VIRGINIA TECH

The Informal Leader's Role on Construction Sites

A comparative analysis of formal and informal leadership structures within the construction industry

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Abstract

There are numerous causes of delays in productivity and efficiency on construction job sites, many of which stem from inadequate understandings of leadership characteristics and jobsite relationships. The focus of this study is to determine who construction personnel naturally seek advice from on a construction site when confronted with a situation that requires it. Additionally, this study seeks to establish a classification procedure for locating individuals towards whom those in need of leadership are naturally drawn. A minimum of three construction sites will be observed with the permission of each relative construction company. First the researcher will collect observations of the frequency with which advice is sought. Each time advice is required on the construction sites the researcher will collect observations determining from whom the advice is asked and who asked the question. After substantial data for these variables are collected, characteristics of the individuals who are asked advice the most often will then be evaluated in attempts to form a system of classification for informal leadership. The characteristics that will be examined include, but are not limited to, proximity, job title, experience, age, gender, and validity of the advice they provide (these characteristics are subject to change). Advice validity will be measured by determining whether or not the situation in question has been improved or corrected. It is expected that advice will be sought more often from those with various job titles who are older, have more experience, are close in proximity, and have historically provided valid advice, regardless of gender. Once the leadership structure of each jobsite is evaluated, a comparison of the productivity of each of the companies associated with their respective jobsite will be done to determine whether informal or formal leadership structures are more effective. It can also be determined whether or not chosen leaders are more effective when they are in a formal position of authority. By discovering where leadership truly lies on construction sites, one will be enabled to use this information to improve productivity and efficiency by maintaining relationships and promoting where necessary.

Problem Definition

Informal leadership has been defined in many ways. C. Dean Pielstick (2000) defines informal leaders as “those not in a formal position of leadership but recognized as leaders nevertheless.” The informal leader has also been defined by Schneier and Goktepe (1983) as “one who exerts influence over other group members.” For the purposes of this study, informal leadership can be defined by discovering what drives workers to follow the advice of one individual over another, regardless of title or authority. With this information one will become more able to influence how a jobsite operates and maintain the relationships necessary to ensure the successful completion of a project. This information also offers one the ability to better select influential leaders for positions that require them and can better direct one to these natural leaders when situations require their assistance.

Ineffective leadership is a common cause of employee disengagement and motivation loss (DecisionWise 2009) which often leads to poor performance and project delays in the construction industry (Ng et al. 2004). Poor site management/supervision and low speeds of decision making are two of the most common causes of project delays in the construction industry (Chan and Kumaraswamy 1997). In this industry it is common to work with different sets of workers on each project to which one is assigned. Understanding and identifying leadership qualities early in the project can help ensure that the project runs on schedule and produces quality results. In a time when work has become increasingly more difficult to find in this industry, many contractors cannot afford project delays nor can they afford to fail in their attempts to outperform their competitors in terms of quality and efficiency. According to projections made in

Figure 1 - Taken from www.calculatedriskblog.com

December of 2008, roughly 50% of businesses in the United States were expected to fail by the summer of 2009; 6,400 being construction businesses, one of the most affected industries by the current economic crisis (Construction 2008). Supporting these projections, it was found that spending for private construction projects was reduced by 20.6 percent from September 2008 to September 2009 (AGC 2009b). More recently, private non-residential construction has begun to decline in spending while private residential construction has been declining since 2006 (Figure 1).

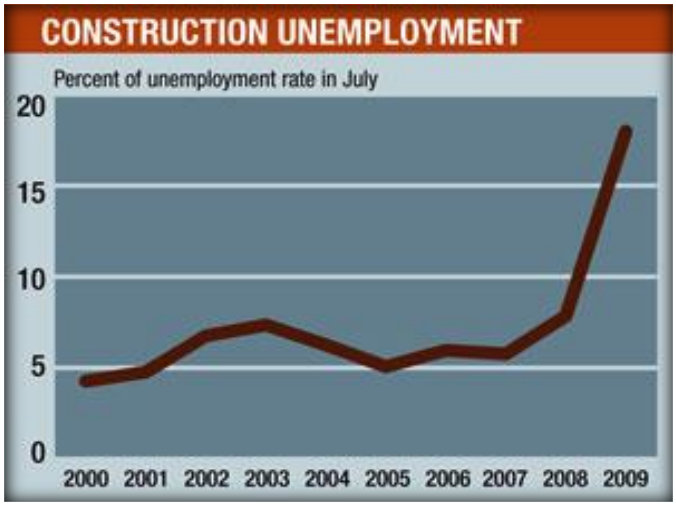

Figure 2 - Chart created by the Engineering-News Record (ENR) from data provided by the Bureau of Labor Statistics (BLS)

When construction companies perform poorly they tend to lose jobs and lose the need, as well as the ability, to pay as many workers as they have been; this phenomenon is often magnified during harsher economic times. In October of 2009 unemployment rose from 9.8 percent to 10.2 percent, the highest rate since 1983, with the construction industry facing one of the largest job losses over the month. Since the initial decline of the economy in December of 2007, unemployment has risen 5.3 percentage points (Figure 2), leaving 8.2 million U.S. citizens without a job (BLS 2009b). Unemployment in the Construction industry alone has risen to 17.1 percent, leaving 64,000 construction workers without a job in September of 2009. Although the residential sector of construction has been said to have taken the biggest hit by the economic downfall, in September it was non-residential construction that accounted for 80 percent of the construction workers who were laid off (AGC 2009a).

Poor leadership practices can also lead to communication failures, so it is important that proper leadership selection is established. Failure to properly communicate with coworkers can lead to problems involving safety and productivity on the jobsite. Safety is a primary concern on construction sites that can often be underestimated by laborers if their supervisors do not properly communicate safety procedures and potential risks to be aware of. Proper equipment must be provided by these leaders who must also communicate the importance of each piece of equipment (Figure 3). Over 135,000 cases of work related injuries or illnesses were reported for the construction industry in 2007, with an incident rate of 190 per every 10,000 workers (BLS 2009c). Construction workers suffered

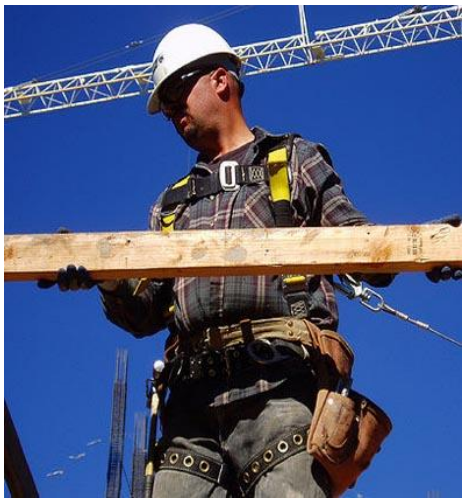

Figure 3 - Taken from www.constructionsafetytraining.com

the greatest amount of fatalities of all other industries in the private sector last year, accounting for one fifth of the total work related fatalities in 2008 (BLS 2009a). Construction is considered to be one of the most dangerous occupations one can pursue. The construction industry accounts for only 7.7 percent of the work force in the United States and yet 22 percent of all work related fatalities are construction related (Waehrer 2007). Failure to properly communicate safety practices on construction sites also comes with financial sacrifices. The total costs for fatal and non-fatal injuries in the construction industry in 2002 were estimated to be $11.5 billion in the private sector alone (Waehrer 2007). These incidents reduce productivity by increasing costs and reducing work crew numbers on the project. In 2005, the construction industry had the second highest rate of nonfatal injuries and illnesses with days missed from work (Figure 4). One way to reduce these incidents is to inform workers properly through effective leadership practices which require adequate leadership selection.

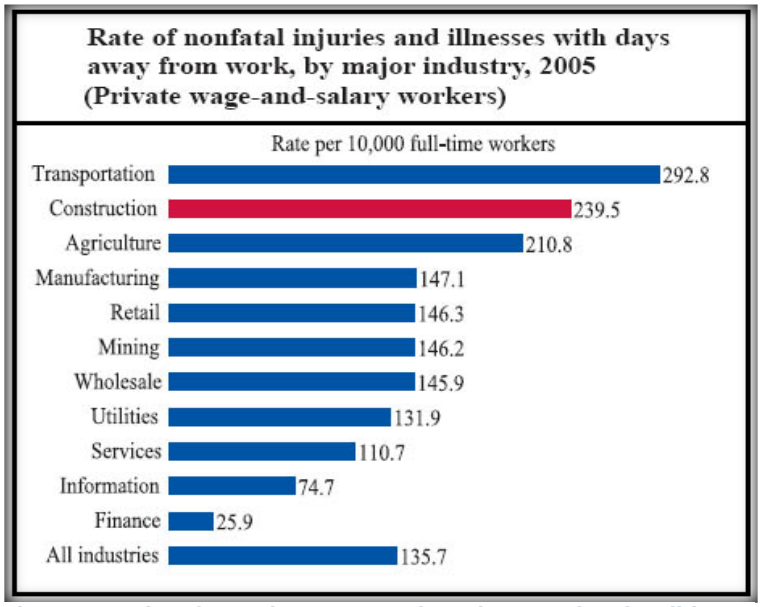

Figure 4 - Taken from *The Construction Chart Book, 4th Edition*

Although there are already many excellent leaders in positions that allow them to fully utilize their leadership abilities, there are still cases where leadership abilities are either overlooked or are not characteristic of those in positions which demand them. In order to remedy these situations, one must identify leadership characteristics of naturally chosen leaders. Naturally chosen leaders are those one seeks advice from for a particular situation. Often this may in fact be the one who holds the supervisory role on the jobsite, but certainly not always. Are naturally chosen leaders more effective with or without a formal supervisory role?

Literature

There has been extensive research done that investigates leadership characteristics, effectiveness, and establishments, but very little in regards to informal leadership in construction settings. Leadership has been investigated in terms of personality traits, gender differences, leadership styles, effectiveness, and many other attributes. Yet the question has not been asked of which leadership style, formal or informal, is more effective on the construction site.

A study done by Neubert and Taggar examines gender differences in leadership selection in a team-oriented manufacturing environment. It was found that a high level of general mental ability predicted informal leadership more often for women than for men. Men were found to have emotional stability, conscientiousness, and team

member network centrality as reoccurring indications of informal leadership potential (Neubert and Taggar 2004). This article suggests that gender plays a role in why leadership is naturally selected in certain individuals but does not establish which gender is more often selected to lead. In another study, Neubert analyzed informal leadership dispersion in manufacturing teams where he found a positive correlation between team cohesion and the amount of informal leaders that were identified in each team. It was also found that when a higher percentage of the informal leaders in a group were composed of female participants, supervisors generally gave higher ratings to their performance (Neubert 1999). This supports the idea that women typically can more efficiently provide informal leadership in team settings than men, while stressing the importance of informal leadership in team settings.

At Northern Arizona University, C. Dean Pielstick conducted a comparison study between formal and informal leadership in manufacturing teams; formal leaders being those in a position of power and informal leaders being those who are not in a position of power but are still recognized as leaders. There were 161 variables used that were divided into six primary areas of interest: shared vision, communication, relationships, community, guidance, and character. The results of the study showed that informal leaders scored higher in each of the six areas than did the formal leaders, and informal leaders also received better scores on all but four of the 161 variables (Pielstick 2000). This furthers the belief that informal leaders must be identified to improve productivity and efficiency on construction sites. However this study does not directly apply informal leadership effectiveness to real situations.

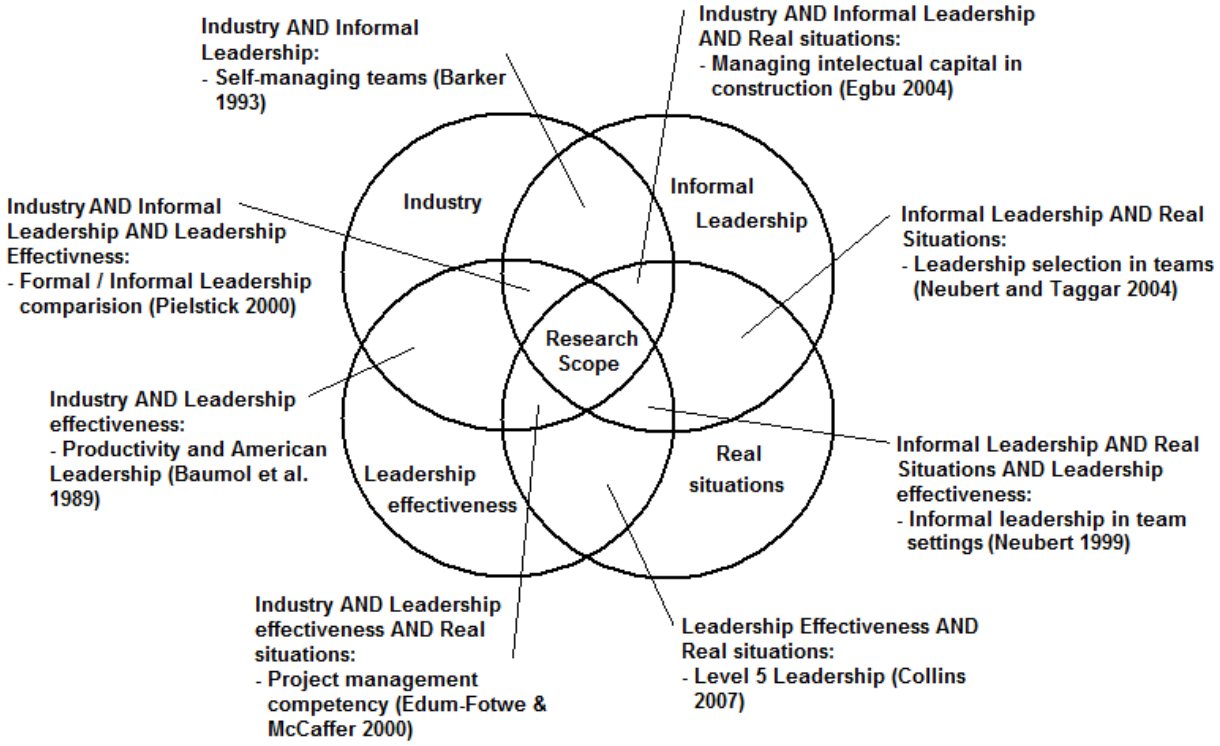

Figure 5 - Gap Analysis

Prior research analyzes four primary constructs relating to the current study: industry, informal leadership, real situations, and leadership effectiveness (Figure 5). The significant advantages associated with informal leaders have been established by all of the previously mentioned research; however there is very little application to real situations. On a construction site, variables such as age, experience, proximity, and validity should be considered when one seeks advice and must be controlled through categorization (see *Methodology*). By direct observing this selection process for informal leaders one is enabled to more accurately identify natural or informal leadership. Prevalence and effectiveness of informal leadership on construction sites can then be evaluated through various data collection methods.

Objectives

With this research it is intended to discover the prevalence and effectiveness of informal leadership within the construction industry in comparison to formal leadership structures. Within the context of this study, informal leadership will refer to those who are sought after for advice on construction sites where they lack a formal supervisory title over those they advise. Instances where advice is sought from formal leaders, or those with formal supervisory titles over those they advise, will also be recorded for effectiveness and productivity comparison purposes. Once these leadership roles have been established, characteristics of each leader will be evaluated in an attempt to establish a set of criteria for locating leadership potential and influential powers in the construction environment.

With informal and formal leadership roles established and associated characteristics defined, prevalence and effectiveness of informal leadership can then be evaluated. Prevalence of informal leadership will be quantified into a correlation with leadership effectiveness. Leadership effectiveness will be determined by the corresponding project status at the time of observations. Project status will be evaluated based on two criteria: whether the project is over or under budget, and whether the project is running on, ahead of, or behind schedule. With this information conclusions may be drawn to determine whether formal or informal leadership is more effective on construction sites.

If this study is successful, the acquired knowledge of informal leadership will provide a better understanding of work site relationships for project managers and supervisors. By better understanding these relationships, project managers and supervisions will be more enabled to effectively communicate with their respective work crews. This communication should aid in the facilitation of improving efficiency and thereby increasing productivity (Figure 6). Increased productivity will then enable these supervisors to give back to the crew in the forms of job security, bonuses, pay raises, new hires / eased work load, more training, advancement opportunities, etc. This can all be made possible by simply knowing who, when, and how to talk to their workers.

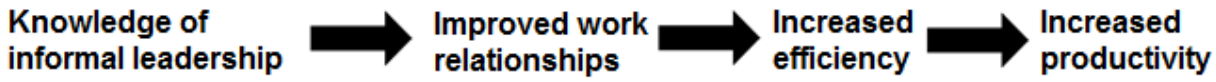

Figure 6 - Process map of research objectives

Methodology

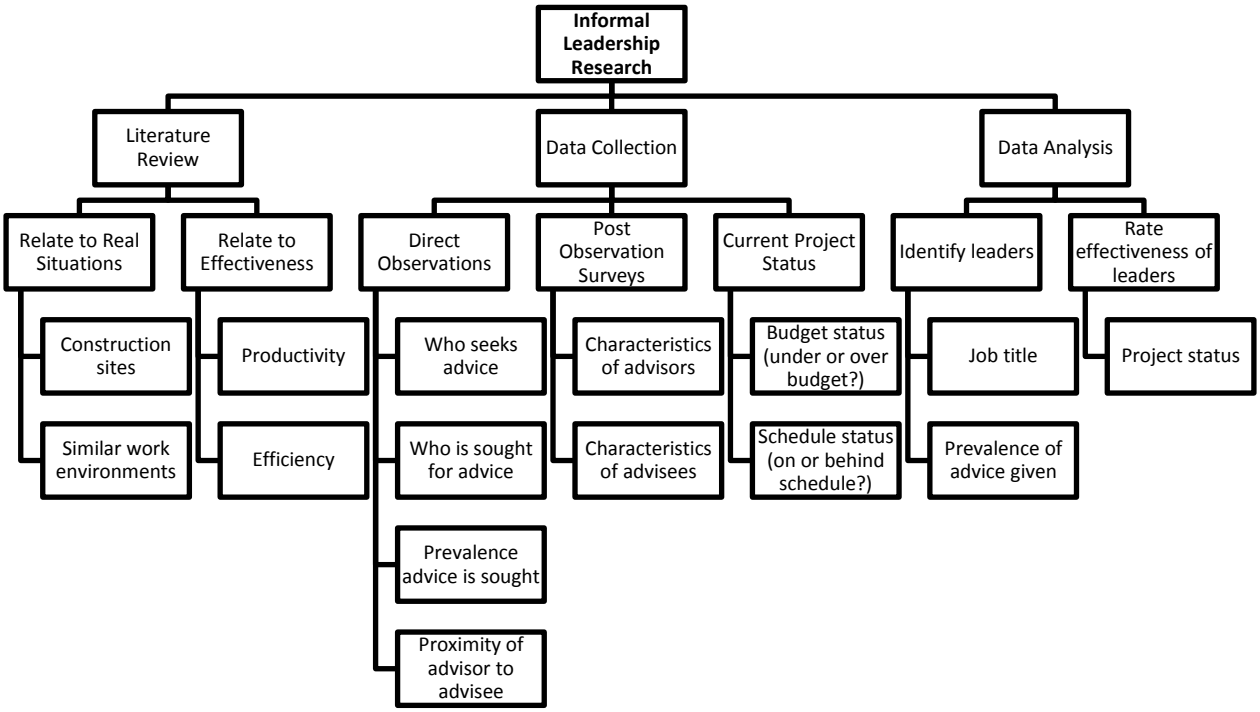

Figure 7 - Work Breakdown Structure of Methods

The proposed research can be divided into three phases (Figure 7). The first phase has been completed in the initial review of previous literature regarding informal leadership. A gap in previous research was discovered between leadership in real situations in industry and leadership effectiveness in terms of productivity and efficiency. The next phase involves collection of the relevant data through direct observations, surveys given after observations are made, and the current status of the relevant construction project. Before data is collected, a pilot will be run by making observations in the spring of 2010 on job site(s) near or on Virginia Tech's Campus. The pilot will be used to identify potential barriers to obtaining relevant data throughout the various phases of the study. In the final phase of research the data will be analyzed to identify formal and informal leaders in terms of how often they are sought after to give advice and their job title at the time the advice is asked of them. This phase will also compare the effectiveness of each leader by analyzing the status of the project at the time of leadership observations.

Once IRB approval has been obtained, observations will take place on a minimum of three different construction sites in order to increase the significance of the sample size. At each site the researcher will act as a volunteer who will make periodic recordings as they arise. Construction site personnel will be asked to make recordings as well by filling out a daily log in the format shown in Appendix 1. It is not possible to observe all advice exchanges simultaneously so the researcher and site personnel will only make observations that present themselves; this is a confound that may benefit by having more than one observer. Projects chosen for observations will be selected

based on availability to the researcher and the cooperation of the construction firms. All projects selected must be within the second half of the overall expected project duration period to encourage more accurate project success rates based on project status. This will be determined by initial inquiries into the expected start and finish dates of each project. Several firms have already offered verbal agreement to allow for observations on their work sites; one of which recommended a specific site due to the young age of the supervisor overseeing the project. Site selection will be based on obtaining a variety of age and experience levels of the site supervisors to control for these confounds. Other confounds will be controlled by means of randomization and increased site selections.

The researcher will record who advice is sought from, how often advice is sought, who is seeking the advice, the relative proximity of the advisor to the advisee, the question that is asked, the answer that is given, and the gender of each respective party. Validation of the advice provided will be derived from the accuracy of the advice given to the problem that needs to be solved. If the advice given does not fully correct the problem or situation, or creates a new problem that would otherwise have been avoided, the advice will be recorded as invalid. Each instance will require the researcher to monitor the situation to determine the outcome and the validity of the advice given.

Once a significant amount of observations have been recorded (which is to be determined by the results of the pilot study), the data will be used to inquire further information from the participants. Each participant (both advisors and advisees) will be asked to fill out a short survey with a deadline of two weeks and return that survey to the researcher once complete. The participants will be informed that they are not required to answer any or all of the questions and that their participation will be greatly appreciated. A pilot study will be run in the same format and will be used to determine response rates. The questions are as follows, and are subject to change:

1. What is your age?
2. How long have you worked in the construction industry?
3. How long have you worked for the company you currently are employed with?
4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)
5. What is your formal job title?
6. How long have you held your current job title?
7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.
8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.
9. Do you see yourself as a leader at work?
10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

These questions are designed to collect relevant data that are not directly observable. The answers to these questions will be used to establish a general set of defining characteristics for informal leaders and also to eliminate confounding variables that may

compromise the integrity of the study. Once this data has been collected, individual advice exchanges will be divided into several categories (Figure 8) to control for varying age and experience levels based on their answers to the first four questions. This process will help establish age and experience differences relative to job titles between advisors and advisees.

CONTROL FOR AGE/EXPERIENCE DIFFERENCES					
Characteristics relevant to advisor or advisee	**Category Divisions**				
	5+ years	**(5 years or less)**	**within 1 year +/-**	**5 years or less**	**5+ years**
Age	Much younger	Younger	Same Age	Older	Much older
Company Experience	Much less experience	Less experience	Same experience	More experience	Much more experience
Industry Experience	Much less experience	Less experience	Same experience	More experience	Much more experience

Figure 8 - Category divisions to control for age and experience differences

Questions five and six will distinguish between formal and informal leaders (the advisors job title relative to the job title of their advisees) and will allow for a comparison to be performed between them. Questions seven and eight will allow the researcher to account for any potentially missed observations. The last two questions, nine and ten, will give the researcher perspective as to how participants view themselves in terms of leadership. This will allow for better understanding of the personality characteristics of leaders and the driving factors associated with informal leadership selection (Figure 9).

SELF PERCEPTIONS: Where leaders view themselves as leaders						
	At work	**At home**	**In School**	**Sports teams**	**Volunteer work teams**	**Other settings**
Informal leaders	%	%	%	%	%	%
Formal leaders	%	%	%	%	%	%

Figure 9 - Self perceptions of formal and informal leaders in terms of leadership

Once all of the data is analyzed in the above mentioned fashion, a final compilation of data will be organized to show total averages to draw conclusions from (Figure 10). This first stage of data analysis will focus on identifying common characteristics of informal leaders in comparison to formal leaders in the construction industry.

FINAL COMPILATION OF IDENTIFYING CHARACTERISTICS		
	Informal Leaders	**Formal leaders**
Advice sought from	% of instances	% of instances
Sought advice	% of instances	% of instances
Prevalence of leader	%	%
Gender	%	%
View themselves as leaders at work	%	%
View themselves as leaders elsewhere	%	%
Proximity to advisee	Most frequently (close, far, or offsite; with %)	Most frequently (close, far, or offsite; with %)
Advice given was valid	% of instances	% of instances
Age difference	Most frequent difference (with %)	Most frequent difference (with %)
Company experience difference	Most frequent difference (with %)	Most frequent difference (with %)
Industry experience difference	Most frequent difference (with %)	Most frequent difference (with %)
Training/Educational difference	Most frequent difference (with %)	Most frequent difference (with %)
Average Age	Years	Years
Average Industry experience	Years	Years
Average Company experience	Years	Years

Figure 10 - Final compilation of research data

In order to establish a leadership structure's effectiveness on construction sites, the researcher will make recordings regarding the current status of the project at the time of completing direct observations. A few questions will be sent to a formal supervisor of each project. The first question will inquire as to whether the project is over or under budget at that point in time; and the second will inquire as to whether the project is on, behind, or ahead of schedule. Anonymity will be ensured for the answers to these questions to encourage more honest answers. Supervisors will also be offered feedback from the results of this study to aid them on future projects. The second stage of analysis will then be run to determine if there is a relationship between the prevalence of informal leaders and project status based on the information provided below (Figure 11).

EFFECTIVENESS / PREVALENCE			
	Site One	**Site Two**	**Site Three**
Informal leaders	Percentage	Percentage	Percentage
Formal leaders	Percentage	Percentage	Percentage
Budget	Under or over	Under or over	Under or over
Schedule	On, behind, or ahead	On, behind, or ahead	On, behind, or ahead

Figure 11 - Effectiveness of informal leaders on productivity

There are several confounds beyond the researcher's (as well as the observed leaders') control that may affect the current status of the projects. Some of these variables are inclement weather, change order complications, poor contract administration, etc. Instances such as these will be recorded by the researcher and this information will be included in the final conclusions of this study. If these confounds are of great enough magnitude to significantly alter the results of data collection, further observations will be required at other sites.

Expected Outcome(s) and Impacts

The intended outcome of this study is to increase the information available to construction professionals about informal leadership prevalence in the industry and the importance of the role informal leadership plays in construction. This information can be used to improve productivity and efficiency on construction sites by improving and maintaining work relationships and promoting effective communication practices. By effectively locating and utilizing informal leadership sources to maintain relationships and ensure proper communication distribution, supervisors may be able to gain significant advantages to aid in their projects.

It also may be discovered that informal leadership demonstration serves as an exceptional indicator for promotional purposes and anticipated success rates based on jobsite efficiency and productivity. Converting informal leaders into formal leaders may prove to increase leadership effectiveness as opposed to current practices of formal leadership selection. Human Resources departments will be consulted as to their current considerations for promotion and they may find informal leadership recognition to be helpful for promotion selection. By giving positions of authority to those who naturally have already acquired the loyalty of their coworkers, communication on the job site can be more efficient and effective. More effective communication may improve construction safety and reduce days that are taken away from work due to injuries or illnesses. So not only may workers be more productive directly from communication improvements, they may also benefit indirectly.

On a larger scale, by increasing productivity construction, supervisors will be more enabled to "give back" to their crews in terms of pay raises, bonuses, and job security. Improved company performance will lead to more project offers and company growth. With more jobs offered with increased incentives, the construction industry may also be able to reduce the predicted shortage of skilled labor (Ireland 2007) by making construction more desirable as a career path. So it is in the best interest of all construction organizations to utilize the findings of this study.

Research Plan

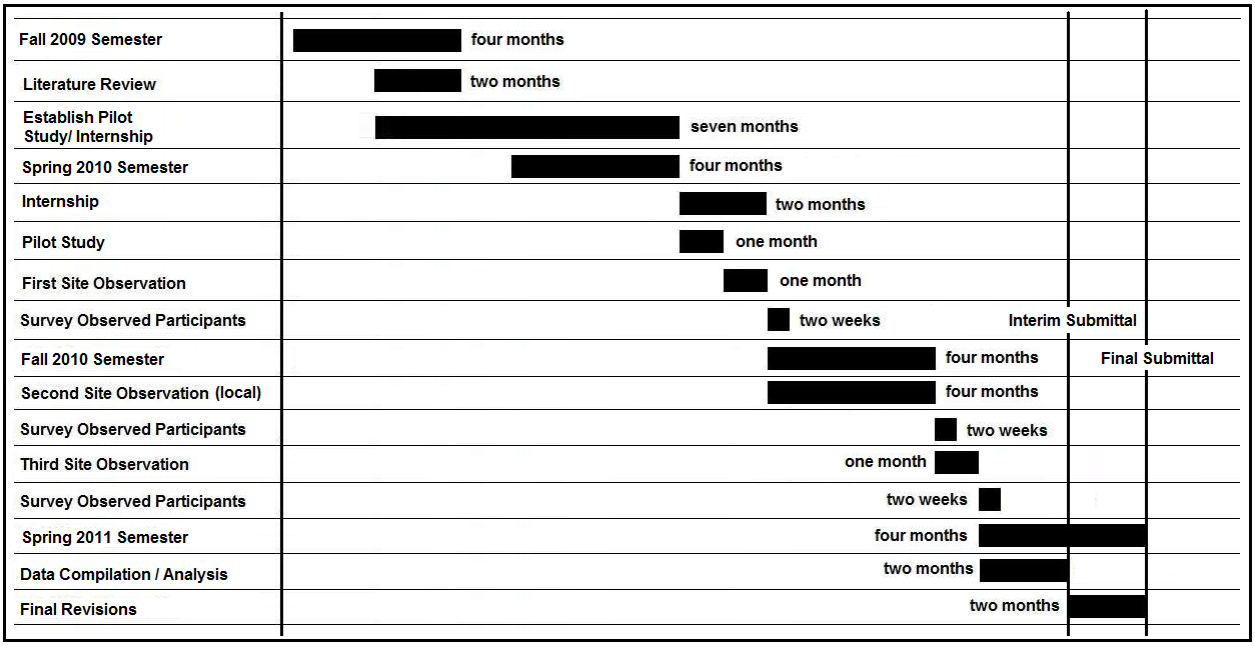

Figure 12 - Tentative Research Schedule

The diagram shown above (Figure 12) illustrates a tentative schedule for the proposed study. Several construction firms have been contacted and have agreed to allow observations of one of their projects. It is assumed that between one to four weeks spent at each site would allow adequate time to make significant recordings, however this will be verified by the pilot study. Other sites may also be observed time permitting. Two additional weeks are assumed for collection of post observation surveys after each set of observations, however this may also vary.

The first set of observations will take place during the internship scheduled for the summer of 2010, once the pilot has been completed during the first month of the internship. Site observations will continue in the fall of 2010 at various periods throughout the semester at a local construction site. This will allow the researcher to complete the third set of observations in between the fall and spring semester (2010-2011). Data will then be compiled and analyzed during the early months of the researcher's final semester at Virginia Tech. An estimated two months are allotted for interpreting the data that is collected. After completing a final draft of the research, an interim submittal will be given to the researcher's committee. Upon receiving feedback, the researcher will then make final revisions before submitting the final research findings.

All research tasks are over-estimated to allow ample time for the researcher to complete them while also completing the program for which he is enrolled at Virginia Tech. During the first eighteen or so months of the research, a final report will be constructed for an interim submittal to the researcher's committee. As many of the firms are not local to Blacksburg, observations will have to be scheduled during breaks in the Building Construction program of which the researcher is currently enrolled.

Construction sites will be selected for observations based on their availability to the researcher, cooperation from construction firms, current stages of project completion (relative to start and finish dates), and site recommendations from industry contacts.

Pilot Results

A pilot test, for the data collection methods proposed, was performed on a commercial construction site in Blacksburg, Virginia. The site superintendent was contacted by the researcher in the Spring of 2010. From there, the researcher was invited to participate in a prescheduled meeting of all of the sub-contractor representatives and managers.

The purpose and process for this study was presented at the meeting to the various subcontractors who agreed to participate. Each representative and Manager was asked to take several Data Collection Forms (Appendix A) to pass out to their team members who would then fill them out throughout the day and return completed forms to the front desk (in the main trailer near the site entrance). The researcher then explained that he would return at a later date to retrieve the completed forms (Figure 13).

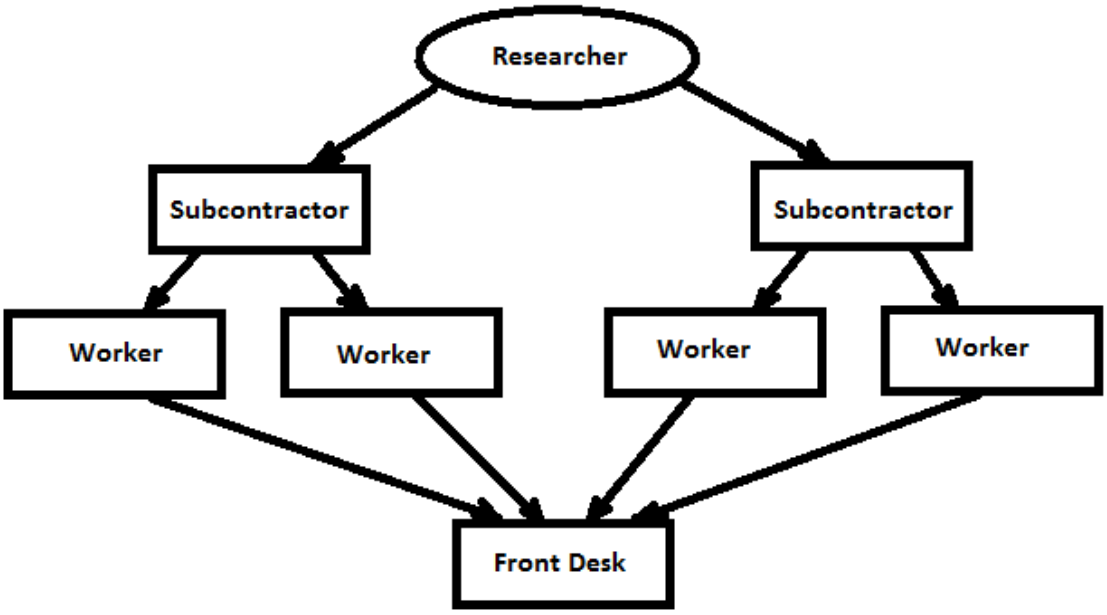

Figure 13 - Data Collection Form Distribution Process (first attempt)

The necessary forms were distributed in the fashion described above with intents to receive a large amount of responses in a short period of time. However participants seemed to be less engaged in the study this way, and did not take the extra time to complete and turn in the forms as a result (no forms were received by the front desk when the researcher returned two weeks later). So to reduce this disassociation, the researcher met again with the project superintendent to develop a new course of action.

The second attempt at data collection took more of a hands-on approach. The site superintendent introduced the researcher to the entire work crew (all subcontractor workers included) during one of their morning meetings and explained that the researcher will be walking the site and asking to borrow a few minutes of their time to answer a few questions (Figure 14). So the researcher did this on several occasions, offering forms to workers individually and answering any questions they had while they filled them out. The researcher first asked each individual to fill out the observation collection form (Appendix 1) and then the ten question survey discussed in the earlier methodology section (Page 10).This method improved the process as responses were returned to the researcher while he was still present onsite (Appendices 2 & 3).

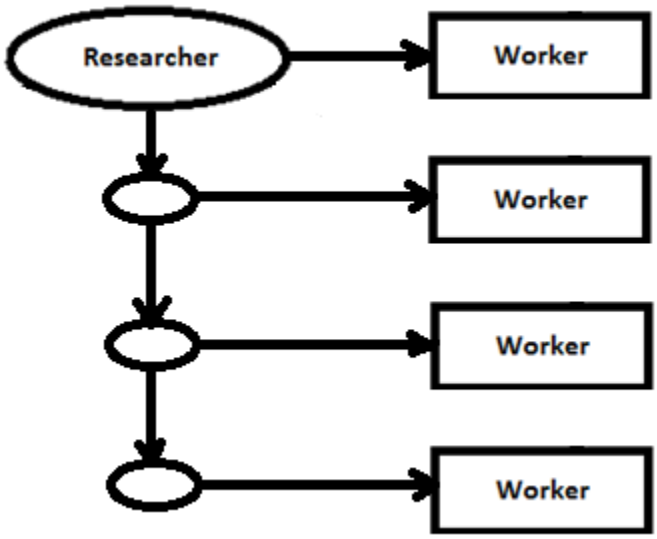

Figure 14 - Observation Form and Survey Distribution/Collection Method Diagram (second attempt)

While the method of obtaining responses had improved, the findings were not what the researcher was looking for. Since the site was very large and small teams were not identified, very few, if any, names were repeated on different form submittals. This made pattern identification impossible, so a different approach has been taken for the following data collection method.

Data Collection Revisions

The two primary difficulties experienced during the pilot were:

- A disconnect or misunderstanding between the participants and what was expected for their answers
- The large size of the construction team greatly reducing the repetition of mentioned team members (lack of pattern recognition).

In order to combat these difficulties, the researcher decided to eliminate the collection of advice seeking instances and only use the survey questions. The researcher also decided to reduce the disconnect created between the participants and the expectations

for their answers by administering the questions in short one-on-one interviews with individual team members. Lastly, smaller teams were sought for subsequent data collection with the expectation that names were more likely to be repeated. A team size of roughly three to ten members was desired.

In addition, and as a result of research pursued for the researcher's coursework, opinion leadership has been added to the current study. As defined by Everett M. Rogers (2003) opinion leadership is "the degree to which an individual is able informally to influence other individuals' attitudes or overt behavior in a desired way with relative frequency." This addition will help to better understand the nature of informal leaders and how they can influence the spread of innovation in the construction industry. To follow the original ten question interview/survey, the following questions have been added:

1. How likely are you to try a new product, process, or idea while working? (rank on a scale between "1" and "5", "1" being least likely and "5" being most likely)
2. How do you most often hear about a new technology or process? From who?
3. What new technologies and construction methods have you seen or heard of while working with your current team?
4. Have you changed the way you perform your work based on this new technology or process? Why or why not? (ask for each technology or process listed in previous question)
5. How long did you use this technology or process? (ask for each technology or process)

These questions are designed to identify the innovative nature of each individual and whether or not they are effective in leading opinions on new ideas or innovations, regardless of whether or not they are favorable to new technologies, processes, or ideas. With this information we may be more able to identify inefficiencies in innovation adoption within the construction industry and also how information flows through construction related social networks.

Account for Limitations

There are several limitations that must be accounted for before further discussion of the findings and potential future research. A critical component of the interview method of collecting information about leadership within small construction teams is to confirm all members of the team have, or will have, participated. Without knowing the perspectives all members in a team, crucial information leading to the identification of informal leaders may be overlooked. So it must be noted that on the general contracting team that was interviewed, two of the eight team members were not present. Significant data was collected on this site, but without the full perspective as mentioned, it is difficult to make complete and accurate conclusions.

To combat this limitation, the researcher must ask all team members to list their coworkers. This provides a more accurate description of the persons on the team and will show if there are any discrepancies between perspectives. Also, if there are

members who are not present during the interviews, the research can allow more ample time to reach those individuals at a later date, or attempt to receive the necessary information about those individuals through the participants that are present at the time.

Additional limitations include the small sample size available to the researcher and the bias associated with interviews rather than first-hand observations. A larger sample size, or even simply participation of larger teams, would most likely increase the identification of leadership roles. First-hand observations, such as on-site video/audio equipment, or the immersion of the researcher into construction team(s) as a case study, would reduce the possibility of missed instances of advice seeking due to the imperfect memory we all have. By taking these adjustments into account in future endeavors, it is hoped to obtain a more complete perspective of the leadership structures on construction teams than the current study has to offer.

Findings

Four different teams were interviewed which totaled at 19 participants. Of the 19 participants, there were seven identified formal leaders, one identified informal leader, and four identified opinion leaders (Figure 15). Leadership status assignments have been made by the researcher based first hand observations as well as the answers obtained during the interview process.

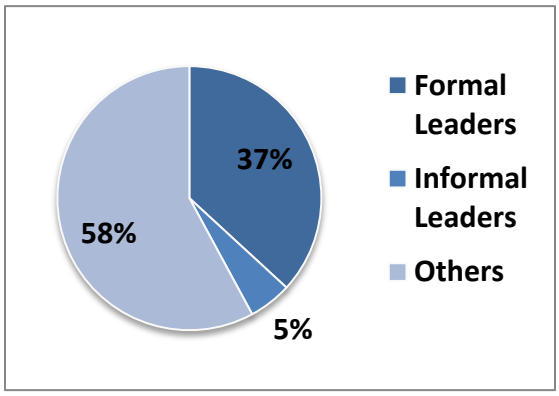

Figure 15 - Leadership Distribution

The first construction site the researcher went to was run by a small residential construction crew assigned to build a custom home in Blacksburg. The crew consisted of four workers, one of which owns the company. To ensure anonymity, designations of “A1 through A4” were used to replace names of those who were interviewed on the interview results chart (Appendix 4). An informal leader, a formal leader, and an opinion leader were all identified based on the observations of the interviewer and the answers given by the participants. In this case, each leader type was a separate person and the leadership structure had enabled the project to be on schedule and on budget. It is interesting to note that the informal leader does not see their self as a leader at work or elsewhere, and in fact they normally turn to the opinion leader or the formal leader for help when needed. It should also be noted that the formal leader is not always on site; so when the formal leader is not available, the informal leader is turned to for advice by the others (Figure 16).

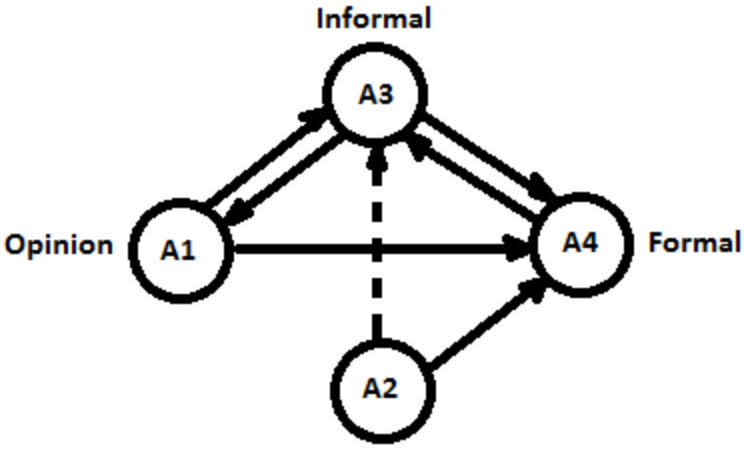

Figure 16 - Advice seeking behavior diagram for first site

On the second site, the team was composed of five members performing electrical work for a general contractor. This site did not appear to have any informal leadership or opinion leadership. There was one identified formal leader who was very efficient in making quick decisions and moving the process along (Figure 17). The efficiency and constant availability of the formal leader may have made it unnecessary to have an informal leader provide advice in the absence of the informal leader. All team members seemed very knowledgeable about the work they were performing which may have reduced the need to seek advice from others. It is also important to note that the team members had been brought together to assist each other on this particular job, but most had not worked together consistently in the past. When asked about the overall status of the project, the formal leader responded that the project is currently on budget and on schedule.

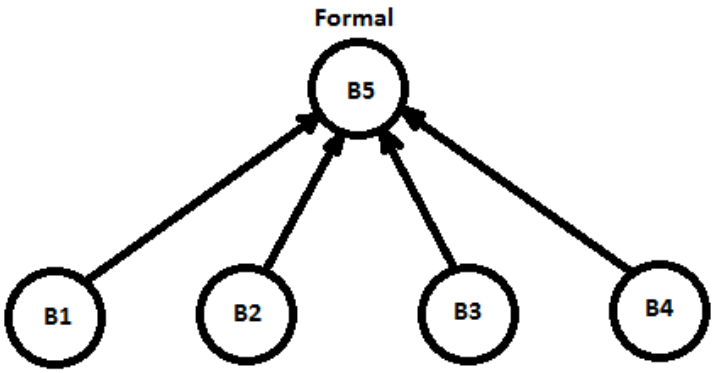

Figure 17 - Advice seeking behavior for the second site

The third site, composed of a subcontracted team assigned to complete the exterior work of several residential homes, also lacked informal and opinion leadership. The formal leader was one of four workers on the team and was also the company owner. What was different about the way this formal leader led is that he seemed much

more open to new ideas and getting feedback or advice from his team members (Figure 18). So while technically the formal leader, he also exhibited qualities you might expect to find in an informal leader. This project was said to be ahead of schedule and either on, or possibly under, budget.

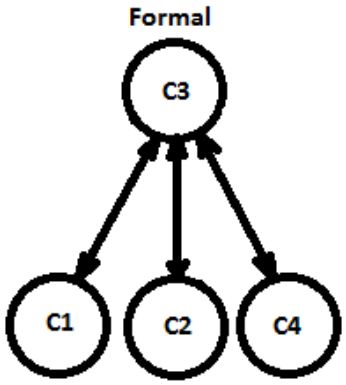

Figure 18 - Advice seeking behavior for the third site

The fourth and last site that was interviewed was a general contracting team providing general management for a commercial project. Of the six total team members that were interviewed, three were identified as opinion leaders, four as formal leaders, and one of the formal leaders (the one with the highest formal title) exhibited characteristics often found in informal leaders. The formal/informal leader was sought after for advice by most other team members due to his extensive experience in construction, rather than just due to his formal title. Other team members were consulted by each other for their particular expertise rather than just their title, but seemingly not to the extent of the formally mentioned leader. This team placed a very high emphasis on innovation and using new processes, tools, or ideas to run their operations more efficiently. All team members exhibited leadership in one form or another as they were assigned the task of managing the site operations of the site. This project was said to be ahead of schedule and on budget, with plenty of remaining opportunity to improve their status as it was still early in the project.

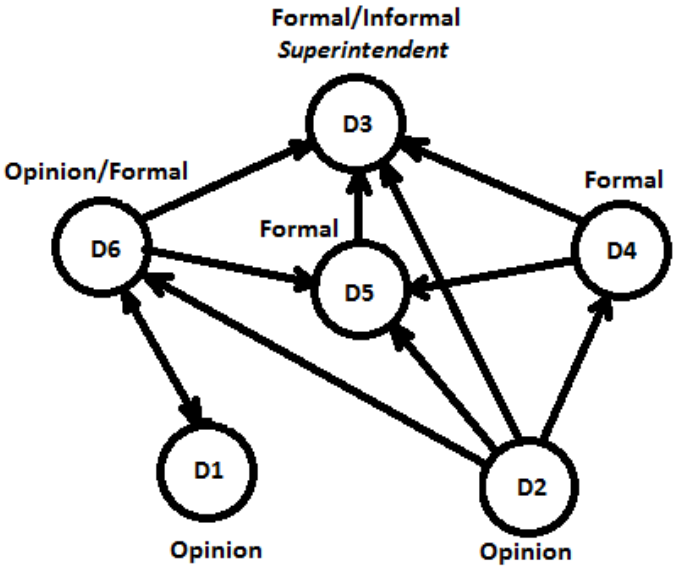

Figure 19 - Advice seeking behavior for the fourth site

Each site had very unique leadership structures and all four projects appeared to be running very smoothly. Two of the sites were actually ahead of schedule and they did not have the presence of informal leadership. There was however more unity among the team members and more idea exchanges between formal leaders and other team members. The interview question answers for each site are listed for comparison in Appendix 4.

Analysis

Once the answers from the interview questions had been compiled, further comparisons were made as illustrated in Tables 1 and 2. Table 1 compares the differences found between formal and informal leaders. Table 2 shows a comparison of the effectiveness and prevalence of the two types of leadership between all four sites.

Table 1 – Informal and Formal leadership characteristics comparison

FINAL COMPILATION OF IDENTIFYING CHARACTERISTICS		
	Informal Leaders	*Formal leaders*
Prevalence of leader	1 out of 19 participants	7 out of 19 participants
View themselves as leaders at work	None	All 7
View themselves as leaders elsewhere	None	All 7
Proximity to advisee	Always on site	Usually on site, further away

Training/Education	Hands-on only	3 out of 7 have BS degrees
Average Age	54	42
Average Industry experience	40	23
Average Company experience	30	14

Table 2 - Effectiveness and prevalence of leadership types on each site

EFFECTIVENESS / PREVALENCE				
	Site One: *Home Builder*	*Site Two:* *Electrical Sub*	*Site Three:* *Exterior Sub*	*Site Four:* *General Contractor*
Informal leaders	1 out of 4	0 out of 5	0 out of 4	O out 6
Formal leaders	1 out of 4	1 out of 5	1 out of 4	4 out of 6
Budget	On budget	On budget	On or under budget	On or under budget
Schedule	On schedule	On schedule	Ahead of Schedule	Ahead of Schedule

Based on these results, it appears that sites without informal leadership identified were often more efficient, yet all sites were still at least on budget and on schedule. Age and hands-on experience seem to be somewhat less important for formal leaders and more important for informal leaders. It should also be noted that higher education was common among most formal leaders, but hands-on experience was more important for those with higher formal titles. Those with the highest formal titles had little or no formal education in construction, only hands-on experience, much like the informal leaders. Self-perception differed between formal and informal leaders, as the informal leader who was interviewed stated that they do not see themself as a leader either at work or other situations (Appendix 4).

Conclusions

From this study, several interesting conclusions can be drawn. First, it appears that although informal leadership is indeed effective and prevalent on some construction teams, formal leadership seems to be more efficient. This is most likely due to the authority associated with their title and how it allows them to make decisions quickly

without hesitation or debate. This suggests that giving an informal leader a formal title may be one way to empower them to be more efficient.

Additionally, more importance seems to be placed on hands-on experience rather than formal education or certifications in terms of leadership effectiveness. Both the informal leader and the formal leaders with the highest titles shared the common characteristic of not going through a formal educating process and, instead, having an extensive background of first-hand construction experience. This suggests that informal leaders may in fact make great candidates for the highest levels of management, even more so than some of the formal leaders who are closer in status.

Contributions

The results and findings of this study have contributed to the general knowledge of construction and leadership practices in several ways. A systematic process for identifying informal leaders has been provided, allowing construction teams to identify and empower informal leaders to make decisions on the job site more efficiently. Basic guidelines for using the developed process are listed as follows:

1. Conduct one-on-one interviews so as to gain individualistic perspectives rather than potentially biased group perspectives
2. Use a short a simple question format as shown in the example in Appendix 3
3. Do not hesitate to stray from the questioning format during interviews if it is relevant to the information that is sought or will provide more accuracy to your results
4. Identify all team members throughout the interview process, asking each participant who they normally work with to identify any discrepancies
5. Collect answers from all participants, allowing amply time after initial interviews to follow up with absent team members
6. Team size but be at least 3 participants to establish leadership structure
7. It is suggested to avoid teams of more than 10 members as names will be repeated less frequently making it difficult to determine leadership structures

Findings suggest that more emphasis should be placed on first-hand or hands-on experience, rather than formal education, for hiring, training, and development processes. Lastly, increasing the availability of formal leaders, either by empowering informal leaders with formal titles or by allowing formal leaders to be closer in proximity more often, may improve efficiency on job sites.

Future Research

Further research into the effectiveness and prevalence of informal leadership on construction sites can be performed in several ways. By collecting a larger sample size, more definitive conclusions may be drawn. To accomplish this, construction site activity could be monitored using audio and visual equipment. Another way to draw more conclusive data would be to perform a case study by working within an organization and witnessing advice seeking behavior first-hand over a longer period of time.

To further test the differences between formal and informal leaders, informal leaders can be identified and promoted using the systematic approach outlined in this study. Then the previously informal leaders could be more directly compared, in terms of effectiveness and efficiency, to formal leaders who have obtained their title due to other qualifications. This process could also be reversed by seeing how well a formal leader performs as a leader without their formal title.

Another step that could be taken would be to see how well an identified informal leader performs when leading a company in a position of higher management. As discussed earlier, formal leaders with the highest formal titles had near identical characteristics in terms of lacking formal education and having an extensive background of first-hand construction knowledge. Another common characteristic was their willingness to hear new ideas and try new processes at the suggestion of others on their team.

A study discussed by Jim Collins, titled “Level 5 Leadership” (2001), suggests the highest level leaders in organizations bring the greatest results for their company when they are what Collins refers to as a “Level 5 Leader.” In contrast to the persona of many leaders of organizations, these level 5 leaders show extreme modesty and humility, often giving more credit to those they are leading than to themselves. Although this contrasts many formal leaders of organizations, it seems to be apparent in informal leaders based on the results and findings formally discussed. This leads us to believe that informal leaders can be greater leaders if or when they are given the opportunity.

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Neubert, M. J. (1999). “Exploring the Dispersion and Gender Composition of Informal Leadership in Manufacturing Teams.” *Small Group Research,* 30(5), 635-646.

This study found that higher informal leadership dispersion in groups was positively correlated with higher team cohesion. It was also found that when a group had a higher percentage of female informal leaders, supervisors rated their performance to be much higher. These findings stress the importance of informal leadership and suggest that female informal leaders may be more effective than male leaders. Available online at http://sgr.sagepub.com/cgi/content/abstract/30/5/635.

Neubert, M. J., and Taggar, S. (2004). “Pathways to informal leadership: The moderating role of gender on the relationship of individual differences and team member network centrality to informal leadership emergence.” *The Leadership Quarterly,* 15(2), 175-194.

This study found gender differences among informal leaders in manufacturing settings. This study however did not establish how informal leaders are established or which gender is generally more effective in an informal leadership position. Available online at http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W5N-4C2FKNK-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1096197648&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=1158335b3c516914f85169027e956ef1.

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This article provides a several definitions of informal leadership that have been collected from prior research. The study confirms a relationship between group efficacy and the dispersion of informal leaders. The results suggest that group efficacy (the confidence a group has in its abilities to complete the task assigned to them) is increased when informal leadership is more prevalent. Available online at http://www.unh.edu/management/faculty/ob/tp/Informal%20Leaders%20and%20the%20Development%20of%20Group%20Efficacy.pdf.

Appendices

Appendix 1 - Data Collection Log Format

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Today's Date: ___________________

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Appendix 2 - Completed Observation Collection Forms (Pilot)

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: DONALD PENDERGRASS **Today's Date:** 5/8/10

Prefered Method of Contact (phone # or email address): 540 599 3534

Advice asked by:	LABORER		**Approximate Time:**
Advice asked from:	G.F.		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☑ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:	SCREW WENT THROUGH ANKLE ON 2ND FLOOR		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	PLUMBERS		**Approximate Time:**
Advice asked from:	ME		8 30
Proximity to one another:	☐ In eye-sight/ear-shot	☑ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☑ To seek guidance
Question Description:	REPLACE INSULATION ON PIPE		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: Gerry **Today's Date:** ______

Prefered Method of Contact (phone # or email address): Jerichotoo@Hotmail.Com

Advice asked by:	Gerry Ritte		**Approximate Time:**
Advice asked from:	Billy O.		5 MIN
Proximity to one another:	[ ] In eye-sight/ear-shot	[X] On the job site	[ ] Off-site (call/email)
Purpose of question:	[X] To seek direction	[X] To seek information	[ ] To seek guidance
Question Description:	An OOPS Needs fixed		
Validity of advice:	[ ] Problem solved	[ ] Situation improved	[X] Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	[ ] In eye-sight/ear-shot	[ ] On the job site	[ ] Off-site (call/email)
Purpose of question:	[ ] To seek direction	[ ] To seek information	[ ] To seek guidance
Question Description:			
Validity of advice:	[ ] Problem solved	[ ] Situation improved	[ ] Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	[ ] In eye-sight/ear-shot	[ ] On the job site	[ ] Off-site (call/email)
Purpose of question:	[ ] To seek direction	[ ] To seek information	[ ] To seek guidance
Question Description:			
Validity of advice:	[ ] Problem solved	[ ] Situation improved	[ ] Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	[ ] In eye-sight/ear-shot	[ ] On the job site	[ ] Off-site (call/email)
Purpose of question:	[ ] To seek direction	[ ] To seek information	[ ] To seek guidance
Question Description:			
Validity of advice:	[ ] Problem solved	[ ] Situation improved	[ ] Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: Dave Elliott **Today's Date:** 5-18-10

Prefered Method of Contact (phone # or email address): _____

Advice asked by:	Tom		**Approximate Time:** 10:00 AM
Advice asked from:	David		
Proximity to one another:	☑ In eye-sight/ear-shot	☑ On the job site	☐ Off-site (call/email)
Purpose of question:	☑ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:	Can you change this pipe?		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	My Dad		**Approximate Time:** 6:00 AM
Advice asked from:	Dave		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☑ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	How are you doing		
Validity of advice:	☐ Problem solved	☑ Situation improved	☐ Problem unsolved

Advice asked by:	Mike		**Approximate Time:** 11:05 AM
Advice asked from:	Dave		
Proximity to one another:	☑ In eye-sight/ear-shot	☑ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:	What are you doing?		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	Dad		**Approximate Time:** 11:06 A.M
Advice asked from:	Dave		
Proximity to one another:	☑ In eye-sight/ear-shot	☑ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	Why did I have to get a latter?		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: MIKE HALL **Today's Date:** 5:22:10

Prefered Method of Contact (phone # or email address):

Advice asked by:	TONY BROWN		**Approximate Time:** 10:30
Advice asked from:			
Proximity to one another:	☒ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☒ To seek information	☐ To seek guidance
Question Description:	LOCATION OF ACESS DOOR		
Validity of advice:	☒ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	TOM KINDER		**Approximate Time:** 11:00
Advice asked from:			
Proximity to one another:	☒ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☒ To seek information	☐ To seek guidance
Question Description:	TO MOVE WATER PIPE		
Validity of advice:	☒ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: JOEY LEE WILLIAMS **Today's Date:** 5-18-10
Prefered Method of Contact (phone # or email address): 540-357-1378

Advice asked by:	CHUCK SMART		**Approximate Time:** 8:00 AM
Advice asked from:	JOEY WILLIAMS		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	WHERE CAN I FIND DRIVE KEYS		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	STEVE HARMON		**Approximate Time:** 8:30 AM
Advice asked from:	JOEY WILLIAMS		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	WHERE DO I TURN THIS ELBOW DOWN		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	STEVE HARMON		**Approximate Time:** 10:00 AM
Advice asked from:	JOEY WILLIAMS		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	HOW MUCH DO I CUT THIS OFF (DUCT)		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	STEVE HARMON		**Approximate Time:** 11:00 AM
Advice asked from:	JOEY WILLIAMS		
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☐ To seek guidance
Question Description:	HOW MUCH PIPE DO I CUT OFF		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: Jacob Riffe **Today's Date:** 5-18-10

Prefered Method of Contact (phone # or email address): _____

Advice asked by:	Jacob		**Approximate Time:**
Advice asked from:	Bill		11:00 a.m.
Proximity to one another:	☐ In eye-sight/ear-shot	☑ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☑ To seek information	☑ To seek guidance
Question Description:	I needed to know where the self-drilling drywall screws were.		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	Joshua		**Approximate Time:**
Advice asked from:	Bill		7:00 a.m.
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☑ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:	I needed a new assignment this morning.		
Validity of advice:	☑ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	Jacob		**Approximate Time:**
Advice asked from:	Gerry		9:00 a.m.
Proximity to one another:	☑ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☑ To seek guidance
Question Description:	I wanted to know if I was properly installing rearview head.		
Validity of advice:	☐ Problem solved	☑ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: _____ **Today's Date:** _____

Prefered Method of Contact (phone # or email address): _____

Advice asked by:	Mark Yanez			**Approximate Time:** 8:50
Advice asked from:	John McGuire			
Proximity to one another:	☐ In eye-sight/ear-shot	☒ On the job site	☐ Off-site (call/email)	
Purpose of question:	☐ To seek direction	☒ To seek information	☐ To seek guidance	
Question Description:	Removal of Decking			
Validity of advice:	☐ Problem solved	☐ Situation improved	☒ Problem unsolved	

Advice asked by:	Clearon Kask			**Approximate Time:** 10:50
Advice asked from:	John McGuire			
Proximity to one another:	☐ In eye-sight/ear-shot	☒ On the job site	☐ Off-site (call/email)	
Purpose of question:	☒ To seek direction	☐ To seek information	☐ To seek guidance	
Question Description:	Clean out Units			
Validity of advice:	☐ Problem solved	☒ Situation improved	☐ Problem unsolved	

Advice asked by:				**Approximate Time:**
Advice asked from:				
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)	
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance	
Question Description:				
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved	

Advice asked by:				**Approximate Time:**
Advice asked from:				
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)	
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance	
Question Description:				
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved	

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: DONALD PENDERGRASS **Today's Date:** 5/20/10
Prefered Method of Contact (phone # or email address): 5405993574

Advice asked by:	TRAVIS HYPES		**Approximate Time:** 8:30 AM
Advice asked from:	ME		
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☒ Off-site (call/email)
Purpose of question:	☐ To seek direction	☒ To seek information	☐ To seek guidance
Question Description:	ABOUT MATERIALS ON ANOTHER JOB		
Validity of advice:	☒ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:	ME		**Approximate Time:** 10:00
Advice asked from:	GARY PAGE		
Proximity to one another:	☐ In eye-sight/ear-shot	☒ On the job site	☐ Off-site (call/email)
Purpose of question:	☒ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:	WEEK END OVER TIME		
Validity of advice:	☐ Problem solved	☒ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Advice asked by:			**Approximate Time:**
Advice asked from:			
Proximity to one another:	☐ In eye-sight/ear-shot	☐ On the job site	☐ Off-site (call/email)
Purpose of question:	☐ To seek direction	☐ To seek information	☐ To seek guidance
Question Description:			
Validity of advice:	☐ Problem solved	☐ Situation improved	☐ Problem unsolved

Appendix 3 - Post Observation Survey Responses (Pilot)

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: DONALD PENDERGRASS **Date:** 5/18/10

1. What is your age? 46

2. How long have you worked in the construction industry?

8 YEARS

3. How long have you worked for the company you currently are employed with?

8 YEARS

4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)

TRADE

5. What is your formal job title?

INSULATION MECH.

6. How long have you held your current job title?

5 YEARS

7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.

GARY PAGE
MIKE CUPP

8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.

MATERIALS
JOB PERFORMANCE

9. Do you see yourself as a leader at work? Circle one: **(YES)** / **NO**

10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

YES
FRIENDSHIPS RELATIONSHIPS SAFE ON MY TIME OFF

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: Dave Elliott **Date:** 5-18-10

1. What is your age? 38

2. How long have you worked in the construction industry?

19 years

3. How long have you worked for the company you currently are employed with?

9 yrs

4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)

Medical gas certified

5. What is your formal job title?

Plumber

6. How long have you held your current job title?

9 yrs

7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.

My Boss

8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.

He ~~Boy~~ has a task for each of us to complete each day

9. Do you see yourself as a leader at work? Circle one: (YES) / NO

10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

Yes. I am also a father of three.

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: MIKE HALL **Date:** 5-22-10

1. What is your age? 53

2. How long have you worked in the construction industry?

35 YRS

3. How long have you worked for the company you currently are employed with?

18 YRS

4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)

GRADUATED HIGH SCHOOL

5. What is your formal job title?

SHEETMETAL FOREMAN

6. How long have you held your current job title?

10 YRS

7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.

FROM JOB SUPER

8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.

FOR INFORMATION OR DIRECTION

9. Do you see yourself as a leader at work? Circle one: **YES** / **NO**

10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

COACH REC BALL

BOSS AT HOME

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: JOEY LEE WILLIAMS SR **Date:** 5-18-10

1. What is your age? 39

2. How long have you worked in the construction industry?

22 YRS

3. How long have you worked for the company you currently are employed with?

16 YRS

4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)

SUPERVISOR TRAINING ON THE JOB, SAFTEY TRAINING

5. What is your formal job title?

SHEETMETAL MECHANIC / WELDER

6. How long have you held your current job title?

14 YRS

7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.

MARK HARMON

8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.

JOB SUPERVISOR, HE OVERSEES ALL THE DAY TO DAY FUNCTIONS

9. Do you see yourself as a leader at work? Circle one: (YES) / NO

10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

HOME, SCV / SONS OF CONFEDERATE VETERANS

All names listed on this form will remain anonymous in all published or otherwise publicly submitted material.

Completed By: Jacob Riffe **Date:** 5-18-10

1. What is your age? 26

2. How long have you worked in the construction industry?

9 years

3. How long have you worked for the company you currently are employed with?

8 years

4. What formal training/educational programs have you completed? (Trade school, associate's degree, bachelor's degree, etc.)

Carpenter's Apprenticeship School

5. What is your formal job title?

Union Carpenter

6. How long have you held your current job title?

5 years

7. Who do you normally seek advice from on the construction site when a problem arises relating to the task you have been assigned? If there is more than one person please list them as well.

Our Job Superintendant or Foreman.

8. Why do you generally seek advice from this person? Please list reasons for seeking advice from all persons mentioned in previous answer.

They are held responsible for the finished product of what we are building or installing.

9. Do you see yourself as a leader at work? Circle one: (YES) / NO

10. Do you see yourself as a leader in other situations? If you do, what are the other situations? (Examples: sports teams, at home, volunteer work, etc.)

At home, church, or when I am helping friends or family

Appendix 4 – Site interview answer comparisons

DATA FROM FIRST SITE					
		A1	A2	A3	A4
1	Age	28	52	60	54
2	Construction Experience	12	30	42	40
3	Experience with Company	6	15	34	30
4	Formal training/education	Some College	Hands on	BS in Architecture	Hands on
5	Job Title	Carpenter	Carpenter/Painter	Company Owner	Carpenter
6	How long title has been held	6 years	15 years	34 years	30 years
7	Advice usuaully sought from	A3 or A4	A3	A4	A3
8	Why sought from this person	position/experience	position (he's the boss)	experience	position (boss)
9	Leader at work?	No	No	Yes	No
10	Where else?	At home, w/ friends	At home	Yes, in general	No
11	How likely to try new things	5 at home, 2 at work	3	3	5
12a	How do you hear about it	magazines, reading	from boss	word of mouth, magazines	word of mouth
12b	Who do you hear it from	trade magazines	boss	no one in particular	From A1
13	What new things have you used A)	New roofing membrane	Water-base stain	nothing in particular	new roofing material
	B)	Water-base stain			
	C)	New wood epoxy			
14	How/if changed work style A)	Applied same as before	must be more careful	some things differently	put on the same way
	B)	Must be more careful			
	C)	More repairs, less replace			
15	how long new idea/process used	Only 1 job, will use again	1 job so far	N/A	1 job so far
	Perceived Leadership Status:	Opinion	None	Formal	Informal

DATA FROM SECOND SITE						
		B1	B2	B3	B4	B5
1	Age	47	21	49	42	32
2	Construction Experience	29	2.5	30	24	19
3	Experience with Company	7	2.5	6	18	2
4	Formal training/education	Class B Contractor's Lic.	Apprenticeship	Master Electrician	Hands on	Master Electrician
		Traffic Control Lic.			Classes/Films	OSHA/Traffic
		Flagger Operations Lic.			Certifications	VDOT Traffic Control
						BS Engineering
5	Job Title	Foreman	Laborer	Project Foreman	Foreman	Project Manager
6	How long title has been held	5 years	2.5 years	2 years	17 years	2 years
7	Advice usuaully sought from	B5	B1 or B5	B1	B5	no one
8	Why sought from this person	position (he's the boss)	They're the boss	Boss	Boss (solves issues)	N/A
9	Leader at work?	Yes	Yes	Yes	Yes	Yes
10	Where else?	Coaching, others	Motorcycle racing	Several places	At home	Outfitters (Outdoor)
11	How likely to try new things	2.5 (anything if beneficial)	5	4	5	4
12a	How do you hear about it	magazines, postings, demos	Commercials, magazines	Product Suppliers	Word of mouth	Classes, Training
12b	Who do you hear it from	spokes persons	anybody	anybody	Project Manager (offsite)	In house programs
13	What new things have you used	Keyed recepticle	none specific	Not many recently	none in particular	Several
14	How/if changed work style	Not yet, but same principle	not usually	N/A	N/A	Sometimes different
15	how long new idea/process used	Not used yet	none specific	N/A	N/A	Often times easier
	Perceived Leadership Status:					Formal

DATA FROM THIRD SITE					
		C1	C2	C3	C4
1	Age	29	57	49	40
2	Construction Experience	12	10	35	25
3	Experience with Company	12	3	15	14
4	Formal training/education	On the job / hands-on	Hands-on	Hands-on	Job Core
5	Job Title	Carpenter/Installer	Laborer/Installer	Company Owner	Cut man/Installer
6	How long title has been held	12 years	3 years	15	14
7	Advice usuaully sought from	C3	C3	Contractors, Everyone	C3
8	Why sought from this person	position (he's the boss)	Experience (he knows everything)	Promote Collaboration	He's the boss
9	Leader at work?	No	No	Yes	Yes
10	Where else?	At home	At home, Cooking	At home	At home
11	How likely to try new things	5	2	4	4.5
12a	How do you hear about it	Suppliers, Contractors	Internet	Lumber companies	See it in stores
12b	Who do you hear it from	Who we build for	Internet	Lumber companies	Anyone
13	What new things have you used	Prefinshed Hardiboard	New hardiboard System	Hardiboard and new saw	Hardiboard
14	How/if changed work style	Process similar, more careful	Same process, so no	more demanding, no paint, pays more	Cleaner cuts, more careful
15	how long new idea/process used	Only this job so far	4 days, just this job	Have used before this job	Two other houses prev.
	Perceived Leadership Status:			Formal	

DATA FROM FOURTH SITE							
		D1	D2	D3	D4	D5	D6
1	Age	25	24	56	27	43	29
2	Construction Experience	2	4	29	7	16	13
3	Experience with Company	0.75	1	29	7	7	6
4	Formal training/education	BS Architecture	BS Civil Engineering	Hands-on	Hands-on	LEED AP, Hands-on	BS Construction Manag.
							LEED AP, Company Training
5	Job Title	Office Engineer	Project Engineer	Superintendent	Assitant Superintendent	Project Manager	Project Manager
6	How long title has been held	0.75 years	0.5 years	20 years	2 years	7 years	0.25 years
7	Advice usuaully sought from	D6	D5, D6, D3, D4	Usually come to me, idea exchange	D3 or D5	D3	D1, D3, D5
8	Why sought from this person	Supervisor / Proximity	experience/knowledge	Rely on experience of others	Experience for both	A lot of Experience	Experts in Fields
9	Leader at work?	Yes w/ BIM	Yes	Yes	Yes	Yes	Yes
10	Where else?	At home	Habitat for Humanity	Everywhere	At home, Softball	In general	Coach of Softball Team
11	How likely to try new things	5 on a daily basis	5	4	4	3.5	5
12a	How do you hear about it	Corp. BIM, Meetings	Meetings, Conferences	Meetings, classes, other jobs	From Subcontractors	Research, Trade publications	Conferences, Managers
12b	Who do you hear it from	Corporate BIM	Managers	Other sites or entities of company	From Subcontractors	Company, Subcontractors	Fresh-out-of-school Associates
13	What new things have you used	New BIM Processes	Blue Beam Software	Not many b/c foundation is standard	Caissons/drilling processes	Soil Improvement	Lean Scheduling
			Lean Construction Tracking	BIM			Higher Detail BIM
			Buzz Saw Program				"Agilia" self-leveling concrete
14	How/if changed work style	Constantly learning	All done much differently	Used to much higher magnitude	Learning everyday	Managed same way	Value added, less labor req.
15	how long new idea/process used	Throughout the project	6 months	Used for 5 years, but not this much	On this job, based on site condition	On this site	BIM - progressive, Conc. 0.25 yrs
	Perceived Leadership Status:	Opinion Leader	Opinion Leader	Formal/Informal Leader	Formal Leader	Formal Leader	Opionion/Formal Leader