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Study of Various Construction Job Functions to Address Workforce Challenge

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ABSTRACT

Lack of construction workforce is one of the most predominant challenges faced by the construction industry. It is predicted that the industry will have a major shortage of skilled labor in the next decade due to the retirement of baby boomers and the lack of new talent entering the industry to replace these baby boomers. To attract young talent into the construction industry, it is critical to make them aware about the industry regarding various job functions as it relates to job satisfaction, compensation and career fulfillment. The purpose of this study is to gain insight of various construction job functions from construction employees regarding job satisfaction, compensation satisfaction, work hours per week, recommending a career in construction, fulfillment in their line of work and correlation between various factors. To achieve this, the researchers developed and distributed a five-point scale nine-question survey to project managers, project executives, superintendent, field personnel and office admin employees in the state of Arizona. The study revealed that the total annual income had a positive linear relationship with job satisfaction, number of work hours per week did not have any correlation with the job satisfaction and number of years worked in the construction industry had a positive linear relationship with the total annual income.

Keywords: Career, Construction, Compensation, Job, Satisfaction

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INTRODUCTION

Construction industry has contributed to 4.49% of the economy in the United States, resulting in $1.3 trillion towards the national gross domestic product (GDP) (U.S. Census Bureau, 2017). Between 1998-2012, the average GDP was 4.4%, topping out at 5.1% between 2005 and 2006 (U.S. Dept. of Commerce, 2013). Reports indicate a rise in construction spending with predicted growth rates averaging 7.8% through the year 2020 (Becker et al., 2014). The Bureau of Labor Statistics projects 790,400 new construction jobs by 2024, but the industry faces a deficit (Bureau of Labor Statistics, 2017; Seresht, 2015).

This shows that the demand for construction increases while the amount of qualified skilled workers declines. In an industry where labor costs account for 30% to 50% of the total project cost it is imperative to have adequate influx of high quality workers (Karimi et al., 2018). Performance of a project is also impacted by the availability of skilled craft labor in the construction industry (Karimi et al., 2017). In 2015, the Associated General Contractors of America conducted an industry-wide survey in which over 1,300 firms participated and found that 86% of contractors had difficulty finding personnel to fill roles for qualified craft workers and salaried jobs. Among the most difficult hourly craft professional positions to fill were carpenters, sheet metal installers, and concrete workers. The most difficult salaried professional positions to fill include project managers/supervisors, estimating professionals, and engineers (AGC, 2015). Moreover, 82% of builders responded that the single most significant problem in 2017 was increased construction cost and the lack of availability of skilled labor (Chaluvadi, 2017). Taylor et al. (2016) also researched the North American construction companies and found that the skilled labor shortage had an impact on about 52% of the surveyed projects.

This shortage of construction workforce is only compounded by a lack of education towards young adults to generate their interest in construction as a career path (Johnson, 2013). In a recent poll of over 2,000 young adults (ages 18-25), it was found that only 3% had considered construction as their career path (Quint, 2017). One of the most important factors affecting a career choice in young adults is compensation and job satisfaction (Chileshe et al., 2009). According to Quint (2017), 87% of young adults have a misconception that construction positions in the form of trades and managers do not command high compensation. However, the notion that construction positions do not offer a high compensation conflicts with the study of Bureau of Labor statistics. They reported an average annual salary of $53,110 for construction equipment operators, $55,770 for electricians, and $98,320 for Construction managers and reported average yearly earnings for all construction employees at $60,195 (Bureau of Labor Statistics, 2017). Nevertheless, with 7.23% of the nation’s employment and between 4-7% of the nation’s GDP there is a growing urgency within the construction industry to develop an effective and practical solution to attract young talent and retain existing talent into the construction industry.

According to National Center for Construction Education and Research (NCCER), 41% of today’s workforce in the construction industry will be retiring within the next couple of decades (Burris, 2017). Escamilla and Ostadalimakhalbf (2016) studied the fundamental factors that impact recruitment of potential workforce and concluded that construction career path perception and career advancement in construction were the top barriers for recruiting construction workforce. To address this challenge, this study aims to understand and analyze the current employee’s satisfaction in the construction industry in the state of Arizona in terms of their job duties, compensation, work hours per week, meaning in their line of work and if they recommend a career in construction. Similar construction employee satisfaction studies have been performed in the construction industry in other countries (Salisu et al., 2015; Zaniboni et al., 2016). As per Albattah et al. (2019) the demand of construction workers varies by region in the Unites States and the West and South region face
the greatest shortage of workers. The objective of this study is to give a better representation of the construction industry in one of the western states of Arizona in terms of job satisfaction, compensation and the correlation between different job functions to employee satisfaction to attract young talent into the construction industry and retain existing talent.

METHODOLOGY

The research methodology included four phases as outlined in Figure 1.

**Figure 1. Methodology Process Overview**

### Phase 1: Identification of Study Objectives

The first phase was to identify the purpose of the study and its relevance to the construction industry. It was identified that gaining insight pertaining to various careers in the construction industry from construction employees for the benefit of attracting future talent, retaining new and current construction employees was a key objective. In particular, the following objectives were to be accomplished through the study:

1. Measurement of employee satisfaction regarding the actual job function, their compensation and number of average working hours in the industry.
2. Correlation between employee satisfaction and multiple job functions such as compensation, work hours and number of years in the construction industry.

### Phase 2: Contact List Development

To have respondents that will reflect the variety of entities in the construction industry, general contractors and subcontractors were identified as the prime participants in the study. From the author’s pool of resources, a total of 147 participants were contacted to be a part of this study. The response rate of 70% (103 out of 147 total participants) was achieved for this study. The participants consisted of different positions within the construction industry outlined in Table 1 that range from executive positions to the field personnel. However, five of the thirteen job titles had small number of respondents (less than 4) and are compiled into one category as “Others” that include administration and coordinator positions within a company.

**Table 1. Survey Participants**

<table>
<thead>
<tr>
<th>Title</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Project Manager</td>
<td>3.9%</td>
<td>4</td>
</tr>
<tr>
<td>Executive</td>
<td>11.7%</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>12.6%</td>
<td>13</td>
</tr>
<tr>
<td>Project Engineer</td>
<td>21.4%</td>
<td>22</td>
</tr>
<tr>
<td>Project Manager</td>
<td>23.3%</td>
<td>24</td>
</tr>
<tr>
<td>Sales</td>
<td>3.9%</td>
<td>4</td>
</tr>
<tr>
<td>Skilled Trade / Craftsman</td>
<td>9.7%</td>
<td>10</td>
</tr>
<tr>
<td>Superintendent</td>
<td>13.6%</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>103</strong></td>
</tr>
</tbody>
</table>

### Phase 3: Distribution of Survey

A nine-question electronic survey was distributed to the participants to collect the data and relevant information for the study. However, prior to the mass electronic distribution, ten individuals were selected from the list and surveyed via telephone as a pilot testing of survey to request additional insight and feedback from survey participants. Based on the lessons learned and feedback from pilot testing, the survey was modified and distributed to all the participants. The responses on the survey were recorded on a five-point scale with 1 being strongly disagree and 5 being strongly agree for Questions 1 to 5.

1. I am satisfied with my current job.
2. I am satisfied with my compensation (wages/salary/benefits).
3. I recommend a career in construction.
4. The work I do is meaningful.
5. What is your current job title?
6. What was your total income before taxes during the past 12 months?
7. How many hours do you typically work in one week?
8. What is the highest level of education you have completed?
9. How many years of experience do you have in the construction industry?

Phase 4: Analysis of Results

The data collected was analyzed in relation to the objectives of the study to measure among various job functions within the construction industry as follows:

1. Job, compensation satisfaction and work hours per week,
2. If survey participants recommend a career in construction,
3. If survey participants find meaning in their work, and
4. The correlation relationship between job satisfaction, compensation and number of years in the construction industry.

FINDINGS

The analysis for this study has been broken down into four sections: survey results, correlation between total income and job satisfaction, correlation between number of work hours per week and job satisfaction and correlation between total income and number of years worked in the construction industry.

Survey Results

A total of 103 participants responded to this study. Table 2 display the overall results of the survey regarding satisfaction of the job, compensation, career recommendation and meaning in their line of work.

Job satisfaction resulted in an average score of 4.19 out of 5, based on a five-point scale. The categories with the highest values of job satisfaction are Executive (4.58) and Sales (4.50). The categories of job titles with the lowest values of job satisfaction are Superintendent (3.78), and Skilled Trade and Project Manager (4.1) With respect to job satisfaction, 86.41% of the respondents agree or strongly agree that they are satisfied with their current job.

Satisfaction with compensation resulted in an average score of 3.82 out of 5. The categories with the highest values of satisfaction with compensation are Sales (4.5) and Project Engineer (4.14). The categories with the lowest values of satisfaction with compensation are Assistant Project Manager (3.50) and Superintendent (3.79). Overall, 74.76% of the participants agree or strongly agree that they are satisfied with their compensation in the industry.

For recommending a career in construction the scores resulted in an average score of 4.23 out of 5. The categories with the highest values of recommendation are Executive (4.75) and Project Manager (4.33). The categories with the lowest values of construction career recommendation are Superintendent (3.79) and Skilled Trade (4.00). Overall, 86.41% of the participants agree or strongly agree that they are satisfied with their compensation in the industry.

Table 2. Survey results

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Agree Or Strongly Agree (Score of 4 and 5)</th>
<th>Neither Agree Nor Disagree (Score of 3)</th>
<th>Disagree Or Strongly Disagree (Score of 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – I am satisfied with my current job.</td>
<td>86.41%</td>
<td>7.77%</td>
<td>6.80%</td>
</tr>
<tr>
<td>2 – I am satisfied with my compensation (wages/salary, benefits, perks, etc.)</td>
<td>74.76%</td>
<td>14.56%</td>
<td>11.65%</td>
</tr>
<tr>
<td>3 – I recommend a career in construction.</td>
<td>86.41%</td>
<td>12.62</td>
<td>0.97%</td>
</tr>
<tr>
<td>4 – The work I do is meaningful.</td>
<td>94.17%</td>
<td>3.23%</td>
<td>2.91%</td>
</tr>
</tbody>
</table>
agree that they would recommend a career in the construction industry.

Satisfaction with work as being meaningful resulted in an average score of 4.47 out of 5. The categories with the highest ‘meaningful’ scores are Executive (4.83) and Assistant Project Manager (4.75). The categories with the lowest ‘meaningful’ scores are Superintendent (3.93), and Other – Admin and Coordinator (4.38). Overall, 94.17% of the participants agree or strongly agree that they find their line of work and job function meaningful in the construction industry.

Table 3 and Table 4 outlines the compensation in the form of total income based on the different job functions and the level of education of the participants.

Table 3. Total income for the respondents

<table>
<thead>
<tr>
<th>Title</th>
<th>Total # of Participants</th>
<th>Average Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Project Manager</td>
<td>4</td>
<td>$33,749</td>
</tr>
<tr>
<td>Executive</td>
<td>12</td>
<td>$137,499</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>$52,363</td>
</tr>
<tr>
<td>Project Engineer</td>
<td>22</td>
<td>$68,863</td>
</tr>
<tr>
<td>Project Manager</td>
<td>24</td>
<td>$101,457</td>
</tr>
<tr>
<td>Sales</td>
<td>4</td>
<td>$126,349</td>
</tr>
<tr>
<td>Skilled Trade / Craftsman</td>
<td>10</td>
<td>$48,999</td>
</tr>
<tr>
<td>Superintendent</td>
<td>14</td>
<td>$73,928</td>
</tr>
</tbody>
</table>

From the participants in the study, Executive and Sales had the highest salary whereas Assistant Project Manager and Skilled Trade / Craftsman had the lowest salary. The median wage across all industry sectors in United States is $50,620 (Bureau of Labor Statistics, 2018). 82 out of the 103 (79.6%) respondents reported their salaries are above this national median salary. The average salary of all the respondents is $79,436 which is 36% higher compared to the median salary in all industry sectors.

As expected the average income is higher depending on the level of education of the participants. Upon performing ANOVA test, the results were found to be statistically significant with a p-value of 0.0001 at the 95% level. The level of education had a direct correlation to the average annual income in the construction.

Table 4. Total income for the respondents based on the education level

<table>
<thead>
<tr>
<th>Education</th>
<th>Total # of Participants</th>
<th>Average Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Degree</td>
<td>9</td>
<td>$88,928</td>
</tr>
<tr>
<td>Undergraduate Degree</td>
<td>43</td>
<td>$84,458</td>
</tr>
<tr>
<td>No Undergraduate Degree</td>
<td>51</td>
<td>$71,210</td>
</tr>
</tbody>
</table>

To understand the average number of hours worked per week for each job function each participant was asked to report the number of hours per week. The results are outlined in Table 5.

Table 5. Average number of work hours per week

<table>
<thead>
<tr>
<th>Title</th>
<th>Total # of Participants</th>
<th>Average # of Hours Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Project Manager</td>
<td>4</td>
<td>34.75</td>
</tr>
<tr>
<td>Executive</td>
<td>12</td>
<td>53.00</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>43.19</td>
</tr>
<tr>
<td>Project Engineer</td>
<td>22</td>
<td>48.80</td>
</tr>
<tr>
<td>Project Manager</td>
<td>24</td>
<td>50.88</td>
</tr>
<tr>
<td>Sales</td>
<td>4</td>
<td>50.50</td>
</tr>
<tr>
<td>Skilled Trade / Craftsman</td>
<td>10</td>
<td>47.95</td>
</tr>
<tr>
<td>Superintendent</td>
<td>14</td>
<td>51.82</td>
</tr>
</tbody>
</table>

Executive and Superintendent reported the highest number of work hours per week whereas Assistant Project Manager and Other – Admin and Coordinator reported the lowest number of work hours per week. Overall, 79 out of 103 (76.6%) respondents reported an average of 41 to 60 hours per week. This is higher than the average work hours across other sectors in the US of 40.3 hours per week. The average of all the respondents was 48.9 hours per week (17.5% higher than the average work hours in other sectors).

Job Satisfaction vs Total Income

To determine if there was a correlation between the level of job satisfaction and the annual income of the respondents a scatter plot was plotted as shown in Figure 2. The scatterplot depicts the relationship between job satisfaction and the meaningful work of the respondents.
Upon performing ANOVA test, the results were found to be statistically significant with a p-value of 0.0036 at the 95% level. Furthermore, the correlation coefficient value of 0.297 suggests that there is a moderate positive relationship between total income and job satisfaction of the survey respondents.

**Number of Work Hours per Week vs Job Satisfaction**

To determine if there was a correlation between the level of job satisfaction and the number of hours worked per week by respondents a scatter plot was plotted as shown in Figure 3. The scatterplot depicts the relationship between total income and the job satisfaction of the respondents.

Upon performing ANOVA test, the results were not statistically significant with a p-value of 0.679 at the 95% level. Furthermore, the correlation coefficient value of 0.04 suggests that there is no positive or negative relationship between number of hours worked per week and the job satisfaction of the survey respondents.

**Total Income vs Number of Years in the Industry**

To determine if there was a correlation between the number of years worked in the industry and the total annual income by respondents a scatter plot was plotted as shown in Figure 4. The scatterplot depicts the relationship between the number of years worked in the industry and the total income of the respondents.

Upon performing ANOVA test, the results were statistically significant with a p-value of 0.000000012 at the 95% level. Furthermore, the correlation coefficient value of 0.55 suggests that there is a moderate to high relationship between number of years worked per week and the total income of the survey respondents.

**CONCLUSIONS AND RECOMMENDATIONS**

The objective of the study was to identify and analyze the satisfaction among the current employees in the construction industry in the state of Arizona that can be used to attract future talent and retain current talent. From the study it was identified that 86.41% of the employees surveyed in the construction industry in Arizona are satisfied with their current job and would recommend a career in the construction industry. With a shortage of workforce in the construction industry it is critical that the future workforce be
educated regarding the current employee satisfaction in the field of construction management. In contrast to the misconception of the salary in the construction industry 74.76% of the respondents reported that they are satisfied with their current salary. The average salary of the respondents was $79,436. Compensation is one of the most important aspects for a young professional to choose a specific career path. Educating the future workforce regarding the enticing compensation in the construction industry can attract future young talent.

Based on the study it is concluded that the construction industry offers a plethora of satisfying and well-paying career paths. The respondents did report an average work week of 48.9 hrs. per work week which is 8.6 hrs. more compared to the average work week of other sectors. However, along with satisfaction with job and compensation, 94.17% of the respondents also reported as finding the work that they perform to be meaningful. The respondents that provided an in-depth feedback about the construction industry is valuable in that the comments validate the results of the study and provides a more in-depth positive outlook on the construction industry as a career.

Out of the three correlation factors it was concluded that total income had a moderate positive relationship with the job satisfaction whereas total number of hours worked per week had neither positive nor negative relationship with the job satisfaction. It was also concluded that total numbers of years in the construction industry has a moderate to strong positive relationship with the total annual income for the survey respondents.

REFERENCES


Implementing Unbiased Decision-Making in Construction: A Lean Approach

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ABSTRACT

Construction project-teams are frequently faced with the task of decision-making as part of their responsibility. The positive effects of the decisions made at various stages of the projects lead to improved project performances, while negative effects can hinder the performances. The project-teams take up the task of decision-making surrounded by multiple criteria, which can be arduous and clouded with subjectivity. This paper presents an approach based on the Lean principle of providing more autonomy to the project-teams and supporting collaborative and decentralized process in pursuit of unbiased decision-making. This Lean way of decision-making is formalized as Choosing by Advantage (CBA), which is explained through a descriptive case study in this paper. Due to the minimal literature available on the adoption and application of CBA in the construction industry, this paper will enable the readers to understand the CBA process through an actual situation faced by the project team of the case study project.

Keywords: Decision-making, Choosing by Advantage, Lean, Unbiased decision-making

Somik Ghosh, PhD has built his expertise in Lean construction over the past eight years by actively conducting research on various aspects of Lean construction and promoting its benefits. He values the importance of collaboration with industry for research to practice initiatives and has partnered with the industry to investigate the efficacy of the different Lean tools.

Michelle Robinette, MS is currently working as Senior Project Manager has developed her expertise in Lean tools and Integrated Project Delivery method.

Howard Tapia, MS is currently working as Superintendent has developed his experience in Lean tools and managing complex projects.
Introduction

Decision-making is the art of choosing between two or more possibilities of future actions. Like many human endeavors, decision-making plays a critical role in the outcome of construction projects. Construction projects are immensely impacted by the decisions made by the project-team at various stages throughout the project lifecycle. The multitude of decisions made during any project are motivated by the project goals and achieving better project outcomes. While the positive influence of decision-making can be realized in the form of improved project performances, negative influence can hinder the performances. Emuze and Smallwood (2012) in the context of the South African construction industry, identified associations with poor performances of construction projects with project teams’ decision-making outcomes. Poor project performances can manifest themselves as schedule delays, cost overruns, defective work and/or rework (Meng, 2012). Project performances depend on a variety of external and internal factors. The external factors that affect the project performances can range anywhere from unforeseen weather conditions to delays in deliveries. The internal factors that affect the project performances pertain to the decisions adopted by the project-team (Meng, 2012). Decision-making, thus, has a major impact on the performance of the construction project and a practice that should be seriously considered by the project-team members.

The fact that project-teams will have to participate in decision-making when managing any construction project (large or small) is indisputable. The consequential nature of decisions made at various stages of the project such as during the design stage is equally important to those made during the construction stage. Both types of decisions have far reaching interdependencies and can create ripple effects, which impact critical project outcomes: cost, schedule, quality, and safety. While the project-team might find more time at their disposal to weigh the possible outcomes of critical decisions during the design phase, decisions during the construction phase require timely and sometimes immediate solutions to allow the work to progress in accordance with the schedule. The project-teams are expected to make decisions based on variety of factors that meet the need of the project. This can be an arduous task for the project-team as they need to be flexible and yet not be influenced by biases based on personal experiences of the team members while making the decisions. A Lean approach to facilitate the decision-making process among the construction project-teams can theoretically increase effectiveness and reduce the prejudice or personal biases.

Lean offers many strategies that can be used to bolster collaboration among the project-team and encourage integrated teams to make decisions at the last responsible moment based on the available information. For example, in set-based design within the Lean approach, the design team develops multiple design alternatives to allow the selection of an optimal option to achieve project goals. This approach provides more autonomy to the project-teams and supports collaborative, decentralized decision-making in pursuit of systems optimization. This Lean approach of decision-making can be formalized by using Choosing by Advantage (CBA), which is a Multi-Criteria Decision-Making (MCDM) method. Researchers such as Parrish & Tommelein (2009) and Arroyo et al. (2012) have claimed that the CBA method and Lean thinking are aligned in many ways. CBA supports the values of Lean by supporting multi-discipline collaboration and replaces subjectivity with unprejudiced decision-making process. The CBA method is new to construction practitioners and has minimal documentation; detailed explanation of the process is critical for the practitioners to successfully adopt and implement the process.

This paper aims to provide better understanding of the application of the CBA method in situations where the project-team normally struggles to choose between two or more actions that are similarly attractive. Other forms of MCDM tools available are described briefly followed by the step-by-step implementation of CBA through a descriptive case study. Due to the lack of literature on CBA, an explanation of the process through a descriptive case study was deemed to be the most appropriate approach. The case study presented in the paper will enable the readers to understand the CBA process through an actual situation faced by the project team of the case study project. With the rise of integrated project-teams comprising members of various disciplines within the construction
paradigm, CBA offers a formal, unprejudiced, and informed decision-making method that assists the team in making decisions to support the project goals.

**Multiple Criteria Decision-Making Process**

The complexity of the modern construction project can be daunting to even the most seasoned construction professional. The size and scope of a multimillion-dollar project is akin to the interworking of a bustling city. Each construction phase consists of extensive processes and procedures, as well as, an array of organizations responsible for producing a project. It is not uncommon for the project-team to be forced to alter a decision made during the design phase or create a work around to accommodate such a decision, during the construction phase. The most agile and efficient construction companies understand this and have implemented procedures to allow decisions to be made in an informed and timely manner. One such method is the Multiple Criteria Decision-Making Process (MCDM).

Xu and Yang (2001) state, “multiple criteria decision making (MCDM) refers to making decisions in the presence of multiple, usually conflicting, criteria.” This is a very simplified definition for a construct which can explicitly evaluate the various solutions to a complex problem. By investigating the criteria for each solution, a design team can make an informed and timely decision for the advancement of the project. It is important to note that MCDM is very complex and has many variations and hybrids. This section will present a simplified description of MCDM and then explain the details of Choosing by Advantage (CBA).

The basic organization of a MCDM depends primarily on a decision matrix. The matrix is organized depending on the complexity of the problem, the number of solutions, the solution attributes (positive and negative), and finally the scale or score given to each solution and attribute. The sum of each attribute score is ultimately the final score for an individual solution. Within construction, a final step is undertaken to compare each individual solution against its inherent initial and future cost. Following is a brief history of CBA with the suggested steps for the implementation of the method.

**Choosing by Advantage**

Choosing by Advantage (CBA) is a MCDM process that was first introduced in the United States by Suhr (1980). It is a decision-making method that facilitates project-teams in choosing between two or more options which are equally attractive. The design and construction industry has recently started using this method (Parrish and Tommelein 2009, Lee, Tommelein, and Ballard 2010, Abraham, Lepech and Haymaker 2013, Arroyo, Tommelein and Ballard 2014, Schöttle, and Arroyo 2016). The method involves multiple steps that are described below. As described by Suhr (1980), the method of CBA pivoted on the fundamental rule of sound decision-making, and requires all concerned members of the project-team to be involved. The tabular method of CBA, which is more applicable in the construction industry was developed by Suhr (1999). It can be summarized in the following sequential steps (Suhr 1999): (1) Identify alternative, (2) Define factors, (3) Define must have criteria for each factor, (4) Decide the attribute of the alternative, (5) Identify advantages and determine weightage of the alternatives, and (6) Evaluate the cost impact of the alternatives. The steps are shown in Figure 1 with the definitions of the specific vocabulary used in the method. The following sections elaborate each step with the help of a case study revolving around an incident in a healthcare project.

**Case Study**

The project for the case study was a new addition to an existing healthcare facility located in the Mountain States Region of the US. The 168,000 SF facility was structurally tied to the existing building and would cost approximately 71 million US dollars. A concrete foundation with precast service cores and steel framework were selected for the new building. The building skin was comprised of brick, stucco, metal panels, and curtain walls.

The foundation system of the project was comprised of drilled concrete piers, pier caps, and grade beams, with a concrete slab at the
Fig. 1: Steps involved in the CBA method and specific vocabulary used

Fig. 2: Juxtaposition of the new elevator mat slab to the existing stair core slab

The discrepancy was discovered on the first workday of the week when the foundation of the existing stair core slab was excavated and forming was underway for the new elevator mat slab. Following the detection of the situation, work was stalled, and the members of the project team (henceforth referred to as the core group) followed the CBA method to resolve the issue. Table 1 shows the various members of the project team who can be involved in the any CBA process. For the situation at hand in the case study project, six members constituted the core group for decision making that included program manager of the owner, the architect, the structural engineer, the project manager and the superintendents of the contractor, and superintendent of the subcontractor were involved in the CBA process. The core group then followed the CBA method described in detail the following sections.
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Implementing Unbiased Decision-Making in Construction: A Lean Approach

Fig. 3: Existing stair mat slab discrepancy

Table 1: Members of the project team involved in the CBA process and their responsibilities

<table>
<thead>
<tr>
<th>Owner</th>
<th>Design Team</th>
<th>Contractor</th>
<th>Trade Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive</td>
<td>P Architect</td>
<td>F Project Exec</td>
<td>P Project Exec</td>
</tr>
<tr>
<td>Facilities</td>
<td>F Engineers</td>
<td>A Project Manager</td>
<td>F Project Manager</td>
</tr>
<tr>
<td>Program Manager</td>
<td>A Consultants</td>
<td>A Integrated Services Manager</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Estimators</td>
<td>P Estimators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BIM</td>
<td>P BIM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Superintendent / Foreman</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Engineer</td>
<td>P</td>
</tr>
</tbody>
</table>

‘F’ = Fully responsible; ‘A’ = Assist; ‘P’ = Partially responsible

STEP 1: Identify alternatives

Three alternative solutions were identified by the core group that could mitigate the situation caused by the discrepancy of the existing condition and the new drawings. The first option was to leave the existing stair mat slab as it was. This would eventually protrude 8 inches inside the elevator hoistway. The second option was to saw cut the concrete of the existing stair slab to match the new drawings and then place the new elevator core slab. The third option was to leave the existing stair slab as it was and move the new elevator core slab eight inches towards the north so to avoid conflict with the existing stair (Figure 4).

Steps 2 & 3: Define factors & ‘must have’ criteria

Once the alternatives were identified, a brainstorming session was held among the core group participants to identify the critical factors contributing to the final decision regarding the situation at hand. Six factors were selected to guide the final decision. In addition, ‘must have’ criteria for each of the factors were also identified as shown in Table 2.

Factor 1: Safety consideration – This was a critical factor when making the final decision as the safety of the workers was always at the top of the core group’s priority list. The hazards that could arise from each of the options were evaluated.

Factor 2: Ease of execution – This was a critical factor in the final decision. Each fix was evaluated for obstacles. The goal of the core team was to choose the option with the least number of obstacles while still achieving the desired outcome. Many considerations arose from this investigation which could affect the work.
Factor 3: Schedule impact – The solution’s impact on the project schedule guided the decision-making process. The project was on schedule at this point. With part of the profit and additional incentives for completing early on the line, the core group was meticulous about examining the impact of each alternative on the project schedule.

Factor 4: Cost impact - When the situation occurred, the project did not have a budget overrun. As part of the IPD strategy, the project aimed to not have any change orders. With part of the profit and additional incentives for completing under budget at risk, the members of the core group were meticulous in the process of selecting the alternatives.

Factor 5: Design impact – One of the options had the potential to impact the design of the new facility. If the third option was to be accepted, it could change the layout of the corridors in the floors above and even the layout of the ducts and other utilities. This would also force extensive engineering revision to the precast members of the first floor and the elevator core.

Factor 6: Productivity of workers – It was important to examine how the different options would impact the productivity of the workers. When the discrepancy became evident, work was halted on the mat slab forcing workers to go out of sequence to work on different tasks. The core group discussed how the different options could affect the productivity of the workers moving forward.

STEP 4: Decide the attributes of each alternative
Having defined the three alternatives and factors critical to identify the final decision among the alternatives, the core group members identified the attribute or consequence for each factor. For example, in case of alternative 1: leave existing stair mat as is (protruding in the new elevator hoistway) the consequences would have been no additional safety hazard, few modifications to formwork, no schedule impact, might impact the cost, needed major design changes, and could affect the worker productivity.

STEP 5: Identify advantage and determine weightage
In this step, the core members identified advantage(s) of each attribute and assigned numerical weights to each of the advantages. A scale of 1 to 100 was selected so that the members had some flexibility in assigning different weights to the advantages. Suhr (1999) suggested that the most important advantage should be given a weight of 100. The other advantages should be assigned weights accordingly. After assigning weights to the different advantages, the members computed the total score for each option (Table 2). The weights were assigned to the options on individual factors based on consensus among the core group members.

STEP 6: Draw chart showing cost vs. each alternative’s total weight
In this step, the members of the core group compared the cost associated with each of the options to the respective advantage scores. Theoretically, if funds were unlimited, this step would not have been
Table 2: Comparison of the decision alternatives with their respective advantages and weights

<table>
<thead>
<tr>
<th>Factors</th>
<th>Alt. 1: Leave existing stair mat as is (protruding in the new elevator hoistway)</th>
<th>Alt. 2: Cutting the existing stair mat slab</th>
<th>Alt. 3: Moving the new elevator mat slab towards north</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety considerations of any corrective action</td>
<td>Att. no additional safety hazard</td>
<td>Att. need engineering control, PPE</td>
<td>Adv. no additional safety hazard</td>
</tr>
<tr>
<td>Criteria: Elimination is preferred</td>
<td>Adv. very minimal due to modification in formwork</td>
<td>Adv.</td>
<td>Adv. no change in the formwork design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>55</td>
<td>80</td>
</tr>
<tr>
<td>Ease of execution</td>
<td>Att. few modifications to formwork</td>
<td>Att. saw cutting activity before formwork</td>
<td>Att. new layout before formwork, additional excavation</td>
</tr>
<tr>
<td>Criteria: Least disruption in planned work</td>
<td>Adv. minimal change in planned work</td>
<td>Adv. formwork as planned with modified dowel layout</td>
<td>Adv. formwork almost as planned</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>Schedule impact</td>
<td>Att. no impact currently; might impact elevator sub</td>
<td>Att. formwork can resume after completion of saw cutting</td>
<td>Att. formwork can resume after new layout</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>Cost impact</td>
<td>Att. might cause increase in elevator package</td>
<td>Att. additional cost of saw-cutting</td>
<td>Att. additional cost for layout</td>
</tr>
<tr>
<td>Criteria: Minimal or no impact</td>
<td>Adv.</td>
<td>Adv. impacts budget</td>
<td>Adv. minimal change in budget</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>70</td>
<td>75</td>
</tr>
<tr>
<td>Design impact</td>
<td>Att. hoistway and elevator system needs major revision</td>
<td>Att. minimal design of dowel</td>
<td>Att. revision of corridor layout, utilities, precast members</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Productivity of workers</td>
<td>Att. might affect productivity of elevator installation</td>
<td>Att. formwork crew will work out of sequence</td>
<td>Att. formwork crew will work out of sequence</td>
</tr>
<tr>
<td>Criteria: No change</td>
<td>Adv. no impact currently</td>
<td>Adv. minor change</td>
<td>Adv. very minor change</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>Total Score</td>
<td>285</td>
<td>400</td>
<td>390</td>
</tr>
</tbody>
</table>

necessary and the option with the highest advantage score would be the automatic choice. However, that is seldom the situation, as was in the project. Charts were created comparing the cost and alternatives’ total weight to help the core group members in the CBA process.

The cost implications of the three options were calculated based on immediate cost, as well as expenses that the project team could incur further down the line (future cost). The first decision alternative, which was to leave the existing stair mat undisturbed, involved no immediate cost. However, that decision would force redesigning the elevator hoistway and a modification in elevator equipment that could cost approximately USD13,000. The second alternative would cost USD 4,000 for the saw-cutting and additional USD 500 for the extra dowels, but would cost nothing in the future. Lastly, the third alternative would cost USD 800 immediately for the new layout and then additional USD 8,000 for the revision in the precast design, architectural design of corridor layout, revision of MEP layout, and coordination (Table 3).
Table 3: Comparison of the cost implications of the options

<table>
<thead>
<tr>
<th>Cost</th>
<th>Alt. 1: Leave existing stair mat as is (protruding in the new elevator hoistway)</th>
<th>Alt. 2: Cutting the existing stair mat slab</th>
<th>Alt. 3: Moving the new elevator mat slab towards north</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate Cost</td>
<td>$0</td>
<td>$3,500</td>
<td>$800</td>
</tr>
<tr>
<td>Future Cost</td>
<td>$13,000</td>
<td>$0</td>
<td>$8,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$13,000</td>
<td>$3,500</td>
<td>$8,800</td>
</tr>
</tbody>
</table>

Fig. 5: Comparison of the cost implications and advantage scores of the options

Subsequent to computing the cost implications for each alternative, the core group members could compare the cost implications and advantage for each alternative (Figure 5). Based on the chart below, the core group members selected the second alternative as the final decision.

Conclusion

Construction project teams engage in decision-making at various stages of the projects. These decisions have far-reaching implications on the performance of the projects and their outcomes. Time is of the essence while making the decisions, as timely decisions are critical for the work to progress per the schedule. The complexity of the situation and the outcome’s impact on the project calls for a structured decision-making process that is unbiased and fact-based. While it is difficult to separate the decision-making process from personal preferences, the Lean CBA method supports multi-disciplinary collaboration and replaces subjectivity with objectivity, which aligns with the Lean approach. However, the CBA method is relatively new to construction practitioners and lacks appropriate documentation. Save fora handful of studies (Parrish and Tommelein 2009, Abraham et al. 2013, Arroyo et al. 2014, Karakan et al. 2016), there is a dearth of literature specific to the construction industry.

A descriptive case study of a healthcare project was used to present the CBA method as this approach enabled the author to describe the process in detail in the light of the situation faced by the case study project-team. Deciding the path forward in the wake of the situation involved exploring alternatives as a group and carefully examining all alternatives for their impact on the project performance. The process involves multiple steps and is based on a well-defined vocabulary as illustrated by Suhr (1999). In all the steps of the CBA method, members of the core group were involved as described in this paper. Particularly for the case study project, the multidisciplinary collaboration was encouraged by the Integrated Project Delivery (IPD) arrangement among the major stakeholders. In a similar situation within a Design-Bid-Build or Construction Management at Risk project, the contractor would have usually communicated the findings to the designers with a request for change order and a longer time to resolve the issue.

In addition to quick turnaround time and utilizing the expertise of multiple disciplines, the CBA method separates the cost from the value in contrast to other MCDM methods. In the case study project, members of the core team could focus on the value of the different alternatives before calculating the immediate and long-term cost implications of the alternatives. So often, the decision-making is guided by the cost implication that the value quotient gets obscured by the cost. According to Arroyo et al. (2014, 2015) this feature of the CBA process provides transparency to the process.

As is evident from the case study, the CBA method is not intuitive and requires learning the process and practice. Often, an experienced facilitator is
required for the successful implementation of the process. The process cannot assess one alternative as the basis of the method is comparison between advantages of alternatives. Additionally, as a fact-based approach, CBA cannot be applied to conceptual problems and depends on first-hand information for its success. Nevertheless, the CBA method presents an opportunity to construction practitioners to use an unbiased and fact-based decision-making method. This paper presents the application of the CBA method in a situation that is common and will be faced by other project teams as well. As the project-teams realize the benefits of the CBA method, it should be integrated in the decision-making at every stage of the project. The CBA method underlines the Lean concept of providing autonomy to project teams and supporting multidisciplinary collaboration. Involving individuals with the knowledge of the working conditions and authority to make decisions resembles the approach of the Last Planner System, another successful Lean production planning tool.

References


ABSTRACT

Construction standards and methods for building new homes has improved over the last two decades resulting in significant improvements in energy efficiency, comfort, indoor air quality, and durability of new homes. Despite these improvements, the most common builder warranty for a new home in the United States ranges from 6 months to two years in duration. During the past two decades, manufacturer warranties on other durable goods such as automobiles has increased significantly. This study measures consumer perceptions of extended 12-year new home warranties with a survey completed by 162 adults in the United States. The results indicate that U.S. consumers associate extended new home warranties with greater psychological comfort. The research also indicates that there is greater perceived value among consumers with extended new home warranties along with a willingness to pay for it. This study also evaluates the potential of offering a builder provided home preventative maintenance program. The program would provide an additional service to the consumer and reduce the risk of claims on the extended warranty. This study found a positive perception of a builder provided preventative maintenance program and a willingness to pay for this service.

Key Words: Warranty, Home Builder, Maintenance, Residential

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INTRODUCTION

Innovation is discussed frequently in business as a way of driving continuous improvement and economic growth. The home building industry has been slower than most industries to undergo disruptive innovations. In the study Characteristics of Innovative Production Home Builders by Koebel and Cavell, the authors explain that industries that are not as dependent on science and technology tend to have extended periods between disruptive innovations and focus primarily on refining existing technologies (2006). Home building is clearly one of these industries and has historically lagged behind other industries in the adoption of innovative change. One example of the lag is the typical warranty period provided with a new home in the United States. At typically one year in duration, new home warranties pale in comparison to the warranties of other durable goods such as automobiles.

There is a perception among home builders that innovation has a greater cost than the status quo without providing a balanced return on investment (Koebel, Papadakis, Hudson, & Cavell 2003). However, most home builders view competitive advantage as a major motivation to innovate (Hassell, Wong, Houser, Knopman, & Bernstein 2003). The outcome of this study may identify opportunities in the home building industry for innovation through new home extended warranties and builder provided preventative maintenance programs leading to competitive advantages for home builders who embrace innovation in this area.

LITERATURE REVIEW

It was not surprising that studies on residential new home warranties are essentially non-existent in the literature. The residential new home industry is fragmented and limited in industry groups undertaking public research and development. The limited literature identified relating specifically to new homes in this area of study included a patent application from 2009 that has not been granted (United States Patent No. US2009/0106135 A1 2009), a 1976 Stanford Law Review analysis of the National Association of Home Builders HOW (Home Owners Warranty) program (Kempner 1976), and an article in the Wisconsin Law Review on implied warranties for new homes from the early 1990’s (Sovern 1993).

However, there is substantial literature on warranties in other industries, specifically the automotive industry in which two-dimensional warranties are common. Two-dimensional warranties incorporate a usage element (typically mileage with automobiles) and a time element. While two-dimensional warranties are not useful for residential homes (there is no way to capture usage of a home), the concepts covered in some of the research could be applicable to new homes. Where relevant, this research has been cited.

There is significant literature on the economic reasons for a warranty provision including the theories of insurance and signaling (Chu & Chintagunta 2011). Both theories are based on the concept that warranties lower the risk associated with a purchase. The insurance theory of warranties relates to the obligation of a seller to compensate the buyer in the event of a failure of the product. This theory relies on the concept of the consumer being risk averse. Without an aversion for risk, the insurance theory is not a factor since those who are risk-neutral are willing to bear all of the risk. Similarly, those buyers who are more risk averse will purchase warranties of longer duration to mitigate risk. It can be inferred from this theory that longer warranties will appeal to buyers who are more risk averse.

Signaling theory of warranties examines the use of warranties as indicators of product quality when there is information asymmetry. Information asymmetry typically occurs when buyers are not fully informed of the product quality before purchase due to the variability in product quality for a given product. Therefore, sellers may signal product quality using warranties (Chu & Chintagunta 2011).

Signaling theory of warranties operates on several assumptions. One assumption is that companies offering warranties not only have a legal obligation,
but also have an incentive to honor warranty claims due to repeat purchase or word-of-mouth positive impacts (Boulding & Kirmani 1993). Another assumption is since a warranty claim results in cost to a company, the warranty itself is an indicator that a company has higher confidence in its product. Companies with lower quality products will have higher warranty costs and companies with higher quality products will have lower warranty costs. This results in companies with higher quality products being able to offer warranties that are greater in length. An example of signaling theory in practice occurred in the automotive industry. In 1999, Hyundai Motors changed their new car powertrain warranty from 5 years / 60,000 miles to 10 years / 100,000 miles. After this change in warranty, Hyundai Motors’ U.S. market share climbed from 1.1% to 4%. To the contrary, in 2002, Volkswagen reduced their powertrain warranty from 10 years / 100,000 miles to 5 years / 60,000 miles and in the subsequent three years, U.S. sales of Volkswagen cars declined 30% (Choi & Ishii 2010). Hyundai dealer Rick Case Hyundai in Fort Lauderdale, Florida doubled the Hyundai factory warranty in 2008 to 20 years / 200,000 miles and realized a unit sales increase of ten percent in the first year. The owner of the dealership notes that the coverage gives buyers peace of mind (Harris 2009). These illustrate a likely relationship between the warranty coverage and consumer demand for vehicles (Choi & Ishii 2010).

In the home building industry, many builders claim product quality in their advertising, but do not use new home warranties as a signal of product quality. This appears to be a potential opportunity for home builders. Research has shown that while some consumers tend to overestimate the cost and likelihood of product failure influencing their purchase of an extended warranty, most consumers behave emotionally in their purchase of extended warranties. The emotional benefit of having an extended warranty results in the purchase. (Huyssentruyt & Read 2010). There is evidence in the literature that the average maximum willingness to pay for an extended product warranty approaches the market price suggesting that this emotional drive can be substantial.

Home builders create one of the most expensive products that American consumers purchase (Bureau of labor Statistics 2018), yet rarely stand behind their product by providing an extended warranty. In fact, owning a home is the most significant capital expenditure for American consumers, followed by owning an automobile (Bureau of labor Statistics 2018). The typical lifespan of an automobile in the U.S. is eleven and one half years (IHS Automotive, 2015; United States Department of Transportation 2017). The standard duration automobile warranty provided in the auto industry today is a three year / 36,000 mile warranty (Edgerton 2010). New homes, in contrast, have standard included builder warranties ranging from six months to two years (Evans, 2018; U.S. Federal Trade Commission 2005). The average lifespan of a new home ranges widely based largely on opinion. Most sources claim average lifespans of fifty to one hundred years or more for a home built today (Swiss Life Group 2018; Geffner 2010). Many also note that regular maintenance can result in a home lasting much longer.

**Warranty Ratio**

The literature on typical warranty length and lifespan for new homes and automobiles uncovered an idea for relative comparison of the two products with respect to warranty coverage. This measure is the warranty ratio, defined as the ratio of the typical warranty period in years to the average lifespan of the product. A comparison of relative warranty length as a percentage of average lifespan demonstrates a disparity between common warranties on new homes and the base warranty on most automobiles. The typical lifespan of an automobile in the U.S. is eleven and one half years (IHS Automotive 2015; United States Department of Transportation 2017). The shortest standard duration of automobile warranties provided is a three year / 36,000 mile warranty (Edgerton 2010). The warranty to lifespan ratio for the shortest automobile warranties is twenty six percent – indicating that the base warranty for an
automobile covers the vehicle for twenty six percent of its average lifespan. New homes, in contrast, have standard builder warranties ranging from six months to two years (Evans 2018; U.S. Federal Trade Commission 2005). The average lifespan of a new home ranges widely based largely on opinion. Most sources claim average lifespans of fifty to one hundred years or more for a home built today (Swiss Life Group 2018; Geffner 2010). Many also note that regular maintenance can result in a home lasting much longer. To develop a conservative estimate of warranty to lifespan ratio for new homes, the new home warranty is assumed to be two years and the lifespan of the home is assumed to be fifty years. The resulting warranty to lifespan ratio of four percent – indicating that the standard warranty for a new home covers the home for four percent of its average lifespan.

Comparing the warranty ratios of the two most expensive purchases made by Americans in their lifetime, the difference is great. More specifically, the lowest duration standard new automobile warranty has more than seven times the coverage relative to average lifespan as a standard new home warranty. Further, while many automobile manufacturers offer longer standard warranties (Edgerton 2010), there are not many home builders offering warranties greater in length than 2 years (Evans 2018).

The disparity in warranty coverage between the two most significant financial expenditures faced by most Americans could be a substantial opportunity for home builders. The automotive industry has capitalized on longer warranties as a successful strategy for gaining market share (Choi & Ishii 2010). From this research, it appears that this opportunity also exists for home builders. In addition to gains in market share, home builders may also realize closer connections with clients resulting in the potential for greater brand loyalty, referral business, and customer satisfaction.

Opportunity

Given this disparity, it appears as if there may be an opportunity for home builders to differentiate themselves from their competition by offering an extended warranty. However, for a builder to offer this added coverage, they must first have a path to mediate the risk associated with warranty claims. Lack of proper maintenance is a frequent cause for equipment/building failure. Home owners do not typically insure that the recommended preventative maintenance is performed on their home. One opportunity for mitigating the risk of extended warranty claims is for the builder to provide preventative maintenance such as HVAC tune ups, filter changes, termite inspections, and inspection for moisture related issues.

This research seeks to address two primary research questions. First, what is the market’s perception of an extended home warranty as measured by “psychological comfort”? The second question addresses the market opportunity for a builder provided preventative maintenance program as a means of mitigating the builder’s risk of extended warranty claims.

METHODOLOGY

No theoretical constructs or methods applicable to new home extended warranties were found in the existing literature. The literature did, however, provide ideas around which new theoretical constructs were created for this study. The constructs developed for this study are psychological comfort, perceived value, and amount willing to pay. A structured survey was developed using a six point Likert scale to measure these constructs. The 1 - 6 scale correlated to the following responses; 1) strongly disagree, 2) disagree, 3) somewhat disagree, 4) somewhat agree, 5) agree and 6) strongly agree.

Survey Instrument

The structured survey consisted of 46 items that the respondents answered online. The survey incorporated skip logic questions in order to exclude participants that did not meet the study’s criteria of owning a home or planning to purchase a home in the next six months. Participants answering that they did not currently own a home were then directed to an item asking if they planned to purchase a home in the next six months. If participants answered that
they were not planning to purchase a home in the next six months, the survey ended. The survey utilized composite scoring of multiple correlated questions to measure the key constructs psychological comfort and builder perception. This approach asks similar questions in different ways, correlates the responses, and averages the scores into a single measure. This approach dilutes potential bias with the way a question is phrased and strengthens the reliability of the response. For other measures, such as willingness to pay for a service, individual questions were used.

Definitions of the terms “extended warranties” and “preventative maintenance” were provided to the respondents in order to provide a consistent interpretation of their meaning. The following definitions were provided with the questions related to them.

*An extended warranty refers to a 12-year warranty provided by the builder of a new home. (The most common warranty provided in the new home market today is a 1-year warranty. There are third party warranties which extend the base warranty to 2-years and cover structural defects for 10 years. A 12-year warranty was selected to differentiate from possible respondent association with 10-year 3rd party structural warranties)*

*Preventative maintenance on a home includes an annual checkup on the heating and cooling system, air filter changes, inspection for moisture related problems, and termite inspection.*

**Participant Population**

A total of 162 survey responses were received. A data acquisition service (MTurk) was used to collect 47 surveys and the other 115 were collected from a convenience sampling predominately from the Mid-Atlantic region of the United States. The self-reported demographic information received indicated a wide range of survey respondents. Table 1 provides some descriptive statistics of the respondents; however, the most frequent demographic response (mode) for the survey takers was that they were 48 years old, white, female, held a bachelor degree and had an income between $125,000 to $149,999.

<table>
<thead>
<tr>
<th>Numerical Descriptor</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>22</td>
<td>75</td>
<td>47.6</td>
<td>12.1</td>
</tr>
<tr>
<td>Household Income</td>
<td>&lt;$25,000</td>
<td>&gt;$300,000</td>
<td>$125,000</td>
<td>$72,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Categorical Descriptor</th>
<th>Answer</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Men</td>
<td>33%</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>67%</td>
<td>90</td>
</tr>
<tr>
<td>Race</td>
<td>African American / Black</td>
<td>3.9%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>American Indian or Alaska Native</td>
<td>1.3%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Asian American, Asian, or Pacific Islander</td>
<td>7.1%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Latino(a) / Hispanic</td>
<td>3.9%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Caucasian / White</td>
<td>83.8%</td>
<td>129</td>
</tr>
<tr>
<td>Education</td>
<td>Did not complete high school</td>
<td>&lt;1%</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>High school diploma or GED</td>
<td>3.3%</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Some college or trade school</td>
<td>8.7%</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Associate’s degree</td>
<td>8.0%</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Bachelor’s degree</td>
<td>42.0%</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Graduate or professional degree</td>
<td>38.0%</td>
<td>57</td>
</tr>
</tbody>
</table>

Table 1: Demographics of Survey Respondents
FINDINGS

Demographics

The five demographic questions (age, income, gender, race and education) in the survey were reviewed for correlation. There was no meaningful correlation to the demographic responses and any other aspects of the questionnaire. The one exception to this is with education and the perception of the home building industry which will be discussed in the next section.

Perception of Home Building Companies

To explore the value of an extended home warranty for potential customers it is important to understand their overall perception of the organization that would provide the warranty. Five questions related to various characteristics of home building companies were asked in the survey. The question responses were analyzed to have substantial correlation. The resulting composite score from the questions was used to measure the construct of builder perception. The individual characteristics specifically measured were dependability, trustworthiness, reliability, credibility and the overall home building experience. See Table 2 for a summary of the responses. The survey showed that the overall perception of home builders is modest at best. On a six point Likert scale, the composite score for builder perception was 3.8 which is between “somewhat disagree” and “somewhat agree.” It is also worth noting that none of the 162 respondents indicated they “strongly agreed” that home building companies are dependable or trustworthy. This lackluster perception of the homebuilding industry spanned across all five demographics surveyed. The highest correlation coefficient between the home building industry and the measured demographics was -.26. The slight negative correlation indicates that the more educated a person was, the lower the opinion they had of the industry.

Psychological Comfort of an Extended Warranty

As part of the evaluation of the value home buyers would place on an extended warranty, the study looked at the construct of “psychological comfort” provided by an extended warranty. The psychological comfort construct was measured on seven items adapted from the work of Ahmad and Butt (2012) and Simon (1993). See Table 3 for a summary. Inter-item correlation was evaluated for the seven items in the survey showing strong correlation between the items. From the survey results, there does appear to be an elevated level of psychological comfort with an extended warranty. The composite response for psychological comfort was 4.9 (agree) out of six with the most frequent response being 6 (strongly agree). Additionally, we can use the average perception of the warranty value to gauge correlation to what they would be willing to pay and acceptance to a builder provided maintenance program.

Willingness to Pay for an Extended Warranty

With the establishment that survey respondents see value in an extended warranty, the next key point to understand is how much they are willing to pay for it. Two questions were asked to evaluate this. The first question asked the “amount that you would be willing to pay” and the second was what “would be a fair investment” for the 12-year extended warranty. For both questions, the response options

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average</th>
<th>Mode</th>
<th>Std Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home building companies are dependable.</td>
<td>3.8</td>
<td>4</td>
<td>1.1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Home building companies are trustworthy.</td>
<td>3.8</td>
<td>4</td>
<td>1.0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Home building companies are reliable.</td>
<td>3.7</td>
<td>4</td>
<td>1.1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Home building companies are credible.</td>
<td>3.9</td>
<td>4</td>
<td>1.0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Building a new home is an enjoyable experience.</td>
<td>3.8</td>
<td>4</td>
<td>1.4</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Composite Score for Builder Perception</td>
<td>3.8</td>
<td>4</td>
<td>1.1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 2: Perception of Home Building Companies
Table 3: Perception of Extended Home Warranty

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average</th>
<th>Mode</th>
<th>Std Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>A warranty on a new home is an important feature.</td>
<td>5.1</td>
<td>6</td>
<td>1.1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>The length of a builder’s warranty on a new home is important.</td>
<td>5.2</td>
<td>6</td>
<td>0.9</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>An extended warranty on a new home is a great way to minimize the risk of a costly repair.</td>
<td>4.9</td>
<td>6</td>
<td>1.1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>An extended warranty on a new home would give me peace of mind.</td>
<td>5.1</td>
<td>6</td>
<td>1.1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>It would be comforting to have the protection of an extended warranty on my home.</td>
<td>5.2</td>
<td>6</td>
<td>1.0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Without an extended warranty, I would worry about repair costs on my home.</td>
<td>4.4</td>
<td>4</td>
<td>1.2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>I would feel more stress without an extended warranty on my home.</td>
<td>4.1</td>
<td>4</td>
<td>1.2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Average Perception of Extended Home Warranty</td>
<td>4.9</td>
<td>6</td>
<td>1.1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4: Willingness to Pay for Extended Warranty

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average</th>
<th>Mode</th>
<th>Std Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check amount that you would be willing to pay per month for a 12-year extended warranty on your home.</td>
<td>$36</td>
<td>$40</td>
<td>$26</td>
<td>$0</td>
<td>$100</td>
</tr>
<tr>
<td>What, in your opinion, would be a fair investment per month for a 12-year extended warranty on a home?</td>
<td>$39</td>
<td>$20</td>
<td>$23</td>
<td>$0</td>
<td>$100</td>
</tr>
<tr>
<td>Average Willingness to Pay for Extended Warranty</td>
<td>$37</td>
<td>$30</td>
<td>$25</td>
<td>$0</td>
<td>$100</td>
</tr>
</tbody>
</table>

were $0, $20, $40, $60, $80 and $100 per month. The findings are summarized in Table 4 and show that the respondents indicated that $37 a month would be a fair price for the warranty.

**Builder Provided Maintenance Program**

For an extended warranty program to be successful, managing the builder’s cost of the warranty is just as impactful as what the home buyers are willing to pay. One of the leading causes of warranty claims, legitimate or not, has a root cause of non-existent or improper maintenance. Lack of timely HVAC filter replacement, clogged roof gutters, failure to maintain water flow away from the home and a host of other factors can reduce the useful life of equipment and overall building performance. Home builders are often called back for warranty claims that are the result of lack of maintenance and either fix the issue at their own expense to maintain a positive relationship or refuse to do the work and risk harming the relationship. One way to manage the risk of improper or non-existent maintenance is to offer a program where the builder provides preventative maintenance for the owner. This has the benefit of an added service for the builder but also reduces the chance of a warranty claim. A builder provided preventative maintenance program, as a risk mitigation option for the extended warranty program was investigated with this study.

To make sure the respondents had a consistent understanding of what “preventative maintenance” was the following definition was provided. “Preventative maintenance on a home includes an annual checkup on the heating and cooling system, air filter changes, inspection for moisture related problems, and termite inspection.” The responses indicated that home owners appreciate that home maintenance is important. When asked to rate the statement “It is important to perform annual preventative maintenance on a home,” the home owners had an average response of 5.4 (between “agree” and “strongly agree”). They were also
supportive of the concept of the builder providing this service for them. When asked to evaluate the statement “Subscribing to an annual preventative maintenance plan on my home would give me peace of mind” they scored it at 4.7 out of a possible 6. This was a positive response indicating that they perceived value in it. However, a better gauge of perceived value was the response to the questions regarding what they would be willing to pay. Two questions were asked related to the cost of a preventative maintenance service. Similar to the questions regarding warranty cost, the first question asked the “amount that you would be willing to pay” and the second was what “would be a fair investment” for a preventative maintenance program. For both questions, the response options were $0, $20, $40, $60, $80 and $100 per month. The results, shown in Table 5, indicate that home owners are willing to pay $27 a month.

CONCLUSIONS AND RECOMMENDATIONS

The study made several key findings valuable to the home building industry. First, the overall opinion of home building companies by the survey respondents was not high. This indicates an opportunity for home building companies to differentiate themselves from their competition. The study evaluated if an extended home warranty and a builder provided preventative maintenance program were services that respondents valued and what they would be willing to pay for them. This study observed that respondents had a positive association with a builder extended 12-year warranty and would have higher psychological comfort if such a warranty was included with their home. The respondents indicated they would be willing to pay an additional $37 a month for an extended warranty. This is in line with 3rd party home warranty services currently available to home owners. The National Association of Realtors estimates that these third party home warranty services range from $300 - $600 per year (Ericson 2017). The study also found that respondents had a positive association with a builder provided preventative maintenance program and would be willing to pay on average $27 a month for it. The prices willing to pay for the warranty and maintenance program had large standard deviations indicating that a significant portion of the population would be willing to pay more than the average.

Discussion

From the builder perspective, the most significant apprehension in offering an extended warranty is risk. However, if the home is built well and is properly maintained, the risk of costly repairs for a home should be minimal. An option that could differentiate a home builder from their competition is to offer a 12-year warranty along with a preventative maintenance program as a choice for all of their new homes. We define preventative maintenance in this study as builder provided annual checkup on the heating and cooling system, air filter changes, inspection for moisture related problems, and termite inspection. Our survey indicated that the home buyers would pay on average $37 a month for the warranty and $27 a month for the builder provided maintenance totaling at $64 a month or $768 annually. Assuming a discount rate of 5%, the net present value of $768 annually over 12 years is $6,919. In other words, the survey suggests that home owners willing to pay on average $54 a month for preventative maintenance (including all other services) and an additional $37 a month for the extended warranty. This would result in an average willingness to pay of $91 a month or $1,092 annually. This is a significant portion of the population willing to pay more than the average.

Table 5: Willingness to Pay for Builder Provided Home Maintenance

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average</th>
<th>Mode</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check amount that I would be willing to pay for annual preventative maintenance on my home if it was offered by my builder.</td>
<td>$26</td>
<td>$20</td>
<td>$24</td>
<td>$0</td>
<td>$100</td>
</tr>
<tr>
<td>What, in your opinion, would be a fair investment per month for preventative maintenance plan?</td>
<td>$27</td>
<td>$20</td>
<td>$21</td>
<td>$0</td>
<td>$100</td>
</tr>
<tr>
<td>Average Willingness to Pay for Builder Maintenance</td>
<td>$27</td>
<td>$20</td>
<td>$23</td>
<td>$0</td>
<td>$100</td>
</tr>
</tbody>
</table>
buyers would be willing to pay $6,919 more for their home if this service was provided. The survey did not ask about the value of the respondent’s home. However, if we assume annual income can be a surrogate for home value, the data suggest no meaningful correlation of value or willingness to pay for either the extended warranty or the builder maintenance program and new home price. As such, on a percentage basis higher end homes would have a smaller impact whereas more economical homes would have a more significant increase in upfront costs.

The expected costs of warranty claims and providing the maintenance is a critical aspect of the builders evaluation on whether this is a service they are willing to provide. Estimating those costs is beyond the scope of this study but worth evaluating in the future. However, what may be the most important benefit to the builder is the face-to-face contact with the home buyer that an annual inspection would afford. The data from remote monitoring could also be automated into a monthly “home health report” giving the builder another point of contact monthly. Continuing the relationship has a host of benefits including generating leads for remodel/upgrade work in the home, positive word of mouth advertisement and potential repeat business with the customer’s next home.

Limitations and Future Research

There are a number of limitations to this study. First, the demographics of the sample population was not representative of the U.S. population. The sample population was comprised of eighty percent college educated respondents which had a slight negative correlation (-.26) with the measure of home builder perception. This slight correlation indicates a difference in the perception of homebuilding companies by those respondents with a college education. This would be an area of awareness and interest for future study. Eighty-four percent of the respondents were White / Caucasian and sixty-seven percent were female. For future studies, a sample population that is more representative of the overall U.S. home buyer / home owner population would likely provide more representative data. The sample population was disproportionately located in the mid-Atlantic region of the eastern United States. Perceptions related to extended home warranties might vary based on geographical location within the U.S. due to regional viewpoints, the age of the housing stock in different regions, and even the relative cost of housing in various regions.

Relative cost of homes was a second limitation of this study. The study did not control for nor ask about the cost of a participants’ home. If the survey had asked this question, the responses could have been reviewed based upon the price range of the home each participant currently owned. The price of the home that a participant lives in could be correlated with the participant’s income or wealth, which may influence one’s perspective on extended new home warranties. Some warranty research indicates that as wealth increases, the perceived need for product warranties decrease. This would be an interesting area for future research.

The participants in this study were home owners. With the study focus of understanding the perceptions of consumers on extended new home warranties, this may have been a limitation of the research. Future research results may provide more accurate results by limiting surveys, interviews, and other means of data collection to participants who are currently shopping for a new home. Participants who are in the process of shopping for a new home should be more in tune with the research questions as they relate to new homes.

In addition to addressing the limitations of the research identified, future areas of research relating to extended new home warranties might include surveying home builders and/or home building company leaders to understand their perspectives on extended new home warranties. If the literature is correct, the researcher would expect that home builder perspectives might contradict the perspectives of home buyers regarding extended new home warranties. The specific scopes of extended new home warranties could also be explored to determine the optimal balance of warranty coverage,
home owner perception, and warranty cost. Insurance companies who provide home builder extended warranty coverage might also be surveyed to understand what coverages are offered in the marketplace and the most common warranty claims. Understanding consumer perceptions of third party warranty companies (insurance companies) would be important if a third party warranty (insurance company) is considered.

REFERENCES


Social Resources of Mechanical Contracting Management Personnel

Blake Wentz, Milwaukee School of Engineering | wentz@msoe.edu
Sarabeth Gandara, U.S. Engineering Company

ABSTRACT

The construction industry in the United States is projected to grow faster than average compared to other industries through 2026. The Baby Boomer generation is leaving a significant gap in the labor force as they reach retirement. Retention of high quality management personnel is a priority for all companies in the construction industry, including mechanical contracting companies. Firms that fail to retain these employees will be left with an understaffed and underqualified workforce, which will hinder their ability to be competitive in the marketplace. In order to aid in retention efforts, mechanical contracting firms need to focus their attention on the factors that affect burnout, which leads to turnover of their management personnel. Social Resources were identified using the LISRES-A survey for mechanical contracting supervisors. The results showed that these supervisors had significantly low levels of social resource in regards to their children. The results suggest that contracting firms should tailor their employee assistance programs (EAPs) to increase this social resource. By doing this, mechanical contracting firms can combat burnout and help retain their management personnel.

Keywords: Life Stressors, Social Resources, Burnout, Retention, Management, EAPs

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Sarabeth Gandara is a Preconstruction Engineer with U.S. Engineering Company in Denver, CO. She attended the Milwaukee School of Engineering earning both a B.S. and M.S. in Architectural Engineering.
INTRODUCTION

The construction industry is one of the largest in the nation with approximately 7.1 million wage and salary jobs recorded in 2017 (www.bls.gov, 2018). These employees span a wide range of trades and varying job positions in the industry, each with its own unique conditions. But of the 7.1 million workers, about 64% of these jobs are categorized as specialty contractor positions, primarily plumbing, heating, air-conditioning, electrical, and carpentry positions (www.bls.gov, 2018).

According to the U.S. Bureau of Labor Statistics (2018), a faster-than-average employment growth is expected for construction management personnel over the next decade. This is attributed to the predicted overall expansion of construction activity through 2026. There will be a growing emphasis on retrofitting buildings to make them more energy efficient as well as a need to improve portions of national infrastructure. The increased complexity of these projects will require specialized management personnel that have or will complete training to handle the unique tasks (www.bls.gov, 2018). Mechanical contractors will play a large role in the retrofitting of buildings for energy efficiency over contractors of other disciplines, simply because mechanical systems are responsible for a majority of building energy use.

In order to complete these complex energy retrofit projects, mechanical contracting firms will have to train their personnel and strive to retain their employees in order to maximize their investment. Organizations that fail to retain high performers will be left with an understaffed, less qualified workforce that ultimately will hinder their ability to remain competitive (Rappaport, Bancroft, & Okum, 2003). This is especially vital in the area of mechanical contracting supervisory personnel.

The objective of this research is to identify the coping resources that correspond to life stressors that affect mechanical contracting supervisors in the United States. This study will determine the magnitude of these coping resources and the degree to which these affect mechanical contracting supervisory personnel. There are several potential benefits of this research. By identifying the coping resources that these supervisors possess, mechanical contracting firms can identify these resources within their organization in order to reduce the effects of the corresponding life stressors, therefore increasing productivity and reducing the potential for employee burnout. These firms can focus their improvement strategies on these areas to maximize the results of stress-reduction plans as part of their Employee Assistance Program. The improvement of coping resources may also lead to increased retention in supervisors for mechanical contracting firms.

LITERATURE REVIEW

The Baby Boomer generation is nearing retirement age with an estimated 10,000 retiring each day across all sectors (Wing, 2016). Boomers currently make up more than more than 40 percent of the construction industry workforce, but their majority is dwindling (Bohner, 2016). In particular, 54 percent of construction managers are from the Baby Boomer generation (Bohner, 2016). As the veterans of the construction industry retire, they are leaving a significant labor gap. According to the U.S. Department of Labor, the ratio of construction job openings to hiring is at its highest level since 2007 (Reuters, 2016). Construction companies must work to attract and retain quality employees from the available talent pool in order to meet the demands of the growing construction industry. The retention of quality employees is an issue of importance to all contracting firms, especially mechanical contracting firms.

Predictors of Turnover

Researchers are continually working to identify the best predictor of employee turnover. Several different factors affect retention in workers. Joo and Park (2010) found organizational learning culture, career satisfaction, and organizational commitment are significant factors that predict turnover (p. 494). Perryer, Jordan, Firns, and Travaglione (2010) found organizational commitment as well as perceived
organizational support to be predictors of turnover intentions (p. 920). However, a meta-analysis of the previous millennium showed organizational commitment predicts turnover better than overall job satisfaction (Griffeth, Hom & Gaertner, 2000). In this area, determinates include stress levels, work group cohesion and leadership that are internal to the firm, while external factors such as company tenure and number of children were found to be predictors of turnover (Griffeth, Hom & Gaertner, 2000).

**Burnout**

Another area of study in retention of workers is burnout. The most commonly accepted conceptualization of burnout stems from Maslach’s three-component definition, which views burnout as a unique type of stress syndrome that includes exhaustion, cynicism, and reduced personal efficacy (Maslach, Schaufeli, & Leiter, 2001). The vast majority of the research on burnout has focused on the physical and mental consequences of burnout, such as depression, anxiety, sleep disturbance, neck and back pain, and cardiovascular disease (NIOSH, 2008). Burnout can lead to higher costs of treating the physical and emotional ailments of workers, as well as the detrimental effect on worker productivity, resulting in increased absenteeism and turnover (Wright & Cropanzano, 1998).

For an individual, burnout has been associated with the experience of psychological stress, anxiety, depression, and reduced self-esteem (Maslach et al., 2001). Research also consistently links burnout to lower levels of organizational effectiveness, job satisfaction and organizational commitment as well as higher levels of turnover (Wright & Bonnett, 1997). With this in mind, it is vital to companies to minimize psychological stress of its management personnel in order to retain its high performing employees.

There are different theories of what causes burnout in an employee. One of the more popular models is the Conservation of Resources Theory (COR) of Burnout. This theory, which was developed by Hobfoll in 1989, states that burnout is a situation resulting from a perceived threat, actual loss, or lack of intrinsic energy (Park et al., 2013). According to COR, resources are differentially related to facets of burnout, meaning that the abundance of resources will result in lower levels of burnout (Park et al., 2013). The resources in this model can be anything; they could relate to physical resources such as money or manpower or psychological resources such as elevated levels of status or importance. The key to this theory is that burnout can be evident after persistent shortfalls in the resources that are needed to fulfill demands at work (Hobfoll, 1989). Studies show that a decline in resources predicts depression (Ennis, Hobfoll, & Shroder, 2000). This shows that employers must be mindful to prevent this loss of resources in order to help mitigate burnout of their employees.

A related theory is that of the Resources and Perception Model. This model states that individuals sometimes feel they have accumulated many resources, and that when they have accumulated resources, their perception is more accurate (Harber, Einev-Cohen, & Lang, 2007). The primary conclusion of this is that if an individual has what they believe to be a high level of resources, they will not overreact to a threat or potential danger since their perception of that threat or danger is more accurate. Conversely, a person with less resources will tend to overreact and inflate threats or dangers.

Another theory of job burnout is the Job Strain Model. This theory is significant because it relates specific job demands to stress (Karasek & Theorell, 1990). The theory states that an employee’s control buffers the impact of job demands and strain and can help enhance an employee’s job satisfaction (Karasek, 1979). Much of the expanded research on the Job Strain Model has been inconsistent because different variables have been used to measure demands, control, and strain as well as the limitation of the model since it does not take workers’ individual characteristics into account (Van Der Deof & Maes, 1999). To address these issues, research has been expanded to incorporate self-efficacy, active coping, and social support into the model (Kain & Jex, 2010).
Stress

Stress is not unique to the construction industry, and the impacts caused by stress can have a significant impact on employees. A study conducted by Gallup in 2000 showed that 80% of workers feel stress on the job, and nearly half say they need help in learning how to manage stress (American Institute of Stress, 2011). More recently, a study conducted by the American Psychological Association (APA) in 2013 showed that more than one-third of working Americans reported experiencing chronic levels of work stress and just 36 percent said their organizations provide sufficient resources to help them manage that stress (www.apa.org, 2014).

The effects of stress are not limited to the employees; the employers also experience the effects of these stressors on their workforce. It is estimated that job stress costs the United States $300 billion annually covering accidents, absenteeism, employee turnover, diminished productivity, workers’ compensation and healthcare claims (NIOSH, 2018). It is reported that an estimated 1 million workers in the U.S. are absent every day due to stress (NIOSH, 2018). Other research shows that just among the nation’s executives, an estimated $10 to $20 billion annually is lost through absence, hospitalization, and early death, much of it as a result of stress (Karren et al., 2003).

Individual and Employee Coping Resources

Coping strategies can reduce the effects of stress. Yip, Rowlinson, and Siu in 2008 researched coping strategies employed by construction engineers in Hong Kong to moderate role overload and burnout. This survey based study used the Maslach Burnout Inventory – General Survey to measure burnout and the Ways of Coping Questionnaire (WCQ) by Chan to measure coping strategies. The WCQ was comprised of 29 items rated on a 4-point Likert scale to measure four coping dimensions (Yip, Rowlinson, & Siu, 2008). The four coping dimensions were rational problem solving, resigned distancing, seeking support/ventilation, and passive wishful thinking (Yip, Rowlinson, & Siu, 2008). The results of the study indicated that rational problem solving demonstrated a significant moderating effect on all three dimensions of burnout (Yip, Rowlinson, & Siu, 2008). The coping strategies of resigned distancing was significant in moderating emotional exhaustion and seeking support/ventilation was significant in moderating cynicism (Yip, Rowlinson, & Siu, 2008, p. 877). These results lead to the assumption that increased individual coping strategies will lead to reduced levels of burnout in employees.

The construction industry is inherently stressful, and there are many different types of stress faced by construction management personnel. There have been studies done on the stressors faced by construction workers, but little has been done on management personnel. Only one study measured the stressors of mechanical contracting supervisors, finding that the only stressor that is above the average level is the due to children as per the LISRES-A survey (Wentz, 2015).

Most firms have realized that stress is a problem, and in response, many firms have instituted Employee Assistance Programs (EAPs) to help cope with stress. These programs originated in the U.S. 70 years ago as industrial alcoholism programs and finally gained popularity during the 1970s and 1980s. An example of this type of program is when Ford Motor Company launched its employee assistance program in 1976, Its primary objective was combating alcohol abuse in the workplace (Ruiz, 2006). Now, Ford’s EAP is completely different; it now handles a wide spectrum of issues, ranging from finding day care for children to planning for the purchase of a new home (Weiss, 2010).

Since their inception, these EAPs have become significantly more popular. As of 2016, an estimated 97 percent of companies with more than 5,000 employees have an EAP; 80 percent of companies with 1,001 – 5,000 employees have one; and 75 percent of companies with 251 – 1,000 employees have one (APA Staff, 2016). Although EAPs are increasingly popular, there is no standard program that will address the needs of all companies. Cutting-
edge EAPs have recognized the changing nature of employee needs over time and have incorporated a wide range of new innovative services designed to help employees meet the challenges of everyday life while staying on top of their game at work (Gleason, 2010). With the demographics of the workforce changing, the U.S. Department of Labor suggests that EAPs be targeted at millennials through strategies of increasing technology use, promoting work/life programs, and providing mediation resources (U.S. Department of Labor, 2009).

**Burnout in Construction**

When reviewing the literature on stress and burnout in the construction industry, relatively little can be found on the subject. The vast majority of the research deals with occupational stress, primarily focused on physical characteristics such as safety and exposure to chemicals. In addition, many of these studies focus on the construction worker, not on the supervisor.

A closely related research project to this topic is a study on an integrated model for the stressors and stresses of construction project managers in Hong Kong. This study conducted by Leung, Chan and Yu in 2009 looked specifically only at construction project managers and placed by far the most importance on personal stressors than any other research to date. The goal of the research was to develop a model for personal and work related stressors and determine the impact they had on performance of construction project managers.

The study developed a survey that investigated eight key stress areas: work overload, poor role congruence, poor organizational structure, career-developing environment, workgroup cooperation, type A behavior, poor work environment, and poor home environment (Leung, Chan, & Yu, 2009). The subjects of the study rated their actual ability versus their expected ability for each of the measures using a 7-point Likert scale. The results showed that all of the factors except type A behavior had an alpha value above 0.6, showing that these seven factors were significant.

The results of their survey showed some interesting correlations. Most notably, poor home environment was positively correlated to work overload, poor role congruence, poor organization structure, and poor work environment (Lueng, Chan, & Yu, 2009). One could conclude from this that poor work conditions could lead to poor performance at work. However, one could also assume that a poor home environment could lead to issues in the workplace.

In regards to burnout of construction professionals and construction managers, there are two studies of interest. Enshassi, Al Swaity, and Arain (2016) studied burnout in construction professionals in the Gaza Strip. The subjects of the study rated their agreement or disagreement with the common causes of burnout based on Maslach’s model on a 5-point Likert scale (Enshassi, Al Swaity, & Arain, 2016, p. 47). The relative importance index method was then used to determine the presence of coping behavior strategies (Enshassi, Al Swaity, & Arain, 2016, p. 48). Enshassi, Al Swaity, and Arain conclude depersonalization is the most prominent factor of burnout in construction professionals followed by reduced personal achievement and emotional exhaustion (Enshassi, Al Swaity, & Arain, 2016, p. 52). Their results point to unfair reward and treatment, ambiguity, insecure job, workload, and work family conflict as the causes for burnout (Enshassi, Al Swaity, & Arain, 2016, p. 53).

Yang, Li, Zhu, Li, and Wu (2017) researched burnout in construction project managers in China. Yang et al. (2017) created a 19-item scale based partially on the Maslach Burnout Inventory – General Survey and partially on an interview questionnaire that was distributed to experienced construction managers in order to capture construction manager burnout characteristics (p. 1276). After administering the survey, it was found that construction managers suffer from a high level of burnout characterized by medium personal efficacy, high exhaustion, and extremely high cynicism (Yang et al., 2017, p. 1285). The authors suggest future research be conducted on the role organizational intervention can play in reducing job stress and burnout (Yang et al., 2017, p. 1285).
Nature of Research

In order to measure the coping resources of mechanical contracting supervisory personnel, an appropriate survey instrument must be identified. Research was conducted on several different standard survey tools that have previously been validated and used in other studies. These were compared with the possibility of creating a new survey for this study. After the research of the possible survey instruments was completed, it was determined that a previously developed survey would be adequate for this research study.

The Life Stressors and Social Resources Inventory – Adult Form (LISRES-A) provides an integrated picture of an individual’s current life context. The measure is designed to identify stable life stressors and social resources as well as changes in them over time, if applicable for the study. This measure gives a reliable indicator of a subject’s life context, and it can be compared to other subjects or with other groups or proceeding studies.

The LISRES-A questionnaire form contains 200 statements that ask the subject to identify if the statement pertains to them by answering one of the following responses: definitely yes, mainly yes, mainly no, or definitely no. Some of the questions have the alternate response pool concerning their life stressors and social resources: never, seldom, sometimes, fairly often, or often. These responses are then tabulated on a separate score sheet for analysis and interpretation.

This instrument was chosen because of its documented ability to identify the life stressors and social resources of the test subjects. The LISRES-A has been used extensively since its conception. The validation of the LISRES-A was proven using extensive studies on alcoholics (Moos & Brennan, 1990). Dr. Moos has also published numerous studies using the LISRES-A concerning depression (Moos & Holahan, 1991), social support and coping (Moos & Fondacaro, 1987), as well as studies on juveniles with rheumatic disease (Moos, Miller, Stovel, & Timko, 1992).

The LISRES-A is divided into 7 different scales of evaluation for social resources. To assess a subject’s social resources, there is a battery of questions regarding several social resource domains and include positive life events that have happened in a subject’s life in the past year. The seven scales for measuring social resources as defined by the Professional Manual for the LISRES-A (Moos, 1994) are:

- **Financial (FIN)** – total annual family income
- **Work (WK)** – challenge, independence, and support at work
- **Spouse or Partner (SP)** – support and empathy in relationship with spouse or partner
- **Children (CH)** – support and empathy in relationships with children
- **Extended Family (FAM)** – support and empathy in relationship with mother, father, and other relatives
- **Friends (FR)** – support and empathy in relationships with friends; number of close friends; membership in social groups
- **Positive Life Events (PLE)** – number of new positive life events that occurred in the last 12 months across all domains except extended family and friends

**RESEARCH METHOD**

The data used for this research study is collected from mechanical contracting firms located in the United States that are members of the Mechanical Contractors Association of America (MCAA). By collaborating with the MCAA, a larger pool of subjects could be identified and surveyed, thereby generating responses from a diverse group of individuals all across the nation. The MCAA has a database of these firms and a current listserv emailing system already in place, making it efficient to contact potential subjects for this study.

This research is targeted at mechanical contracting supervisory personnel. Because of this, the survey is
directed companies from the MCAA listserv, which is comprised of 870 contracting member firms. The instructions were to direct the survey to a person defined as a supervisor at that particular firm. Any member of the firm that is part of the field staff or part of the support staff would not be surveyed. The survey asked for one respondent per firm.

Because of the large geographic area between each of the mechanical contracting firms that were identified for this study, it was not feasible to have the investigator physically administer the survey instrument. Also, the prospect of manually mailing a physical questionnaire to each firm presented several logistical problems and created a high probability of a low response rate. Because of these issues, an online survey was determined to be the most efficient method of data collection.

The survey used for this research project was loaded electronically into an online survey tool called Survey Monkey (www.surveymonkey.com). This tool allowed for the exact survey questions to be loaded and disseminated to the survey population quickly. The software creates a secure database and questionnaire and then generates a password-protected link for the respondent to access the survey. The link to the survey was distributed using the MCAA email list described above.

The hypothesis for this research project is that the results of the LISRES-A Social Resources Survey are outside the average range for any group of people according to the LISRES-A Professional manner. This will be investigated by testing the null hypothesis that the results of the LISRES-A Social Resources Survey are not outside the average range.

Once the data from the survey have been collected, it was entered into a statistical analysis software program called SPSS. The normality of the data set was verified first. Normality is an assumption of parametric procedures which are more sensitive than non-parametric procedures. The determination of the normality of the data set dictated which type of statistical analysis was used to test hypotheses about the variables in the study.

In order to accomplish this, the data was analyzed using descriptive statistics. This described the central tendency of the data set, or what are the “typical” values (Norusis, 2010). This was done for each of the 16 values of the LISRES-A Survey. The mean and standard deviation of each of the categories was calculated to determine the amount of variation that exists in the data from the mean (Norusis, 2010).

To confirm if the data is normal, the Shapiro-Wilk test was used. The Shapiro-Wilk test is used to test if a data set came from a normally distributed population and is primarily used when the number of values in the data set is less than 2,000 (Norusis, 2010). If the data set was determined to be normal, the mean value of the data set was compared to the mean value of any group of people according to the LISRES-A Professional Manual with the one-sample t-test. If the data set was not normal, then the one-sample signed rank test was used to compare the median value of the data set to the median value of any group of people according to the LISRES-A Professional Manual.

Basic parameters of statistical testing include the significance level, the power, the effect size, and the sample size. It is common to approximate a sample based upon a significance criterion, power, and effect size since any one of these parameters is a function of the other three for a given statistical test. The significance criterion used for this research was 0.10, which means that there is a 10% chance of rejecting a true null hypothesis (Norusis, 2010). The selected significance criterion of 0.10 is often found in research in the construction field (Burns, 2007) and is practical because the risk associated with making a Type I error does not pose any safety or economic risk in this study. This was also the rate used in the study finding that children were the largest stressor on mechanical contracting personnel (Wentz, 2015).

Results

There were 137 respondents to the online survey. This constitutes a 15.75% response rate. When
analyzing the responses, it was discovered that 14 responses were incomplete. Therefore, the total number of usable responses to the survey was 123, which translates into a 14.14% response rate. In order to draw conclusions from the results of the survey, the validity of the data set was first tested. For each individual Social Resources category the mean and standard deviation were calculated. The results for each Social Resource are found in Table 1.

Table 1 - Descriptive statistics

<table>
<thead>
<tr>
<th>Social Resource</th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN</td>
<td>123</td>
<td>45</td>
<td>60</td>
<td>59.88</td>
<td>1.353</td>
</tr>
<tr>
<td>WK</td>
<td>123</td>
<td>9</td>
<td>22</td>
<td>16.84</td>
<td>2.864</td>
</tr>
<tr>
<td>SP</td>
<td>123</td>
<td>0</td>
<td>24</td>
<td>18.01</td>
<td>5.394</td>
</tr>
<tr>
<td>CH</td>
<td>123</td>
<td>0</td>
<td>24</td>
<td>15.11</td>
<td>4.196</td>
</tr>
<tr>
<td>FAM</td>
<td>123</td>
<td>5</td>
<td>24</td>
<td>13.14</td>
<td>3.436</td>
</tr>
<tr>
<td>FR</td>
<td>123</td>
<td>0</td>
<td>38</td>
<td>24.54</td>
<td>6.854</td>
</tr>
<tr>
<td>PLE</td>
<td>123</td>
<td>0</td>
<td>6</td>
<td>2.12</td>
<td>1.592</td>
</tr>
</tbody>
</table>

Other statistical tests used to determine if the data set is normal are the Shapiro-Wilk test and the Kolmogorov-Smirnov test. With data sets with fewer than 2,000 elements, the Shapiro-Wilk test is used (Norusis, 2010). If the p-value of the Shapiro-Wilk test is above the alpha level (for this study the alpha level was chosen at .10), then the data set is determined to be normally distributed, meaning that the values are disturbed around a central value with no bias left or right, so that certain tests may be used to make interpretations of the data. The results of the Shapiro-Wilk test for the individual social resources are found below in Table 2.

As shown in Table 2, all but two social resources have a p-value that is less than the stated alpha level of 0.10. This indicates that the Children Social Resource and the Extended Family Social Resource are normal data sets, and the one-sample t-test is used to determine significance. The results of the one-sample t-test are found in Table 3.

The results of the one-sample t-test shown in Table 3 show that the Extended Family Social Resource has a p-value above the alpha level of 0.1, and the Children Social Resource has a p-value below the alpha level of 0.1. This indicates that there is a statistical difference between the median value of the Children Social Resource of mechanical contracting supervisors and the expected value according to the LISRES-A Professional Manual.

For the remaining Social Resource data sets, non-parametric testing must be done in order to make conclusions based on the results of the survey. Since there is only one variable to evaluate and it is not from a normal data set, the one-sample signed
rank test is used to compare the median of the survey results to the expected median as defined by the LISRES-A Professional Manual (Moos, 1994). The results of the one-sample signed rank test for the Social Resources are found in Table 4.

Table 4 - One-sample signed rank test

<table>
<thead>
<tr>
<th></th>
<th>Missing</th>
<th>Med</th>
<th>25%</th>
<th>75%</th>
<th>p</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN</td>
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<td>0</td>
<td>60.0</td>
<td>60.0</td>
<td>&lt;0.001</td>
<td>YES</td>
</tr>
<tr>
<td>WK</td>
<td>123</td>
<td>0</td>
<td>17.0</td>
<td>15.0</td>
<td>0.627</td>
<td>NO</td>
</tr>
<tr>
<td>SP</td>
<td>123</td>
<td>0</td>
<td>20.0</td>
<td>15.0</td>
<td>0.19</td>
<td>NO</td>
</tr>
<tr>
<td>FR</td>
<td>123</td>
<td>0</td>
<td>25.0</td>
<td>21.0</td>
<td>0.982</td>
<td>NO</td>
</tr>
<tr>
<td>PLE</td>
<td>123</td>
<td>0</td>
<td>2.0</td>
<td>1.0</td>
<td>&lt;0.001</td>
<td>YES</td>
</tr>
</tbody>
</table>

The results of the one-sample signed rank test shown in Table 4 show that all of the Social Resources have a p-value above the alpha level of 0.10 except Financial and Positive Life Events Social Resources. This indicates that there is not a statistical difference between the median value of the social resources of mechanical supervisors and that of the expected values according to the LISRES-A Professional Manual except for the Financial and Positive Life Events Social Resources.

Conclusions and Recommendations

This research resulted in several findings. The first finding was that all but three of the social resources were at a normative level compared to the average level of stress for any group of people according to the LISRES-A Professional Manual. As indicated in the literature review, there have been several studies investigating the effect of work stress in the construction industry, and that the primary focus on burnout has been in this area. The Financial Social Resource in the LISRES-A Survey is a measure of the total annual family income of the survey respondents (Moos 1994). The statistical analyses showed that there is a significant difference between the survey participants’ mean value and that of the expected mean value in the LISRES-A Professional Manual. Using the LISRES-A scoring rubric, the mean value was 59.88 which translated to a z-score of 61. The LISRES-A Professional Manual indicated this level of coping resource is considered well above average for this survey group (Moos, 1994).

This well-above-average level of the Financial Social Resource is significant. The results of the Financial Stressor were within the average range, but the respondents have a higher level of total income compared to that of the average person according to the LISRES-A Professional Manual, which translated into a higher level of Financial Social Resource to deal with life issues. Many businesses and managers believe that by raising an employee’s salary, they can alleviate all stress in their employee’s life. The results of the research show that mechanical contracting supervisors have a much higher level of income than an average group according to the LISRES-A Professional Manual, so raising income to combat stress may not prove effective. This depends on the motivation of the person, where a study has shown that there is a positive and significant impact of income on life satisfaction for individuals with extrinsic or mixed motivations, but not for individuals intrinsically motivated (Jimenez et al, 2010).

The next significant variable is the Children Social Resource. The Children Social Resource is a measure of the support and empathy in a relationship with children of the survey participants (Moos, 1994). According to the statistical analyses, the mean score from the survey group was significantly different than what was expected.

Using the scoring rubric from the LISRES-A Professional Manual, the score of the Children Social Resource was 15.11, which translates to a z-score of 44. This result shows that the amount of Children Social Resource for mechanical contracting supervisors in this study is significantly lower than expected. The LISRES-A Professional Manual indicates that this level of resource is considered somewhat below average for this survey group (Moos, 1994). It is important to note that not only was there a higher level of stress related to children for the survey respondents, but that their coping resource was below average for that stressor.

The final result of the research is the level of the Positive Life Events Social Resource. The Positive Life Events Social Resource is a measure of the number of new positive life events that occurred in the last 12 months across all domains except extended family and friends.
of the survey participants (Moos, 1994). According to the statistical analyses, the mean score from the survey group was significantly different than what was expected.

Using the scoring rubric from the LISRES-A Professional Manual, the score of the Positive Life Events Social Resource was 2.12, which translates to a z-score of 60. This result shows that the amount of coping resources in regards to positive life events for mechanical contracting supervisors in this study is significantly higher than what was expected. The LISRES-A Professional Manual indicates that this level of coping resource is well above average for this survey group (Moos, 1994).

This research identified the Financial, Children, and Positive Life Events social resources for mechanical contracting supervisory personnel are significantly different than that of the average levels according to the LISRES-A survey instrument. Unusually low levels of coping resources can lead to burnout of mechanical contracting supervisors and ultimately a lower retention rate of these individuals. The results of this research identified two coping resources that were above average levels, and one coping resource that was below average levels. It is recommended that companies focus their efforts on reducing the levels of stress associated with children of their management employees. Also, mechanical contracting companies would benefit from instituting policies and procedures that could help raise the coping resource for children. By lowering the amount of stress in regards to children, mechanical contracting companies could help lower the levels of burnout in their employees, and thus improve retention.

There are several different strategies that could be employed to raise the coping resources associated with children. One such method would be for companies to provide an on-site daycare for the children of employees. This would be a convenience to parents, they would be able to bring their children to their place of employment and have their children cared for while they are at work. This would eliminate the need for excess time to drive back and forth to another daycare facility. Also, the expense of daycare could be reduced or eliminated with this policy.

For many firms having an in-house daycare is not feasible due to cost and limited space. Firms can, instead, have recommended provider(s) of daycare services as part of their Employee Assistance Program (EAP). A network of providers that allow for flexibility for the employees would be beneficial. The network of providers would allow employees to choose a daycare provider close to home or close to the office for added convenience.

Another method that could be used to help raise the coping resources associated with children would be to institute a flexible schedule program at work. For many parents, much of the stress from their children comes from their varying schedules and their difficulty in accommodating those schedules with those of their employer. In order to alleviate this stress, a company could institute a flexible schedule to allow for parents to transport their children to school, doctor’s appointments, and extra-curricular activities without it negatively impacting their performance at work. This can be realized through the implementation of remote workspaces. Employers can provide their employees the required technology to work using the company’s IT infrastructure while not being physically present in the office. The benefit of digital workplaces will be two-fold. Not only will remote workplaces accommodate flexible schedules for families, but they will also attract the digital natives of the millennial generation to the company.

Companies can institute counseling services as part of their EAPs to help parents deal with some of the issues they may be facing with their children. This can be obtained by using a third-party provider who is trained in these areas of expertise.

Depending on the age of the children, other resources could be made available by the companies’ EAPs as well. Many children and parents alike are worried about their academic performance, and mechanical contracting firms can help with this. As part of the EAP, a mechanical contracting firm could
offer discounts for tutoring services for academic coursework. Again, this could be obtained by a third-party provider who specializes in academic counseling.

This is not to say that these are the only methods available to help address the life stressors and related coping resources of mechanical contracting supervisory personnel. There are a wide variety of EAP services available from many different service providers. However, according to this research, mechanical contracting firms should focus their attention on this key area to help raise the coping resources of their employees to help minimize burnout.

Not all of the results of the research point to a negative impact. There were coping resources of mechanical contracting supervisors that were above average. The Financial Social Resource was well above the average value. It can be concluded that mechanical contracting supervisory personnel are compensated well above the national average which contributes to the security of this coping resource. Companies should not take this for granted, and most people would not turn down more money if offered to them. Mechanical contracting firms should take note that although the Financial Social Resource is at the top end of the range and above average, these employees still have heightened levels of stress in other areas and money may not always be a method to solve the problems they face.

The Positive Life Events Social Resource was somewhat above average. These positive events have influence over all aspects of a person’s life, so the overall impact of these on burnout of these employees cannot be dismissed. However, this coping resource is difficult to quantify or create organically from the mechanical contracting firm’s side.

There are several recommendations for future research that stem from the experience gained from this research. First, the sample used for this study was taken from MCAA member firms, which are predominately union contractors. Taking a sample from a group of non-union firms, perhaps from a group such as the Plumbing-Heating-Cooling Contractors (PHCC) of America and making comparisons between the two groups could constitute future research.

The sample used for this study was taken from mechanical contracting supervisory personnel. Taking a sample from management personnel from other trades may perform further research, such as electrical or general contracting groups and making comparisons between the groups. Further research could also be performed by taking a sample from non-management personnel, such as the field staff, and making comparisons between the two groups.

This research study identified the Children Social Resource as being below average for mechanical contracting supervisory personnel. Further research may be conducted on methods to increase the level of Children Social Resources.

This research study identified the Positive Life Events Coping Resource as being well above average for mechanical contracting supervisory personnel. Further research may be conducted to identify exactly the effects these positive life events have on the retention of these individuals and on their level of burnout. This research could also investigate this trend for other sectors of the construction industry to assess its overall impact on the industry.

Further research may also be conducted on the effectiveness of specific solutions that have been implemented at a mechanical contracting firm to reduce stress and increase coping resources in regards to children. Studies can be conducted on the effectiveness of Employee Assistance Programs (EAPs) that have instituted specific changes in regards to stress and coping resources attributed to children and compare the stress and coping resource levels before and after the EAP program was implemented. The implementation of daycare providers and networks, as well as the implementation of flexible schedules through remote workspaces are EAPs that can be studied in regards to stressors and coping resources related to children.
References


The James L. Allhands Essay was established by the late James L. Allhands, one of the founding members of AGC and a prolific writer of construction-related works. The award recognizes a student essay on a specific topic that is deemed to be beneficial to the advancement of technological, educational, or vocational expertise in the construction industry. The competition is open to any senior-level student in a four or five-year ABET or ACCE-accredited university construction management or construction-related engineering program. The First Place essay author receives $1,000. His/her faculty sponsor receives $500. Both the recipient and sponsor are invited as guests of the Foundation to the AGC Annual Convention.

The winner is notified in February and the award is presented at the AGC Annual Convention.

The topic for 2019 was “Attracting and Retaining Top Employees by Placing Performing Employees: A Student Perspective.” The essays of the top three finalist are included in the following pages.

1st place - Joseph Weldon Franklin, East Carolina University
2nd place - Caleb Bardin, Texas A&H University
3rd place - Julia Allen, Auburn University

The topic for the 2020 Allhands Essay Competition is “Identifying and Positively Addressing Real and Perceived Barriers to Inclusion in Construction.” The deadline to apply is November 15, 2019.

For more information, go to the AGC Education and Research Foundation website: https://www.agc.org/about-us/awards-recognition-programs/agc-foundation-awards
Attracting and Retaining Top Employees by Placing Proper Value on Their Contribution to the Company

Joseph Franklin III
East Carolina University

Abstract:
Due to an optimistic economic future, construction companies want to attract and retain the best employees to ensure company success. Because of a larger job market, employees now look for the optimal work values to be met in long-term employment opportunities. Construction companies have many challenges when attracting and retaining top employees in a growing market. Therefore, it is beneficial for employers to consider the evolving work values of employees and for these values to be promoted throughout company culture. Offering employees good value for their contribution to the company attracts and retains top employees.

Introduction
The optimistic market of the construction industry creates an increasingly competitive market for companies to attract and retain top employees. Though many variables take place in hiring and retaining employees, employers must incorporate the overall work value of their employees into the company culture. Incorporating these motivational needs into the company culture gives competitive advantage over other companies in the construction industry. This article will address challenges of increasing and incorporating work values of employers and employees, and how intrinsic and extrinsic needs attracts and retains employees. The article will give personal perspective, experience, and preference as a future employee entering the construction field. Finally, the article will also address how an organization, such as AGC, can guide construction companies in their endeavor to attract and retain top employees.

Challenges for Construction Companies to Attract and Retain Top-Performing Employees
Throughout all industries, attracting and retaining top employees is a challenge. With the fast growing construction market, the challenge is even greater because many employees have a vast army of options in the marketplace. Employees in this market look for companies that can give them a sense of good work value and self-worth.

Therefore, it is important for construction companies to understand motivational needs, work value, and options for future top employees. The challenge for construction companies is for them to choose the best options to meet the needs of their employees to the best of their ability. Understanding some of these needs helps companies make the best decisions to attract and retain employees.

Employee Motivational Needs, Work Value, and Competitive Advantage for Attracting and Retaining Employees

Maslow’s hierarchy of needs is a theory of motivation and personality developed by the psychologist Abraham H. Maslow (1908-1970). Maslow’s hierarchy explains human behavior in terms of basic requirements/or survival and growth. These requirements, or needs, are arranged according to their importance for survival and their power to motivate the individual. Once the basic requirements of an individual are met, the individual’s needs evolve to other areas of motivation. Construction companies should meet an individual’s basic needs, and companies should consider going beyond an individual’s basic needs to compete with other companies in the industry. The goal of a company should be satisfying an individual’s basic needs before an employee will begin to consider the next levels of the hierarchy of needs.

Work Value
One way of viewing motivation for employees in the workplace is looking at work values. Work values or work meanings (Kanchier & Urruh, 1989) are the end values individuals seek from their work (Mok et al., 1999, Wong and Chung, 2003). They are defined as the perceived importance an individual gives to certain outcomes related to attributes of work (Elizur, 1984, Super, 1973). Work values are the way employers can increase the “buy-in” of their employees. These work values create a culture where employees become the company’s biggest promoters and work hard to achieve company
success and goals. When work values are high, then employees understand that overall company success is equivalent to individual employee success.

Intrinsic and extrinsic needs are two large divisions of work value found in company culture. Intrinsic values are those inherent in the work activity (e.g., achievement, creativity, altruism), while extrinsic values are the rewards from work such as income or prestige (e.g., way of life, security), and social or environmental value (e.g., surroundings, associates, supervisory relations) (Wong, L.A., Wan. Y. K. P. & Gao, J. R (2017)).

Salary- A Primary Concern for Top Employees

While companies can attract employees by offering benefits and other options, salary remains one of the top methods for companies to attract top employees throughout the world. The following chart shows that salary is a top motivator for potential employees:

<table>
<thead>
<tr>
<th>Top Five Drivers of Attraction: Globally</th>
<th>Global</th>
<th>U.S.</th>
<th>U.K.</th>
<th>Mex.</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive base pay</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Work-life balance</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Challenging work</td>
<td>3</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Career advancement opportunities</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Salary increases linked to individual performance</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Data from O’Neal, S., & Gebauer, J. 2006

Though companies understand salary to be a top motivator, offering competitive salary options can help attract future top employees. To be competitive, employers will need to develop and refine their basic compensation systems and use variable pay programs such as incentive rewards to attract talent. Total rewards packages that include voluntary benefits can be game-changers (Bender, M., Contacos-Sawyer, 2013).

Employers should not overlook offering optional investment opportunities, stock options, and ownership with top employees. Employees who are invested in a company are more likely to continue as a long-term employee. Even financial education programming can help to retain top employees in the company (KPMG: Survey, 1999). Employers who offer customizable salary and benefit packages gain a competitive advantage. This is particularly important to attract more skilled laborers.

The construction industry has an increasing demand for skilled laborers. In an article pointing out the increasing need for skilled laborers, Graham wrote, Skilled trades such as automotive repair and construction and more traditional manufacturing jobs such as fabrication and drafting are begging for workers (Graham, 2006). Companies that offer higher work value for skilled laborers will be able to attract better employees.

Advancement -Another Top Consideration for Future Employees

Advancement is another top consideration for construction companies in the attraction and retention of top employees. In a recent study, Michael Haid, Right Management’s Senior Vice President for Talent Management stated:

We wondered if higher comp would top the list, or perhaps less workplace stress, but we found that opportunity for advancement is number one. That tells us that despite all the workplace complaints we hear most employees are still highly motivated about their own development and careers (Opportunity for Advancement, 2011).

Construction companies should show their overall approach to advancement with the company. By providing a clear structure, advancement ladder, training opportunities, and educational opportunities for career advancement, companies show a visual level of motivation in the company.

Opportunity for advancement is a unique area for employers to attract and motivate employees of all skill levels and education levels. Advancement should be attainable for all employees. Unique ‘training for skilled laborers and continuing education for management should be encouraged and offered as a part of the hiring package. When future employees see that employers are investing time, money, and resources into training and advancement, it will motivate them to higher performance and longevity in the company (Wong, I. A., Wan, Y. K. P., & Gao, J. H., 2017).
Health Benefits - A Growing Challenge for Employees and Employers

Another growing area of interest for future employees is offering a competitive health insurance and benefits package. As health insurance costs increase, this area of need becomes an even greater concern for attracting future top employees. There is a correlation between the growing cost of health insurance and lower pay for employees (Anand, P., 2017). Companies should consider offering health insurance and health benefits to attract employees.

Retirement - Long-Term Retention for Employees

Though retirement is not always the first motivational need for top employees, it becomes more important for a company’s offer as other needs have been met. Companies should offer optional retirement options for employees. Age based programs and education for retirement planning are great ways to retain employees. When employees invest in the company and their retirement in the company, then they are more likely to stay with the company until retirement is attained. Profit sharing, stock options, and ownership are ways to provide motivational benefits for employees. When the company succeeds, all employees benefit.

Location - An Increasing Challenge for Retention

With a growing marketplace and many multinational construction companies, location becomes an increasing issue with attracting and retaining top employees.

Construction companies should consider multiple options for location. While moving expenses and a bonus for relocation may be options, some companies should consider paying for travel expenses for employees who often do not wish to relocate or cannot relocate due to personal reasons. Keeping employees close to family support systems, homes and familiar settings increases their fulfillment in life.

Achievement - Overall Job Satisfaction

Achievement or satisfaction is long-term intrinsic motivation for retaining employees. Achievement gives employees the satisfaction of meeting thresholds or goals for the company. If goals are rewarded with recognition, then employees are often motivated to continued future success in the company. Thus, achievement satisfaction can improve employees’ performance and create top employees. (Baard, P. P., 2004)

Creativity - Being Involved in the Process

Creativity is a growing need for new generations of potential employees. According to Amabile’s (1988) influential componential mode, creative behavior consists of three main components: expertise, creative personality, and intrinsic motivation. Expertise refers to the degree of knowledge and specialization people possess (Nystrom, 1995) (Auger, P., & Woodman, R. W. 2016). It is also important to note that creativity varies with industry and organization (Auger, P., & Woodman, R. W. 2016).

Companies should invite employees to participate in the pre-construction phase of projects and fulfilling the creative need of long-term employees.

Philanthropy - Long-term Motivation for Employees

New generations of employees are looking at company practices and their actions/inactions of helping humanity. Companies that can find ways to “give back” will gain the respect of their employees. In what they call a “significant finding,” Stephen Brammer and Andrew Millington share, that philanthropic expenditures may play a significant role in stakeholder management and may, in particular, lead to stakeholders holding more positive impressions of philanthropic corporations (Brammer, Stephen 2005). Long-term employees look for companies they can stand behind and promote through hard work and positive affirmations of company practices.

What is My Own Perspective on the Characteristics of a Company I would like to Work For?

Though I have little experience in the construction world, I know that my experience in life has taught me what to look for in an employment opportunity. One of the main characteristics that I look for is overall work value from an employer. The employer should offer a competitive salary, advancement opportunity, a good quality health plan, options for retirement, and social responsibility.

Salary, health insurance, and retirement are three
important features I look for in potential employers. These are three basic needs that quickly tell me if a company values my work. A good beginning salary with potential for advancement (with pay increase) is important when I search for a future long-term employer. Increased health insurance rates are a growing concern for me and many other employees. Retirement is becoming more important as people live longer and need more money for retirement (Hagen, J. 2018). These are all concerns for me as I enter employment.

Finally, I believe that construction companies should be more concerned with their responsibility to their community and the environment. I believe that a company that cares for the local community creates a partnership for the future with that community and the company. I would like to take pride in what our company is doing to help the local community and what they are doing to help reduce environmental impact.

How Has My Educational and Internship Experience Informed My Perspective?

The Construction Management program has helped shape my understanding of what to look for in a future employer. Two important perspectives it highlighted is company safety and environmental impact. Safety is always a concern in the construction industry. Looking for a safe company is one potential way to find a company that cares for its employees. A company that cares for the environment also cares for the surrounding community and the potential impact on the community.

During my internship, I was able to experience a good quality management company who took pride in a safe work environment and good relationships with their employees. The company I worked for was diligent in maintaining safe work environments and following proper safety protocols.

The company also maintained good relationships with their employees in every area of the company. Their skilled labor and the managers all believed that they were valuable to the company. Top management and the owners took time to listen to suggestions from employees and took time to teach new employees or interns. I felt valuable to the company and knew that I mattered to the company.

What Role Can AGC Play In Resolving Some of the Challenges of Attracting and Retaining Top Employees?

AGC and other organizations influence a large number of companies in the construction industry. One way that AGC can help would be to develop a list of work values that top employees would look for in a company. Sharing the top needs/wants of future employees would help construction companies understand what changes should be made to attract and retain top employees. AGC’s list could be a good guide for all employers and give some guidance for future employees. Keeping the ever-evolving list of needs and wants for employees will help the construction companies stay up-to-date with the changing needs.

Another recommendation AGC could do is put together a list of top average salaries, upper salaries, and entry salaries for construction companies based on a particular state or work region in the United States. A list of regional/state salaries could help companies see if they are competing with other construction companies for hiring and retaining top employees. While salary is not the only motivation; it is the top motivator and could give a starting goal for companies to meet.

Finally, AOC should encourage construction companies to become more environmentally and socially responsible. Encouraging philanthropy helps the construction industry’s perception in the business world. Companies that take social and environmental responsibility to heart will gain top employees that take pride in their company. AGC could offer a “gold standard” to companies for social and environmental responsibility. This achievement would attract new employees and help top employees remain loyal and take pride in their company.

Conclusion

In conclusion, construction companies can meet the many challenges brought forth by a growing industry. The challenge of attracting and retaining top employees can be overcome by taking into consideration the needs of future top employees and offering options for those employees. While some extrinsic needs are always going to be very important for attracting top employees, the intrinsic needs seem to retain good employees. Construction companies
who take time to evaluate their employees’ work values and meet these values will attract and retain top employees. Organizations such as AGC should encourage employers to meet these work values by offering some guidance for industry standards. Finally, the construction industry’s continuing survey of future and current employees will give companies the right values to offer employees.

References


Graham, C. (2006). Jobs in skilled trades outnumber workers: Manufacturing industry, pay are growing, but employees becoming harder to find. Arizona Republic
Attracting and Retaining Future Top Performing Employees

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Texas A&M University

Abstract

The goal of this essay is to explore the key factors that influence top-performing employees’ decisions to change companies or remain with their current employers. A few of these factors are salary and benefits, work environment, and corporate advancement. This essay will address such factors and propose solutions using my own educational and professional experience. A key theme to note is the constant evaluation of employees and workplace environment by employers. No company can hope to be successful or have the best people if this skill is not enhanced and implemented well.

Attracting and Retaining Future Top Performing Employees

Why does it seem corporate turnover is occurring at such a high rate, now, more than ever? Perhaps it is because employees are unhappier than they’ve ever been before. Perhaps they have personal and familial obligations that dictate their reasons for change. Or perhaps they simply enjoy a lifestyle governed by frequent change.

When one thinks about the factors that influence choosing a workplace, it’s easy to realize the answer is not simple. Salary, benefits, location, promotion, and corporate culture are just a few of the factors that go into an employee’s decision to remain with a company. These are also the reasons why employees choose to leave companies. “Employees tend to remain with a company until some force causes them to leave.” (Flowers). Largely dependent on the individual, these factors combine and take priority in many different ways. Industries such as construction, where success is measured in terms of production, create high-stress environments, which only complicates these factors. In order to hire and retain high-performing employees, companies must constantly evaluate the environment in which their employees work and their opportunities for advancement. In a world characterized by corporate titles and social status, promotion is at the core of most people’s motivation to work. Great opportunities for growth are often the most attractive aspects for gaining and retaining any high-performing employee.

Employers must realize, however, that they must focus on how they best provide value to their employees and find a competitive advantage within that area. The industry is simply far too large for any one company to be the best at everything. Constant internal and external evaluation is vital in achieving competitive advantage but requires a balancing act. Too much focus on internal factors can blind a company to new, hot opportunities in their sector. However, too strong of a focus on external factors can hinder a company from producing the highest quality products possible. Unfortunately, there is no easy answer for this and might only be reached through trial and error.

Factors that I consider important are company culture, location, and promotion. Considering approximately one-third of our lives, or 8 hours a day, are spent at work, the most important consideration should be the environment in which we work. Positive cultural environments are ones in which there is innovation and accountability among co-workers, bosses, and subordinates. Innovation is not limited to new ideas, but also new methods and procedures. Training is a vital factor that helps create an attractive culture and encourages new processes and methods. Training allows individuals to expand their skill sets, which can lead to increased production and efficiency, both of which are necessary for promotion. Training can also provide mental and emotional benefits. “Positive training offered to employees may assist with reduction of anxiety or frustration” (Truitt). I believe companies that show a commitment to the professional and overall betterment of their employees will always hold an advantage over other firms who may not place as much importance on this factor.

Accountability in the workplace is important as it fosters relationships. Relationships are the foundation of any business in the service industry. Many companies have an open-door policy. This policy allows employees to communicate freely with their superiors about issues, both work and...
personal, in a confidential setting. The ability to not only be heard, but invited to share problems can have a profound effect in one’s feelings of acceptance within a company. As previously stated, construction is a high-stress environment filled with problems. Teamwork and collaboration are vital to ensuring success in this field. Also, holding team members accountable for shortcomings and rewarding accomplishments are absolutely necessary for creating a healthy, balanced work culture. Another part of accountability is understanding what is preventing the employee from holding him or herself accountable (Rheem). It is important to know your employees as intimately as possible so you can have a greater understanding of what motivates them.

Location is another important factor when choosing an employer. For most, especially those with familial obligations, consistency in one area is a key determinant. Personally, I desire a company who places great importance in my family’s well-being and stability. This requires companies to carefully consider the stages of life that their employees and their families are at, especially when it comes to job placement. Even when relocation is not openly welcomed by an employee, the right relocation package can ease this burden. “Financial offerings can take the form of a one-off payment, covering extra travel costs for a fixed period of time, or providing moving costs such as a transport or decorating budget” (Done). Companies may need to re-evaluate the relocation of a top employee if it may result negatively toward one’s home life. The family is the greatest support system that anyone can possess, as long as it is a healthy environment. High-stress work environments can have a devastatingly negative impact on this support system if it is not monitored properly. This kind of monitoring may be difficult to achieve, especially when an employee is not willing or open to sharing about personal matters. However, there are some opportunities for a company to influence this without being directly involved.

One solution could be as simple as having a broader spectrum of allowances for time off. It could include providing avenues, such as counseling or training, which allow employees to work through difficult circumstances not pertaining to work. Another may be a more comprehensive benefit package. This is a great option for companies that may not be able to compete with higher-paying firms. A study by Glassdoor in 2015 revealed that 79% of employees would prefer new or additional benefits to a pay increase (Glassdoor Team). The following chart represents a study by the Harvard Business Journal that asked how important certain benefits are to job seekers (Jones).

The fundamental reason that every human being gets paid to work is so they can provide for themselves and those under their care. Companies who address this factor with great understanding and support excel in fostering a positive culture. “All employees—no matter what their positions are or how well they perform their jobs—want to be respected and valued for their contributions” (Economy). By taking time to set work aside, even if for a few brief moments, employers can connect with their employees on a much deeper level. This kind of interaction creates a sense of trust and belonging, which can propel any employee to a higher level of positivity and productivity.

Constantly moving locations is usually not desired and is not for the faint of heart. Young, single adults dominate this category of constantly moving and show much more willingness to move locations for each job. There are a couple reasons for this; first, since they are not “tied down” with a family they have much more flexibility as it relates to their goals, hobbies, and aspirations. Second, a strong willingness to move into a new market...
or a less popular geographical location is often associated with a greater potential for promotion. Working in harsh environments or “doing the dirty work” is important in building credibility for young employees. “Paying dues is important for any industry” (Herman). For young professionals, eager to climb the corporate ladder, they are often considered more enthusiastic to “prove themselves” by doing what many others cannot or would not.

For the reasons stated above, and more, it should be clearly evident that promotion, whether monetary or authoritative, drives the corporate world. Why is this so important? Promotion is an extremely tangible sign of success. For many, a bigger house, a newer vehicle, and nicer clothes create a sense of pride and accomplishment. They use these items as a symbol of dominance. Therefore, it is important to foster success and accomplishment among employees by providing bonuses, raises, trips, and other incentives for top-performing employees. Competition is healthy within a firm, as long as it is contained and not biased. For this to truly work, companies must ensure that their employees have a clear understanding of the promotional process. “For any employee that is worth retaining, a manager must make clear to them how and where they can move forward on their career path” (Efron). Ambiguity can cause frustration and anxiety over work performance. For this reason, both employers and employees should actively pursue clarity with regards to performance and promotion.

My personal educational and vocational experience has taught me that people are the most important piece of any business. A team is only as strong as its weakest member. For this reason, it is vital that employers invest the appropriate amount of resources into the development of their employees. Academia places a great importance on teamwork and group activities. This forces students to adjust to different group dynamics and personalities in order to achieve success. It encourages collaboration and teaches each member how to delegate responsibility. Other skills are learned as well, they include the following: breaking complex tasks into smaller parts, planning and managing time, refining understanding through discussion and explanation, providing feedback on performance, and challenging assumptions (Eberly). These are all great tools for enhancing leadership and interpersonal skills and are used in everyday work activities. I have certainly benefitted from such activities and groups.

Concerning internships, I think there is no greater or more beneficial tool. The opportunity to experience a professional work environment while still in school or immediately after is invaluable. Internships provide the student with an opportunity to not only apply classroom knowledge, but learn how to respond when “perfect world” academic theories fail. There also seems to be a greater opportunity for initiative and growth as an intern. Since interns are temporary employees, they have the opportunity to experiment and ask questions while under close supervision. As long as the proper supervision and accountability is present, interns can work in an environment where mistakes can be made without fear of termination. “Making a mistake means you’re in the process of learning and that’s the whole point of an internship” (Doyle). Granted, this does not mean interns have total latitude. Rather, employers should assign tasks that are less vital to the overall project. In this way, if mistakes are made they won’t significantly hinder the project and the intern can learn from their mistakes. Experience is built through failure. Overcoming failure and finding success by accomplishing a task the correct way instills confidence. Confidence is key to improving company culture and developing a higher quality employee.

Organizations such as Associated Building Contractors (AGC) can play a role in this process as well. Large, professional organizations can hold training workshops and invite speakers to organizational events focused on these factors (Raines). The idea is for AGC to continually provide the best, most current resources to its members. These members, in turn, can evaluate and implement the information received at these events in their own companies. Another way AGC could assist is by increasing its involvement in the overall community through fundraisers or service events. These can be a great public relations tool for the industry as a whole and could bring outside attention to the companies within the organization. Regarding the skilled labor workforce, AOC could do well to reach out to the local high schools and hold a career day. This is perhaps the greatest opportunity to expose younger generations to the opportunities that exist in the construction industry.
In conclusion, employers must focus on the environments in which they are placing their employees. This includes constant evaluation of team dynamics, accountability, and communication. They must also monitor the factors that affect the happiness of their employees. These factors include location, salary and benefits, promotion, and personal growth. Placing greater importance on the things that your employees value will undoubtedly increase their feelings of acceptance within your organization. This will also promote a higher level of stability. All of these improvements will help increase their performance and create loyalty toward your company, leading to less turnover and higher retainage of top employees.

References


Attracting and Retaining Future Top Performing Employees: A Student Perspective

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Abstract: This essay provides insight as to how construction companies can both attract and retain top performing employees. By making the standard interview and recruiting processes more personal, construction companies can evaluate potential hires to see if they are a good fit for the company for years to come. Once employees are hired, companies then need to provide opportunities for both personal and professional growth. From personal experiences, I share the characteristics I find most important in an ideal employer and emphasize the importance of having an in-depth, genuine conversation with potential hires.

Attracting and Retaining Future Top Performing Employees

Imagine that you have just arrived at an office for an interview. The interview is with John Doe Smith Construction, and you have heard nothing but great things about them from classmates and faculty. Through the glass entrance you see that the reception area is pristine. You are already intimidated before you even step through the door. After talking to the receptionist for a few moments, you patiently wait to be called back for your interview. You sit up straight because you are nervous and want to make a good impression. The interviewers call you back and you feel startled, almost as if they fired the starting shot from your high school track meet. They are ready for you, and you are eager to get started.

After initial introductions, next comes the first series of questions. You talk about where you grew up, your previous work experience, and what past project teams were like. Then you answer a few questions about how you would problem solve in hypothetical situations. Afterwards, there is a pause. One of the project managers asks you what you like to do for fun to gauge your personality a bit. The chief estimator asks you a question that slightly catches you off-guard. You do not know why it is being asked, but you feel like the question has to do with something unique in that particular office, almost like an inside joke in which you are not included. You answer it as well as you can, and you are almost in the clear! But then they drop the hammer: “So why John Doe Smith, Construction?”

Hello, my name is Julia Allen, and what I have just described is my own (slightly satirical) rendition of a standard interview for a full-time position in the construction industry. I am currently a senior at Auburn University set to graduate in May 2019. Like many of my classmates, I am in the process of searching for a job in the construction industry following graduation. More importantly, I am trying to determine where I fit best in the industry as a whole. How construction companies recruit and retain their employees is significant to me, as I am a soon-to-be new hire undergoing these processes. From past internships, I have been fortunate to gain perspective about different companies’ cultures and recruitment strategies. From my experiences at these companies and at other networking events, I hope to give further insight as to what can be done to both attract potential employees and keep them invested for the long term.

The preceding anecdote of this paper exemplifies a primary challenge faced by construction companies. In the interview described, the conversation was incredibly predictable. The interviewee not only anticipated the questions, but also found the process to be monotonous. This should be the opposite desired outcome when interviewing a potential employee. In today’s job market, the goal instead should be for a construction company to stand out in the interview process, selling the company as much as applicants advertise themselves. Unfortunately, there are certain parameters that have to be covered in an interview such as general questions about background, school, and work experience. However, interviewers can get to know potential hires by asking questions in ways that spark more meaningful conversation while still being able to evaluate candidates.

A good interview should feel like a conversation. After all, construction is a business based on relationships no matter the size of the company or
the type of work it performs. I personally find myself often distracted by the magnitude of a company’s work and influence, and it can be intimidating to interact its employee representatives for this reason. If a company’s reputation already intimidates a potential hire, superficial or scripted conversation could leave that interviewee feeling disenchanted or insignificant. An attractive construction company should have representatives that are professional but also approachable. By making a new hire feel comfortable in an unfamiliar environment, a solid foundation is created for the company the applicant to have meaningful, transparent conversation.

An excellent interview establishes the foundation to build a stronger relationship. From the start, both the company and the new hire should be transparent as to what they need, what they want, what they value, and what they aspire to accomplish. The potential hire should address these four points in an interview, and the company should listen to those answers. Personally, I hope to find a company that values ethical character of its employees, the safety of its workers, and holds work-life balance in high regard.

However, I recognize that hundreds of construction companies boast being strong in ethical character, safety culture, and work-life balance. Though a company may embody these values, it is still difficult to “stand out”.

Even before interviews ever occur, construction companies have difficulty with making lasting impressions. With so many companies at career fairs and recruiting events, networking opportunities can be both monotonous and diluted. Construction is a competitive field by design where general contractors (though differing in means in methods) essentially perform the same service. When a potential hire talks to multiple companies at once, conversations about “unique” projects, logos, and company cultures can all blend together. Add this to the pressure for the potential hire to make a good impression, and the company’s cultural identity can get severely watered down. A company’s opportunities can be vast, but its selling points (i.e. its company culture, strong client relationships, “people”) lose their meanings in such a large crowd of employers.

The best way to stand out in these recruiting situations is by socializing with potential candidates in environments outside of standard networking events. This could be at a dinner or a separate event where it is much easier to get to know potential hires individually. When applicants are brought into a more relaxed atmosphere, it creates more opportunity for genuine conversation. Moreover, applicants are able to form an opinion of the company’s identity by experiencing it for themselves. Most often, a well-informed applicant has already done research on a company’s history, past projects, and core values. In meeting company personalities, the potential hire is able to have another set of questions be answered. In this scenario, an applicant can better gauge how they would fit in a company’s culture. If that employee feels they fit in that environment from the beginning, there is a high chance they will be loyal to the company for many years.

A final challenge that construction companies face in recruiting is the narrow pool of candidates available. According to the Bureau of Labor Statistics, “because the construction industry often is seen as having dirty, strenuous, and hazardous working conditions, even for managers, many potential managers choose other type of careers” (Burt 129). Due to negative connotations associated with construction, there is often a misconception about what opportunities exist in the field. I believe that many young people are unaware of the wide variety of high paying jobs that currently exist in the industry, largely because they are not informed. It is also possible that parents may influence or deter their children from working in the industry, as suggested in an article by National Public Radio. It states, “parents are harder to convince because there is that stigma of the six-pack totin’ ironworker” (National Public Radio). I believe that this attitude toward construction causes young people to believe construction is a profession that is drab and limited in opportunity.

I believe that construction companies should take advantage of talent outside the current hiring demographics and inform these groups about industry opportunities. For instance, at my all-girls high school, I had zero exposure to construction until my senior year. Moreover, I would not have even considered jobs in the industry without an introduction from my parents. I was first drawn to the versatility of a construction degree, as it allowed me the ability to pursue many different career paths. However, I really found a passion in construction by seeing the direct results of my work onsite. I
enjoy the fact that no two projects are identical in construction, as each presents unique challenges and new things to be learned each day. I find a huge sense of accomplishment in seeing a project come to life in physical form. Additionally as an extrovert, I have loved being in work environment where I communicate and interact with individuals from diverse backgrounds on a daily basis.

According to the U.S. Bureau of Labor Statistics, it is estimated that construction management jobs will increase by 11.1% between 2016 and 2026 (U.S. Bureau of Labor Statistics). In addition to on-site management, many opportunities exist in preconstruction, safety coordination, quality control, and virtual design and construction. When I explain my degree and career aspirations to my high school classmates now, many are completely unaware that such opportunities exist. Additionally, many speak passionately about wishing they had done something similar. The favorable job market and diverse opportunities are aspects of construction that the AGC and associated companies should promote when talking to potential hires. These groups should also recognize that young professionals might not be aware of all opportunities that exist, and they should do their best to educate those who are not informed.

To attract potential hires, construction industry must first be seen as an enticing profession. I believe the AGC could greatly help showcase opportunities in the industry to young people, specifically to potential candidates outside of regular demographics.

The AGC could sponsor events at high schools to promote construction careers from a young age, both for management and trade positions. They could also offer construction problem solving workshops, have industry professionals speak at high schools, and have these professionals volunteer to mentor young students and help them find a niche in the business. By changing the way construction is perceived and highlighting diverse opportunities, the AGC can help contractors gain more potential hires and bring more diverse talents into the industry.

From my experiences interning at two companies, I have gained insight on different company cultures and various personalities. For confidentiality purposes, I have assigned the names of the two contractors I worked for as Company A and Company B. I had positive and negative experiences at each company, and I feel that these experiences helped me define the company culture that I desire for myself.

At my first internship, I was a field intern for Company A. Until that point, my construction exposure had not left a classroom. Suddenly, I found myself assigned to a $94 million project more complicated than I could fathom. Despite my limited experience, my team members encouraged me to ask any and every question I had. My mentors really positively impacted me during my internship. Coincidentally, these same mentors (a senior project engineer, assistant project manager, and project manager) were all women. Seeing women in leadership positions on such a large project really inspired me as a young woman in the industry. Company A also had a great working environment, where all employees were respected regardless of their role on the job. However, the project had over 150 workers present each day, and it was easy to feel small and unimportant. The tight work schedule made the job environment formal and intimidating, where every action felt like it was “do or die”. My project team at Company A made me excited to work in construction and comfortable onsite. However, I was afraid of making mistakes and did not connect with my coworkers much outside of work.

Where Company A was a renowned international builder, Company B largely built its reputation as a contractor in the Southwestern United States. Moreover, the two company cultures could not have been more different. Company B’s atmosphere felt very informal compared to what I had been used to, and from the start I felt more comfortable. From my interactions with Company B, I felt genuine connections to the business, culture and my fellow employees. The conversation was not forced, and learned more about the company than its value engineering and successful projects. Authentic conversations first drew me to Company B and made me excited to work for them.

From the beginning, Company B gave me the ability to choose where I wanted to focus my efforts and gave me as much responsibility as I wanted and could handle. My project manager said, “If you are
passionate about being in the field, then that is where you should be. The biggest priority you should have on this job is to learn.” My superintendent also facilitated my interests in multiple areas on the job, whether it was finishing concrete, climbing through a labyrinth of scaffolding, or driving a skid steer.

Outside of work, my project team also went above and beyond to make me feel welcome in an unfamiliar city, whether it was going out to dinner or through other group activities. Unfortunately, the project at Company B had gone awry long before I arrived. This strained camaraderie onsite and relationships with our owner and subcontractors. There was very little sense of urgency onsite and low job morale, and I believe many problems could have been prevented with more planning on the front end of the project. Company B encouraged me to pursue my passions, and my coworkers trusted me as a team player.

However, Company B had an “us vs. them” mentality onsite that I did not admire. From these two experiences, I have determined what I really want in a company.

Beyond a company sales pitch, I know that I want to be in an environment where valued and encouraged by those on my team. I want to work for a company that has strong mentorship at all management levels, where I am able to learn from my superiors and also connect with them outside of work. Moreover, I want to be respected and taken care of at my place of work. Safety culture and attitudes are great indications of this respect, for if a company does not care about safety, then I know it probably does not care about its workers. Additionally, I want to work for a company where all trades are respected. As a construction manager, I want to be trusted and given as much responsibility as I can handle. Though in addition to being held accountable for my work, I want to be in an environment where I am allowed to make mistakes. Overall, I want to be surrounded by people I look up to, in a job environment that values my skills, and in a position I can both grow my character and my career. I do not want to be put in a situation where I feel pressured to compromise these values.

The same things I find attractive in a company are the same traits that would make me want to stay. Solid mentorship, good team chemistry, and a supportive working environment would put where I feel I would continually progress. If these needs were met, I know that I would remain loyal to that company. The best thing a company can do to attract and satisfy employees is listen to them. In being open to feedback and improvement, I feel that companies would be able to better cater to employees’ long-term desires. Through yearly evaluations, lessons-learned sessions, and company surveys, employees feel that their ideas are valued. Additionally, they feel the company is investing in them for the long term.

Attracting and retaining top employees is difficult for general contractors, but there are many ways it can be improved. These companies should first seek out as many young people as possible, particularly outside current demographics. Once engaged, these companies should have meaningful, genuine conversation. Students and contractors alike know what they want, need, value, and want to achieve. By listening to a candidate’s aspirations from the beginning, a construction company will discover if that person is a good match. Regardless of if a company builds high-rises, churches, or tool sheds, the strength of that initial conversation captivates a candidate and makes them want to work for that company. By then providing a supportive working environment and strong potential for progress, an overall positive work experience will make that candidate stay. If the interview and recruiting process are done correctly, the potential hire will already know “Why John Doe Smith Construction”. The interviewee’s ideal values, desired work environment, and aspirations would match those of the company, creating a solid foundation for a long-term partnership.

References

