

## **Finance Major to Construction Engineer and Manager: Summer Internship 2018**

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The purpose of this article is to give insight into the knowledge, or lack thereof, that an undergraduate of finance has when matriculating into a master's degree in construction engineering and management. On the surface, there would seem to be a large gap in the knowledge that a finance student has versus what they will be required to know in order to enter into the construction management field. However, there are many advantages that a finance student can bring to a construction engineering and management program. Finance students are taught to think critically and analyze every detail of a company in order to determine its value both in the short term and the long term. A construction project is managed much like a company. By the end of the project, the goal is to build a product on schedule, on budget, and per contract. Finance students are trained to identify how and where profit can be made through critical analysis of financial statements. A large portion of the work a construction manager does has to do with budgeting and forecasting the future. Extrapolating data and understanding what the data means is a key factor to how finance students study and work. This thought process is valuable to the construction industry.

**Key Words:** Construction Management, Finance, Graduate, Construction Industry

### ***Introduction***

For most students in business, the thought of entering an engineering post graduate degree seems like a daunting task. This task can seem even more overwhelming if you are a business undergraduate and wanting to enter into engineering academics. While it seems like a difficult undertaking, in reality it can be done and through hard work business undergraduates can attain a graduate engineering degree. Personally, my desire to achieve this degree started with working in the construction industry during my summers off from school. In college, I decided to pursue a degree in finance. I was unsure about what I really wanted to do for the rest of my life, but I knew that I was interested in the ability to analyze a company's financial stability. Upon graduation, I knew that I wasn't passionate enough about finance to make a career of it. I had worked in the construction industry through three internships and knew that I had an interest in construction engineering. Through countless hours of talks with professors and administration, I came to the decision to pursue a Master of Science in Construction Engineering and Management. Due to my experience in the industry, there was a calling to enter the construction industry not as a business specialist, but as an engineer and I truly believe there was an advantage that I had over some of the other graduate students that were entering the program. While I did not have some of the technical expertise that a construction engineering or construction management student might, I did possess many skills that put me ahead of the curve of some of the students.

One of the more integral parts to being a construction manager is the knowledge and understanding of budgets, cost reports, forecasting and general cost accounting. The ability, or inability, to understand these functions on a job site can differentiate between successful

construction managers and unsuccessful ones. Upon graduation, an undergraduate finance student should have the following general knowledge skills due to their course work:

- *Financial mathematics, management, planning and reporting* – This is a key skill as it makes up the basic understanding of everything finance. The common misconception is that finance students are only studying to learn about markets and how to manage personal finances. However, finance students focus on much more than that. They carry an innate ability to understand budgets, interpret meaning from these budgets, and make important decisions that are in the best interest of the financial wellbeing of all of those involved. Along with this, they are able to present this information in a way that people can understand and glean important meaning. This is an incredibly useful skill on any construction site. The ability to plan and manage assets on a job is valuable. Almost as equally important is the ability to explain and share this information. The primary goal of all projects is to make money. This success or failure drives all companies and having construction managers that excel in this provides a quality avenue for project management in general. [1]
- *Analytical skills* – Similar to the financial reporting, finance students should be able to understand financial data. On large construction projects, it is crucial to identify problem areas and critically think of solutions is a key component. When all the financial reporting is taking place and reports come out, a good construction manager should be able to understand the meaning behind what the business manager presented to them. Being able to identify problem areas, for example issues with the productivity of concrete slab on grade pours, and thinking of attainable solutions to these problems is essential. [1]
- *A general understanding of corporate finance* – A construction site is much like a small company. The only difference is that the construction project has a start and end date. A construction manager should be able to understand by what means their project can finish cash positive. In finance, students are required to understand the signs of a struggling company, as well as the signs of a successful one. This same principle applies to construction managers. Construction Managers should understand how to add value to their firm, the construction site, so as to give more value to their shareholders, the owners. Construction Managers that possess this ability, will have more successful projects that meet or exceed their fiduciary duty to the owner. [1]
- *Ability to interpret and understand monetary and statistical data* – Depending on how simple or complex company's financial reports are, they can reveal a great deal of information the financial health of a project. The financial health of a project or company refers to the ability of that project to earn money over the life of the project. Some companies give a productivity factor, which tells the reader how well a certain area of work is doing relative to what the current forecast is telling them. This factor is represented as greater or less than one. Anything less than one is ahead of the forecast and anything greater than one means the operation is losing money. Being able to know the meaning behind these numbers and taking corrective action based on the data presented is a key skill construction managers will develop over time. [1]

The aforementioned skills are expected to be understood by most finance students by the time of their graduation and this knowledge is a valuable asset for analyzing financial information on the job site. It is to be understood that the finance student will lack in the ability to do some of the main functions that a construction manager can perform, but these skills that the student or potential employee is lacking can be learned over time or with post graduate education.

### *Adapting to the Learning Curve*

The most difficult hurdle to entering into a construction engineering and management graduate program with an undergraduate degree in finance is the lack of engineering and general construction knowledge that is understood by those who were in an undergraduate construction engineering program. I have overcome this gap in knowledge by auditing construction courses along with the required engineering courses and experiential learning through structured internships. Audited courses included estimating, scheduling, materials, equipment, and safety. Experiential learning through structured internships has been shown to be an integral part of higher education and bridge the gap between theoretical classroom education and practical experience in the field [4] [5] [6]. These experiences have helped me understand my fiduciary duty to the project and what the requirements are to run a financially stable job.

The biggest help for my education was my experience in the construction industry as a business specialist prior to my entering the graduate program. According to a study by David Arditi [2] of 34 main functions a construction manager is supposed to be able to perform, seven of them involve finance skills mentioned above. I knew many of the means and methods that were involved in the construction process. The financial background I possess has allowed for a different mentality to be brought to the industry. As construction managers, there is an obligation to the owner to provide them a product at or below the price that was agreed upon. Good construction managers, can keep track of all of their project's cash flows and as a business manager I was exposed to all the budgeting practices.

Upon my entry into the engineering side of construction, my lessons did not need to focus on schedule of values, forecasting and budgeting. I simply needed the focused learning on the core engineering skills like reading plans and coordinating work, and understanding how all different scopes of work need to work in sync in order to be successful. This summer was my first exposure to being an engineer on a construction site. From day one I was exposed to many different tasks that I was unfamiliar with. Things as simple as understanding the correlation between specification sections and the contracts that are agreed upon with subcontractors went right over my head. Failure is common in this process and a part of the learning curve. I was able to utilize many of my finance skills just in the eleven weeks of the summer. I was forecasting expenses, creating commodity curves and managing work. While my in depth understanding of all of these things were lacking, my abilities to manage my time, people and understand how money can be a key indicator on a projects health, allowed me to succeed over the course of the summer.

Figure 1 shows a Strengths, Weaknesses, Opportunities and Threats (S.W.O.T.) analysis that I conducted in review of the summer. Illustrating the foundation that helped propel my learning

forward, while also recognizing the shortcomings that needed to be addressed during the summer is a very important thing to reflect on. My weaknesses were clearly related to my lack of general construction industry knowledge, with the exception of my financial experience, and engineering skills. My threats were focused mainly on my ability to self-teach myself when needed and gaining a sense of complacency. This summer was an opportunity to learn and fill knowledge gaps. I felt that if I was not constantly gaining experience, time was being wasted. This in turn pushed my opportunities. The constant desire to learn something new once I felt comfortable with a certain aspect of my job was key to my knowledge base growing. Being able to understand where I started and where I needed to be by the end of the summer served to set the basis of standards for learning.

<b>S.W.O.T. Analysis of Summer Internship</b>			
<b><u>Strengths</u></b>	<b><u>Weaknesses</u></b>	<b><u>Opportunity</u></b>	<b><u>Threats</u></b>
<ul style="list-style-type: none"> <li>• Understanding of forecasting , buyout, and accurate financial reporting</li> <li>• Ability to analyze financial reports to understand high and low performing scopes of work</li> <li>• Process management</li> <li>• 4 prior summers working in construction</li> </ul>	<ul style="list-style-type: none"> <li>• No prior engineering knowledge</li> <li>• No prior experience in project management</li> <li>• Never had read plans before</li> <li>• Lack of mechanical, electrical, and plumbing in buildings</li> <li>• Never worked with change orders, requests for information or submittals</li> </ul>	<ul style="list-style-type: none"> <li>• The motivation to learn and understand the industry</li> <li>• Coupling in class learning with in the field learning to fortify my knowledge</li> <li>• Asking questions when I didn't understand something</li> <li>• Consistently requesting to be involved in more scopes of work</li> </ul>	<ul style="list-style-type: none"> <li>• Making assumptions during my work</li> <li>• Not learning the important details needed to be successful</li> <li>• Focusing too much on irrelevant or overly specific information</li> <li>• The other interns with engineering experience</li> <li>• Being complacent and not trying to challenge myself</li> </ul>

Figure 1

### ***Conclusion and Discussion***

There is a disconnect between finance students that seek to enter the construction industry in a construction manager capacity and the industry as a whole. Finance students are taught to understand general corporate finance, develop quality analytical and mathematical skills, and understand where and how to make profit within a company. Construction sites are ran much like a small company. They just

have a smaller life cycle. Good construction managers can identify where there are problem areas on a construction site and adapt to either eliminate the waste, or create more value in that area. This is a skill finance students can excel at. A finance student that is wishing to enter a

construction management post graduate degree is entirely capable of being a valuable student. I took the time to learn the industry, take internships to fill knowledge gaps, and worked hard to develop my skills that I developed as a finance student and brought them to my degree. I would encourage any finance student that is interested in construction management to get the degree. Through diligent practice and quality time spent learning about knowledge gaps students might possess, there is nothing that could prevent a finance student from entering a graduate degree program in construction management or engineering.

Additionally, there are many course that construction managers and engineers can take to better understand the finances that happen on construction sites. Accounting and general finance classes will allow these students to better understand the meaning behind budgets as they apply to their jobs. Some universities even offer classes that cater towards construction finance, but they are considered electives and can be considered not as vital to their education in students minds.

If you are not familiar with what a finance student undergoes during their undergraduate degree, it might be easy to assume they would not be fit to enter into the construction management field. Employers do not typically require high levels of job understanding when hiring students out of college. They look for work ethic and a foundation of basic skills required to carry out entry-level duties that fit within the bounds of their employment. College students, upon leaving their university, are not immediately ready to perform every aspect of their job. They need training and time to develop skills. Finance students might not be able to act as a field engineer, but their skills with money management, forecasting, and analytics make them extremely valuable office-level engineers. Finance majors are capable of a valuable resource when it comes to being involved with the day-to-day operations of buying out contracts, conducting change management, and working on job level forecasts. A finance major that is willing and able to learn the industry is more than qualified to succeed in the construction industry. Through post graduate education and time spent working in industry developing their skills, the finance student can provide a unique look into running a multimillion dollar job. Construction engineering and management graduate students with a background in finance have a great deal to offer and provide value to construction engineering and management graduate programs and the construction industry.

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