.edu. Please include your project title and reference number in all correspondence regarding this project.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Human Subjects Review Board's records.