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Right-Sizing the Construction Company With Financial Ratios: Cash to Revenue and Base Payroll to Revenue

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Today's construction industry is highly competitive, and to maintain an advantage in the market, construction companies must manage finances as efficiently as their projects. Right-sizing the construction firm is a process of balancing assets and liabilities, efficiently managing project costs, and leveraging overhead resources to generate higher profits. Two methods for right-sizing a company are to 1) manage cash balances, and 2) maintain the appropriate level of base payroll (overhead personnel). This study uses survey results from nearly 1300 companies in 2022 to provide insight into the use and effectiveness of these methods. Descriptive statistics were used to analyze central tendency and evaluate application in the construction industry. Results provide a mean and standard deviation for evaluating the appropriate levels of cash as a comparison to revenue. Similarly, those same statistics evaluated the relationship between expenses of overhead personnel and annual revenue. A trendline for both ratios was calculated to help companies 'right-size' their respective organizations. Limitations of the dataset are addressed in the conclusions, specifically the variation of how companies report their base-payroll. This study serves as an instrument for guiding managerial decisions about establishing levels of cash as well as establishing budgets for overhead.

Keywords: Construction Finance, Managerial Accounting, Financial Ratios, Key Indicators

Introduction

In a market economy, people often proselytize the mantra "cash is king," perhaps insisting that liquid assets are critical for running a business, or that paper money enjoys fewer processing fees and intermediaries. But mantras are only wise in certain contexts, and cash may not always deserve primacy. We are reminded of a 1975 Monte Python film, wherein a character (Dennis) asks the all-important question, "How does someone become king?" If indeed it is true that cash is king – we venture to understand the limits of its reign and influence. Our constitutional advocate, Dennis, rightly stated, "Listen, strange women lyin' in ponds distributin' swords is no basis for a system of government." Similarly, strange mantras lyin' in conventional wisdom distributin' business advice may be no basis for the accounting practices of a multi-billion-dollar industry.

What is wise then concerning cash for construction companies? Said differently from the perspective of a practitioner, how much cash should a company aim to have on hand? If a company maintains too little cash, they are limited with their ability to secure surety bonding for projects (Tummalapudi,

Harper, & Killingsworth, 2020). Too little cash also limits the ability to invest in revenue-generating assets or limits the ability to expand into new markets for growth (Hovakimian, Opler, & Titman, 2001). On the other hand, too much idle cash can also be a limiting factor (Okeke, Ezejiofor, & Okoye, 2021).

For construction companies the balance of assets and liabilities is a challenging entrepreneurial gauntlet to navigate. Decisions to purchase revenue generating equipment offset by long-term debt, the use of cash or short-term debt to finance project expenses, and the maintenance of sufficient cash to meet surety bonding requirements (Severson, Russell, & Jaselskis, 1994) – all constitute critical choices about how to right-size the firm to be competitive, efficient, and profitable (Tummalapudi, Harper, & Killingsworth, 2020) (Hovakimian, Opler, & Titman, 2001) (Okeke, Ezejiofor, & Okoye, 2021).

Fixed assets and overhead personnel present additional, but similar challenges. Long-term, or fixed assets are only true assets if they are utilized to produce benefit for the company such as generating revenue. Otherwise, one might rightly consider them a liability – as there is often a long-term debt associated with those assets. Additionally, there is a cost to maintenance (e.g. storage, upkeep, insurance, etc.) that must be considered. Fixed assets that are not generating sufficient revenue to generate profits should be liquidated. From a financial perspective, the personnel of a firm that is considered overhead might rightfully be considered a fixed asset. They are hired to generate sufficient revenue to realize profits.

This article uses data on survey results from nearly 1300 companies in 2022 to provide a glimpse into how representative companies are managing their cash and overhead expenses. The analysis is useful to industry participants who might be curious about what other participants are doing and what strategies might be worth mimicking, and it is useful for academics who might be curious about common practices in the industry and whether participants are making systematic mistakes. Our analysis employed descriptive statistics and regression analysis to highlight important relationships between cash or overhead expenses and revenue.

Literature

The fundamental inquiry of the study presented in this paper was to determine the 'right-size' of a construction firm based on two different metrics: a ratio of Cash to Revenue and a ratio of Base-Payroll to Revenue. In other words, based on the current size of a firm's annual revenue – what is the appropriate amount of cash to maintain? And, based on that same revenue, what is the appropriate amount to spend on overhead payroll. These questions are critical to maintaining a competitive balance in the construction industry (Azeem, Ullah, Thaheem, & Qayyum, 2020) and optimization strategies should be employed to reduce overhead expenses (Siskina, Juodis, & Apanaviciene, 2009).

Various measures of cash to revenue have been explored through numerous proxy ratios, such as Cash Ratio and Working Capital (Patamuan, Karpriana, & Yunita, 2024), Cash Conversion Cycle (Garanina & Petrova, 2015), Days in Cash , or Quick Ratio. Yet, the specific behavior of the construction industry in regard to the ratio of cash to revenue has not been found in the literature. Furthermore, the central tendency – which guides the industry as a benchmark for performance – has not been published. Thus, this study explores new ground in this regard.

Similarly, the ratio of overhead expenses to revenue has also been explored in various forms, (e.g. G&A to Revenue Ratio, Fixed Costs to Revenue). Yet, the specific aspect of overhead personnel expenses as it relates to annual revenue is limited (Killingsworth, Grosskopf, & Berghorn, 2017).

Since the expansion and contraction of overhead personnel is a natural result of business strategy, particularly in economic change (Danforth, Weidman, & Farnsworth, 2017) finding the right strategy to maintain a robust, talented staff of human resources and increasing profitability is paramount (Teck Heng Lim, Lan Oo, & Ling, 2010).

Accepting that construction companies will maintain levels of cash and overhead personnel based on differing strategies and other market conditions (Tummalapudi, Killingsworth, Harper, & Mehany, 2021); the mean and central tendency of financial ratios are important to understand. The use of financial ratios to understand central tendencies of behavior is prolific in managerial accounting and have been used in the construction industry (Killingsworth, Mehany, & Kim, 2021).

Methods

To answer the questions of this study, a survey was administered to members of the Construction Financial Management Association (CFMA). This annual CFMA Benchmarker survey solicits self-reported financial data as well as other company-specific demographic questions (e.g. U.S. state, Small Business Administration status, distribution of revenue within North American Industry Classification System categories, etc.). The survey is administered between the months of April and June each year by a third-party entity. The cleaning and initial analyses were performed, and reports were generally released in October of each year. Thus, this research was based on the 2023 survey – representing financial data from 2022 (2024 survey results were not available as of the authorship of this manuscript). An invitation to contribute to the survey was sent to every member of CFMA (over 10,000 in 2023) and responses in the 2023 survey totaled 1293.

From the 1293 participant companies, many of the self-reported data were incomplete – lacking some of the necessary variables for this study, such as Cash, Base-Payroll, or Revenue. In those rare cases, the participant was removed from the study. This step removed 16 of 1293 participants (1.2%) specifically for this ratio calculation. Further review of the remaining participants revealed some unusual managerial accounting – such as negative cash balances, zero balance in cash, or cash levels above 100% of the company's annual revenue. Though these observations are not impossible, they may rightly be considered unusual for the typical construction company. Rather than eliminating the participant prior to analysis due to questionable accounting practices, the expectation was made that a statistical exercise would identify such outliers. Therefore, the ratio of Cash to Revenue was calculated for each participant by using the reported Cash & Cash Equivalents balance from the company's balance sheet as the numerator, then dividing that value by the reported annual revenue from the company's income statement. The Cash & Cash Equivalents balance on a general ledger does not include accounts receivables, retainage, or other current assets. Cash equivalents are those investments which can immediately be liquidated into cash. Thus:

$$\frac{\text{Current Assets: Cash \& Cash Equivalents}}{\text{Most Recent Year-End Revenue: Total}}$$

The next step was to order the participants by the value of the ratio and calculate the mean score and standard deviation. With the 1277 participants completing the survey with sufficient data, the range of values for the Cash to Revenue ratio was observed from –18.98% to 137.28%, and the mean score was 11.07%, with a standard deviation of 12.71%. The histogram shown in Figure 1 provides a visual description of the distribution of Cash to Revenue ratio, with data positively skewed.

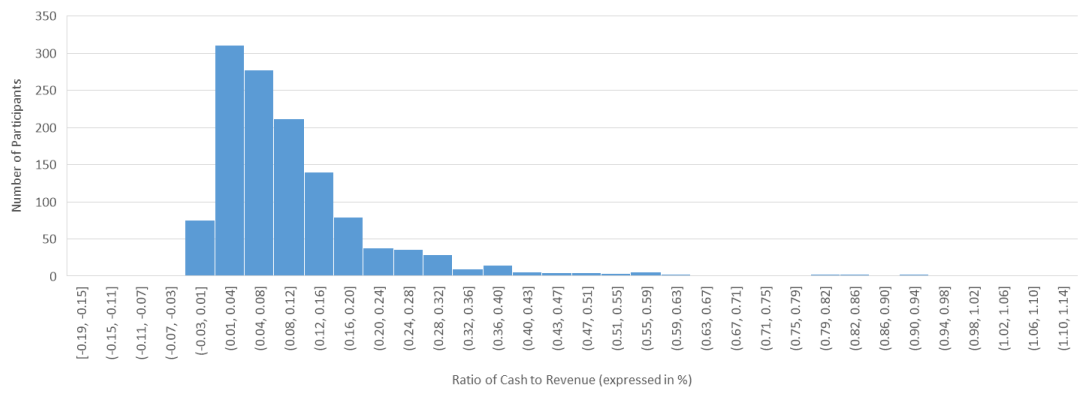

Figure 1: Participation Rates for the Ratio of Cash to Revenue

Applying the standard deviation to the dataset, the central behavior and confidence intervals were established. Adding and subtracting 12.71% to/from the mean score of 11.07%, we identified outliers as those ratios below –1.64% and above 23.78%. This process eliminated 136 outliers (10.65%) from the dataset. Once the outliers were eliminated, the mean score was recalculated to establish the central tendency of the typical construction company for the Cash to Revenue ratio. Additionally, the resultant ratios were set in order and a trendline (Plaut & Davis, 2014) was calculated to determine whether the ratio changes, and to what degree, based on the annual revenue or 'size' of the firm.

The Cash to Revenue ratio analysis was performed to determine part of the research question as to what is the 'right-size' of a construction firm. We also considered the ratio of Base-Payroll to Revenue to consider this same question from another perspective. Following the same methodology for Cash to Revenue ratio, participants were eliminated if they did not report base-payroll or revenue. The reported base-payroll is inclusive of the fringe benefits and other financial burdens associated with salaries. The base-payroll number reported is specifically an overhead expense. This number does not include the labor expenses associated with direct costs on a project.

There were 302 participants that did not provide a value for the base-payroll variable. Additionally, there were four companies that reported a negative value for the base-payroll variable. Considering Generally Accepted Accounting Principles (GAAP), expenses such as payroll are entered as positive values and subtracted from revenue prior to calculating taxable income. Thus, a negative value for an expense account such as payroll causes some confusion. Without reasonable justification for this entry, it was determined that an error was made in entering data. And, with a very low number of participants affected (5), the choice was made to eliminate these participants from consideration. From the original 1293 participants, there then remained 986 participating companies in this analysis.

The ratio of Base-Payroll to Revenue was calculated for each participant by using the reported value for base-payroll from the income statement as the numerator, then dividing that value by the reported annual revenue from the company's income statement:

$$\frac{\text{Expenses: Base-Payroll}}{\text{Most Recent Year-End Revenue: Total}}$$

The next step was to order the participants by the value of the ratio and calculate the mean score and standard deviation. With the 986 participants completing the survey with sufficient data, the range of values for the Base-Payroll to Revenue ratio was observed from 0.034% to 78.29%, and the mean

score was 7.04%, with a standard deviation of 6.92%. The histogram shown in Figure 2 provides a visual description of the distribution of base-Payroll to Revenue ratio, with data positively skewed.

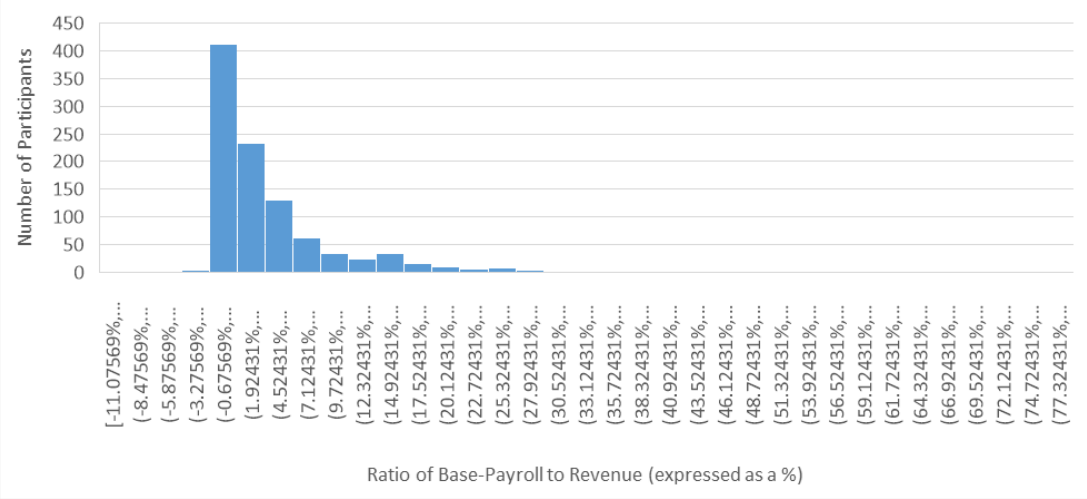

Figure 2: Participation Rates for the Ratio of Base-Payroll to Revenue

Applying the standard deviation to the dataset, the central behavior and confidence intervals were established. Adding and subtracting 6.92% to/from the mean score of 7.04%, we identified outliers as those ratios below 0.1148% and above 13.96%. This process eliminated 100 outliers (10.14%) from the dataset. Once the outliers were eliminated, the mean score was recalculated to establish the central tendency of the typical construction company for the Base-Payroll to Revenue ratio. Additionally, the resultant ratios were set in order and a trendline was calculated to determine whether the ratio changes, and to what degree, based on the annual revenue or 'size' of the firm.

Results

The study began with 1293 survey responses. For the ratio of Cash to Revenue, after eliminating outliers according to the analysis described in the methodology, there remained 1140 participants. Of those participants, analysis of the financial data found that the average construction company maintains 7.829% of their annual revenue as cash. The middle two quartiles (2nd and 3rd) maintained between 3.04% and 11.74% cash to revenue. After sorting the data by total company revenue, the best-fit regression was calculated using ordinary least-squares (OLS). OLS is commonly used when working to understand the linear relationship between variables. The linear formula is shown as:

$$\mathbf{y = 0.235E\text{-}12x + 0.0781}$$

where x represents the annual revenue in dollars, while y represents the ratio of Cash to Revenue.

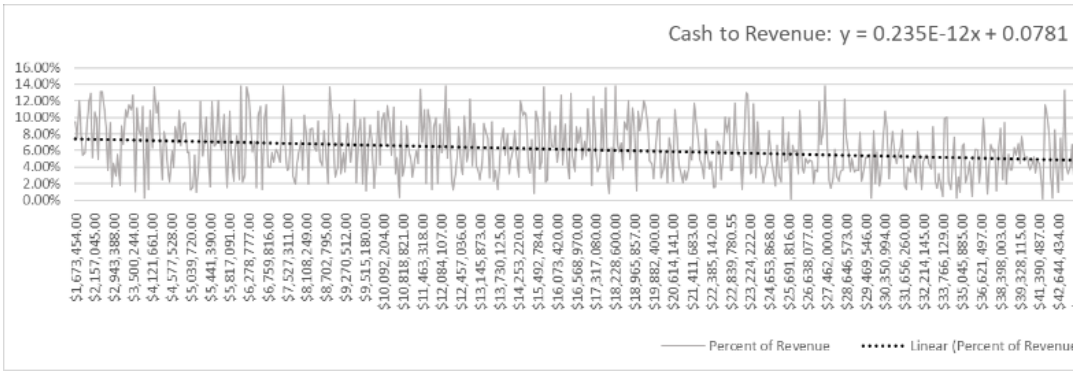

Figure 3, Part 1: Ratio of Cash to Revenue Ratio with Trendline

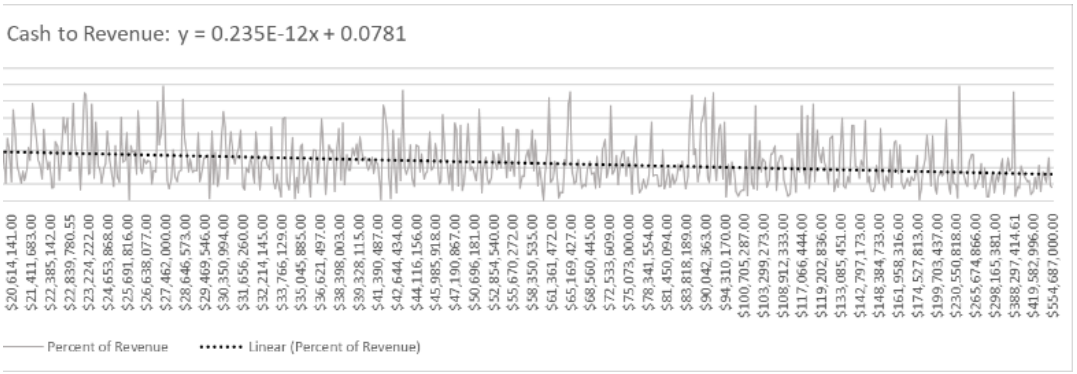

Figure 3, Part 2: Ratio of Cash to Revenue Ratio with Trendline

The trendline of the data was found to be incredibly flat regardless of the revenue, ranging from 7.81% for small contractors (less than $36 million) to 8.853% for the largest contractors (greater than $4 billion) in the dataset. The mean score for this ratio of the remaining 1140 participants was 7.829%. However the standard deviation was 5.736%, thus demonstrating a variety in behavior associated with how much cash is maintained in a construction firm.

It was also found that the average construction company spends 5.341% of their annual revenue on base payroll associated with General and Administrative Overhead. Further, 50% of the 986 participants considered, (the 2nd and 3rd quartile) operate their base-payroll to revenue ratio between 7.61% and 2.71%. Placing the data in order of revenue size (X-axis) a trendline, or best fit regression line, was calculated using OLS, and is shown as:

$$\mathbf{y = -.2953E\text{-}11x + 0.05592}$$

where x represents the annual revenue in dollars, and y represents the ratio of base-payroll to revenue.

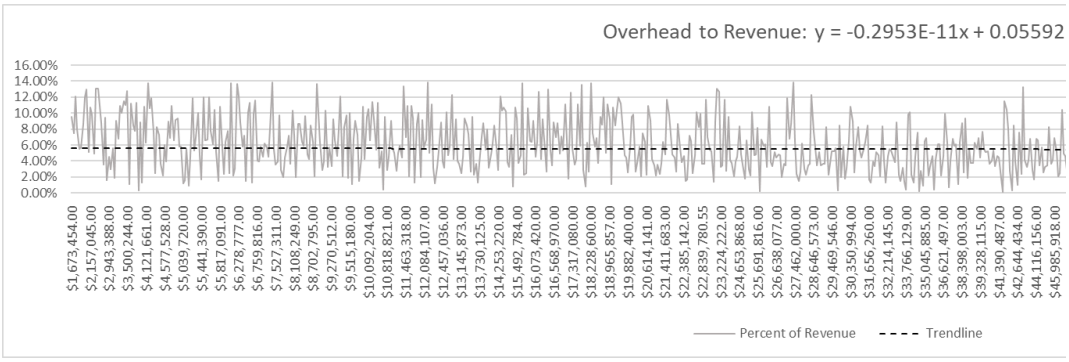

Figure 4, Part 1: Ratio of Base-Payroll to Revenue Ratio with Trendline

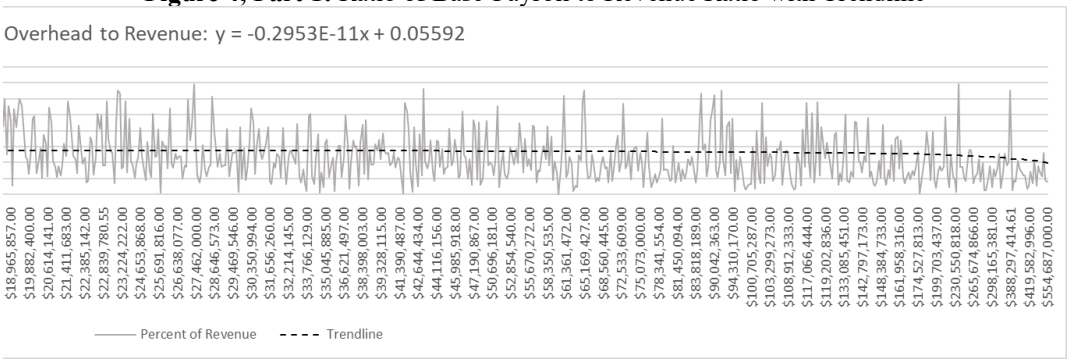

Figure 4, Part 2: Ratio of Base-Payroll to Revenue Ratio with Trendline

With a relatively flat, declining slope, the percentage of revenue spent on base-payroll decreased from 5.59% to 5.002% over the first 807 (91%) participants in the study. It should be noted that the first 91% of the participants are contractors with less than $200,000,000 in annual revenues. The remaining 9% of participants range from $200M (in U.S. dollars) to $1.42B. As a result, we observe the percentage of revenue spent on base payroll decline from 5% to 1.38%. The relative fewer number of participants from $200,000,000 and above causes a notable curve in the trendline. All trendlines have some curve, thus the relative flatness of the curved trendline is a description of the minimal change from one participant to another. This is observed in figures 4, Part 1 and 4, Part 2.

Interpretation and Discussion of Results

For both ratios, Cash to Revenue and Base-Payroll to Revenue, the trendlines were relatively flat. Based on the 1140 participants in the study, the average construction company maintains nearly 8% of their annual revenue as cash, yet with a reasonably high level of variability (5.7% standard deviation from the mean). Based on the 887 participants contributing data to the study of Base-Payroll to Revenue, the average construction company spends 5.34% of their annual revenue on overhead personnel. For this ratio, there is less variability with a standard deviation of 3.35%. Of note, the ratio of Base-Payroll to Revenue demonstrated a slightly declining trendline when ordered from lowest to largest revenue. This would suggest that as construction companies increase in revenue size, each dollar spent to administer overhead activities is increasingly more efficient.

This dataset was inclusive of all types of construction companies, ranging from construction management firms (self-performing less than 25% of the contract), general contractors (performing 25-50% of the contract), and specialty contractors (performing 50% of the contract). And even within

these strata we have additional identifiers, such as Heavy/Highway contractors, infrastructure, multi-family, commercial, etc. These numerous sub-strata may reasonably explain the variability of the results.

Conclusion

The question posed for this study was the consideration of how to right-size a construction company – meaning, how much cash should be maintained and how much is a reasonable amount to spend on overhead personnel. There are numerous reasons to maintain sufficient levels of cash in any business. For a construction company, this may include the necessary cash to meet short-term expenses. This often includes the direct costs (labor, materials, equipment rentals, and payment of subcontractors) associated with multiple active construction projects. It would be reasonable to assume sufficient cash is required to service long-term debts in the immediate future (30 to 90 days). As a construction company grows in market share and capacities – an appropriate level of cash is necessary to qualify for surety bonding requirements. These myriad demands on cash will vary based on the contractor type and scope of work being performed. They may also vary based on the principal's aversity to debt – which is a personal and professional variable not easily captured in an appeal to research. Whatever the variable or combination of variables influencing the decision, the construction industry seemingly maintains nearly 8% of their revenue each year as cash. Certainly, a top-performing construction company would consider cash levels between 7.8% and 13.5% of revenue. Companies with this ratio below 7.8% may rightly consider working towards increasing those levels, while companies above 13.5% should consider whether the high levels of cash are being used effectively. Could such cash reserves be used to invest in revenue-generating equipment, facilities, acquiring greater expertise and talent, or expanding into other markets of higher returns?

The ratio of Base-Payroll to Revenue is just as valuable when considering how to 'right-size' the construction firm – but considers how much to spend rather than how much to save. To be competitive in the construction industry, a firm must maintain a reasonable balance between spending too little revenue on overhead personnel (thus leading to strained human resources) and spending too much revenue (leading to lower profits). It has been said that the greatest asset a company has is its people. Yet, the capacity of these assets is difficult to measure. To further confuse the equation, project efficiencies and profitability will vary – thus the comparison to a single project's revenue to the cost of the overhead associated with that project should not determine the value of the human resources. However, the examination of hundreds of company-wide data points helps to establish a range of revenue within which a company can operate with a given fixed cost of overhead. That ratio is 5.35% on average, with best-in-class operating between 2% and 5.35%. These companies will benefit from high profit margins as a result of lower expenses related to overhead personnel. However, these same companies must monitor carefully the efficiency of their personnel – with the concern of overworking their people. From the opposite perspective, companies with base payroll between 5.35% and 8.7% should be concerned with maintaining profitability. Construction companies that spend greater than 8.7% of their revenue on overhead payroll, of which 20% of this dataset qualifies, should consider carefully strategies to reduce expenses or increase revenues. These companies will likely observe lower profits. It should be noted that the structure of base-payroll from company-to-company, and even from contract to contract may vary. In some cases, a contractor may associated some project overhead with the direct costs of the project – particularly when the contract allows such structure, e.g. a cost-plus contract. The type of contractor may certainly influence the structure of project direct costs and overhead. Evan a large contractor may have numerous 'special projects' which are managed by a single project manager at any given time. In this scenario, the project management costs are difficult to associate with a singular contract and are allocated by a weighted average or some other estimating strategy. The variability in this contract structure accounts

for the wider standard deviation from the mean. The mean and standard deviation still maintain their value in the consideration of establishing a budget for overhead. Knowledge of the industry behaviors informs the business owners and executives regarding how to maintain competitiveness.

The results of the study considered in this manuscript provided critical insight into how to right-size a construction firm. It provided guidelines and boundaries for establishing the amount of cash to hold and the reasonable amount of base-payroll expense to be competitive. These parameters were established by aggregating the data of at least 887 construction companies. Careful consideration should be taken in application of the resulting ratios, averages, and central behaviors. A construction company must consider how and why their own results may vary from the ratios' mean scores. Individual micro-industry behaviors may influence strategic managerial decisions regarding the appropriate level of cash to maintain and the necessary overhead expenses related to a given market and condition. Thus, this study serves as an overall comparison of construction industry behaviors across the United States of America.

An additional limiting factor of this specific database is that it is self-reported data from 2022 – during which the U.S. economy experienced growth. In economic downturns or stagnation, or in other countries, the financial structure of the construction industry may vary at meaningful levels. Thus, the appropriate follow-up study would include an expansion of this dataset to include multiple years of company data. Such an expansion of the study would also facilitate the ability to stratify the data into very meaningful segments of the industry. For example, behaviors differentiating a commercial builder from a highway contractor may reasonably be assumed. The level of self-performed work for a contractor may be a variable to consider in a future study, as such contractors may be required to maintain higher levels of cash and higher levels of overhead personnel to manage those direct costs.

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