

# Enhancing Financial Success Among Electrical Contractors

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**Abstract:** This paper provides electrical contractors with significant information related to enhancing company financial performance. The methodology involves understanding the determinants of contractor financial success through: (1) an extensive literature review; (2) collection of financial- and management-related data from electrical contractors; and (3) analysis of data to identify management trends that are more prevalent in profitable firms. Ninety-six usable responses were collected from small, medium, and larger electrical contracting companies. General trends reveal that more profitable firms place greater emphasis in the areas of certain management initiatives (higher lines of credit and supporting continuing education), marketing initiatives (involvement in formal alliances and partnering), and technology initiatives related to spending more capital resources on computers and software. Significant differences are revealed with financial ratios as well. A Financial Success Scorecard is created for firms to compare their management inputs to those of successful firms. Findings from this study could provide helpful guidelines for nonelectrical contracting firms. Recommendations for achieving future financial success are also provided.

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## Introduction

Electrical contracting firms continuously strive to obtain better financial performance and are continuously challenged by the ever changing environment. Significant changes are occurring in the electrical contracting industry related to deregulation, new markets such as limited energy information services (LIES), and use of the design-build project delivery approach. Electrical contractors need practical guidance to help them achieve financial success in the present and future environments. The paper provides such practical guidance by identifying management attributes that are linked to increased financial success. It is anticipated that results from this study can provide helpful profitability guidelines for other types of construction companies, as well.

A literature review of relevant articles associated with achieving financial success is provided. This is followed by a discussion of the research methodology that describes the survey development, data analysis approach, and study limitations. Research results are summarized conveniently in a scorecard format revealing management inputs that lead to higher firm profitability. Recommendations for future financial success are also included.

## Literature Review

The literature review provides the necessary background to understand several issues related to electrical contractor financial success. Prior Electrical Contracting Foundation (ECF) research was reviewed with the intention of extending or incorporating appropriate results into the current research study. Additional selected papers in the areas of project success were reviewed for their potential in explaining firm financial success.

Becker (1995) found that public construction projects organized with separate prime contractors have lower direct construction costs, for equivalent projects, than projects using a single prime contractor. This report included an interesting characterization regarding visibility of risks/benefits in the two contract categories: (1) a single prime contractor with visible benefits and risks not visible, and (2) separate prime contractors with visible risks but no visible benefits. It is probable that risk-handling will be a significant factor in the characterization of the financially successful contractors.

Rounds (1993) develops and presents concepts for enhancing electrical contractor labor productivity. The study categorizes the concepts into four major groups: (1) tracking labor units; (2) job mobilization; (3) employee relations; and (4) company management. Rowings and Federle (1996) describe partnering and its benefits and proposes an implementation approach. The results are applicable to owner-contractor, contractor-subcontractor, contractor-supplier, and contractor-craft partnerships. Each of these reports identified possible "contributing factors" to financial success. For example, the percentage of projects on which partnering is used, and the partnering categories, may be useful measures in determining the contribution of partnering to project and firm financial success. Also, this study identifies a possible risk reduction and allocation mechanism that could also enhance firm financial strength.

Brownsword et al. (1994) describe behavioral insights provided by personality assessment (in particular, Myers-Briggs), and how these insights may be exploited in the classroom to enhance apprentice training effectiveness. Each of these reports

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identified possible “contributing factors” to financial success. For example, the existence of a sophisticated healthcare program within a firm, and evidence of its successful implementation, could provide a unique measure of financial success.

Severson et al. (1993) investigated financial data that could be used to predict trends in contractor performance level related to the filing of claims. Financial statements of 87 contractors were obtained from 4 companies underwriting construction contract surety bonds. Data were analyzed to determine financial characteristics that were typical of claim (typically associated with bankruptcy) and nonclaim contractors. Nonclaim contractors experienced significantly higher ratios as they related to cash/sales, total current assets/sales, retained earnings/sales, and gross profit/sales. Significantly lower ratios were experienced for nonclaim contractors for the following ratios: (1) accounts receivable/sales; (2) underbillings/sales; (3) total liabilities/sales; and (4) cost of sales/sales.

This literature review assisted the research team in developing a better understanding of factors that are perceived to impact the financial performance of an electrical contracting firm with the goal of being able to anticipate future financial performance. The next section discusses the research approach for this study.

## Research Methodology

The research process involved first developing a better understanding of management inputs related to electrical firm financial success. Financial success, in this study, is defined as a firm whose net profit to sales ratio is greater than the median value of firms studied. The extensive literature review helped the research team obtain a better understanding of the financing, investing, and operating activities of an electrical contractor; it also was instrumental in formulating questions for the data collection tool, which included questions related to the management and financial aspects of a firm. The survey was distributed to appropriate electrical contracting firms. Data were then collected and analyzed using appropriate statistical techniques.

## Survey

The survey consisted of two main parts: (1) firm characteristics; and (2) financial performance. The management portion of the survey included 42 questions related to the following firm characteristics: (1) management initiatives (firm growth attributed to expansion into new geographic regions, annual company cost for supporting continuing education, and annual cost to administer the safety program); (2) marketing initiatives (firm a member of a formal alliance and firm enters into partnering relationship with subcontractors and owners); and (3) technology initiatives (expenditure on computer hardware and software).

The financial performance portion of the survey was the same one used by the National Electrical Contractors Association (NECA) for its biennial financial performance study. It includes information regarding the firm's balance sheet and income statement. Input measures to financial success related to financial ratios, such as asset turnover ratio, gross margin, and the quick ratio. A complete list management and financial inputs can be found in the Appendix.

Peer groups were used to pretest the entire survey that consisted of both NECA and non-NECA contractors. Study participation also included line and transmission contractors. The final survey was distributed to 4,075 NECA members, including com-

**Table 1.** Data Characteristics

Payroll group	Direct labor expense (million dollars)	Number of respondents	Percent of respondents
1	1 or less	21	22
2	1–2.5	21	22
3	2.5–5	22	23
4	Greater than 5	23	24
No payroll category identified		9	9
Totals		96	100

panies related to the utility industry. NECA membership returned 96 responses that were substantially complete for both the financial performance survey and the management survey, representing a 2.4% response rate. The respondents equally represented members of every NECA payroll category. As shown in Table 1, respondents consisted of 21 firms with payrolls less than \$1 million (Group 1), 21 firms with payrolls between \$1 and \$2.5 million (Group 2), 22 firms with payrolls between \$2.5 and \$5 million (Group 3), 23 firms with payrolls greater than \$5 million (Group 4), and 9 firms that did not report their payroll. This type of uniform response increased the ability to generalize the findings of the study. Essentially, the results are representative of the various NECA constituencies, including all firm sizes.

## Data Analysis

The data analysis involved combining management factors and financial performance measures to identify meaningful correlation trends leading to more successful firm financial performance. The output measure of financial success related to firm profitability as shown by

$$\frac{\text{Net profit after tax}}{\text{Total sales}} \quad (1)$$

Appropriate statistical techniques were used to analyze data to determine if there was truly a significant difference in input level for firms with greater or lower financial success, based on the firm's profit to sales ratio. A hypothesis testing procedure using the student's *t*-distribution was applied to determine statistical significance. The null hypothesis was such that the mean of the factor level for firms with greater profitability equals the mean of the management factor level for firms with lower profitability. The alternate hypothesis stated that the mean of the management factor level for firms with greater profitability is greater (or less) than the mean of the management factor level for firms with lower profitability. The null hypothesis was rejected at the 10% significance level (10% of rejecting the null hypothesis when in fact it is true). If there was no significant difference, then the average of all data was presented. Attribute values were reported separately when a significant difference existed for firms with lower and higher financial performance.

Data were normalized for company size by grouping the firms into the direct labor expense categories described above. No attempt was made to divide each input value by a normalizing factor, such as total revenues, because the answer, in most cases, would not make sense. Category selection is narrowly defined consisting of small (less than \$1 million in direct labor expenses), small-medium (\$1–\$2.49 million in direct labor expenses),

**Table 2.** Financial Success Scorecard Example

Firm characteristics	Group 1 firms \$1 million or less (direct labor expense)	Group 2 firms \$1 to 2.5 million (direct labor expense)	Group 3 firms \$2.5 to 5 million (direct labor expense)	Group 4 firms \$5 million or less (direct labor expense)
Median profitability (net profit after tax/total sales)	2.6%	1.5%	1%	2.6%
Total amount of line of credit	\$179,375/\$335,000	\$642,105	\$1,077,500	\$3,599,474

medium-large (\$2.5 to \$5 million in direct labor expenses), and large (greater than \$5 million in direct labor expenses) contractors.

### Study Limitations

The primary limitation of this study is the limited number of respondents that reduced the amount of data representing each group size. In all, there were 96 useable responses collected out of slightly over 4,000 surveys distributed. Some of the trends observed may change slightly with a larger percentage of the population responding. It may also explain why some of the results were not consistent with expectations.

### Results

This section reveals factors related to financial success of electrical contracting firms. The Financial Success Scorecard, (in the appendix) was created to allow electrical contractors to compare themselves to other companies of their size in terms of management initiatives, marketing initiatives, innovation initiatives, and financial ratios.

To better understand how to use the Financial Success Scorecard, one factor, the total amount of line of credit, has been selected and is presented in Table 2. Note that values have been identified for each payroll group. In the first payroll group (\$1 million or less), there are two dollar figures shown. The first one, \$179,375, reflects the line of credit amount for firms with lower profitability (less than 2.6% for this particular firm size category). The second figure, \$335,000, is the line of credit for firms with higher profitability (greater than or equal to 2.6%). Note that median values for profitability are different for each payroll group. In the \$1 to 2.5 million payroll group category, there is only one dollar figure. This means that there was not a statistical difference in the amount of line of credit for firms with higher and lower levels of profitability and an average is shown for this category. All other factors in the Scorecard are interpreted in the same fashion.

For purposes of completeness, all management attributes have been included even though there was no significant difference identified for some factors. A graphical presentation of the key management factors are presented using management initiatives, marketing initiatives, technology initiatives, and financial ratios.

### Management Initiatives

Regarding borrowing issues, there was no indication that larger firms had more lines of credit established. In Fig. 1, it is interesting to note that more profitable Group 1 firms have a significantly higher line of credit compared to the less profitable Group 1 firms (\$335,000 versus \$179,375). For the other group sizes, there was

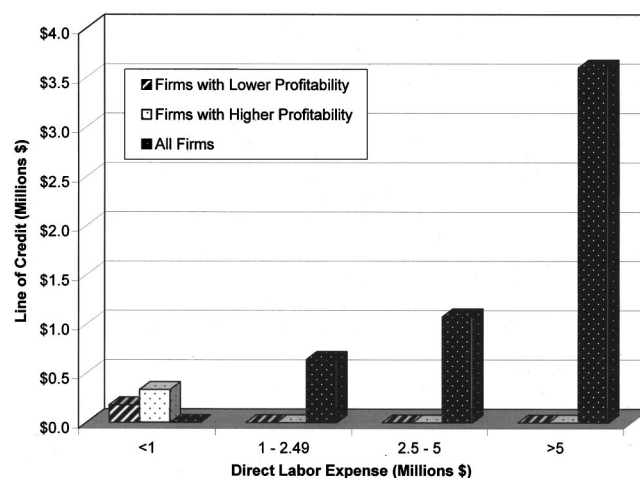
not a significant difference between firms with higher and lower profitability. The Scorecard shows that the more profitable firms have fewer restrictive covenants on their long-term liabilities compared to the less profitable firms.

Regarding ownership issues, the Scorecard shows that approximately 40% of the firms have stock that is closely held. It is interesting to note that only 10% of the more profitable Group 2 firms involved closely held stock by senior management.

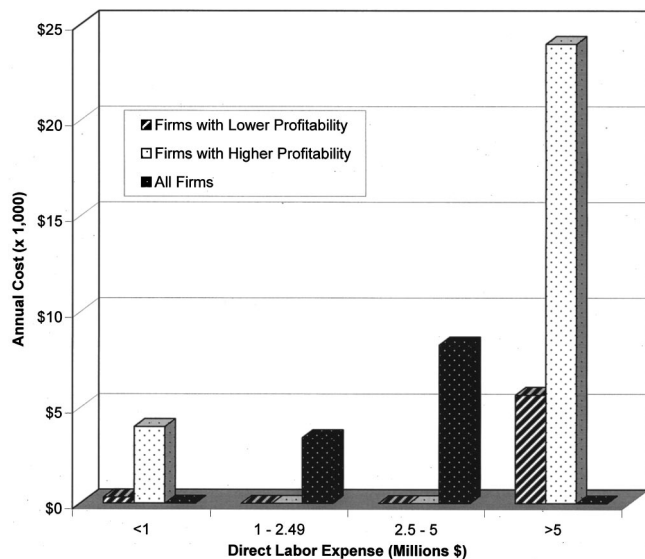
Electrical firms of all sizes primarily use external auditors to audit their accounting and business practices. The annual external audit cost is shown in the Scorecard. Note that there is an increasing cost by group size. There is also a significant difference in the amount expended for more and less profitable Group 2 electrical contractors (\$5,111 and \$10,800, respectively).

In regard to continuing education, there is a definite upward trend in the amount companies expend for time off with pay as the company size increases. As shown in Fig. 2, it is interesting to note that for Group 1 and 4 firms, there was a difference in spending for this category for more and less profitable firms. It appears that firms that spend more on their employees tend to have greater financial success. A similar trend is found with tuition support as revealed in the Scorecard. Note that there is decrease in spending for Group 2 firms, which may be due to a small sample size or other reasons that are not evident.

It appears that more profitable electrical contracting firms have field tool control systems as shown in Fig. 3. The data also suggest that the percentage of firms with computerized field tool control systems increases proportionately with firm size growth (refer to the Scorecard). The annual administrative cost also increases from \$2,700 for Group 1 firms to \$34,125 for Group 4 firms.

**Fig. 1.** Amount of line of credit

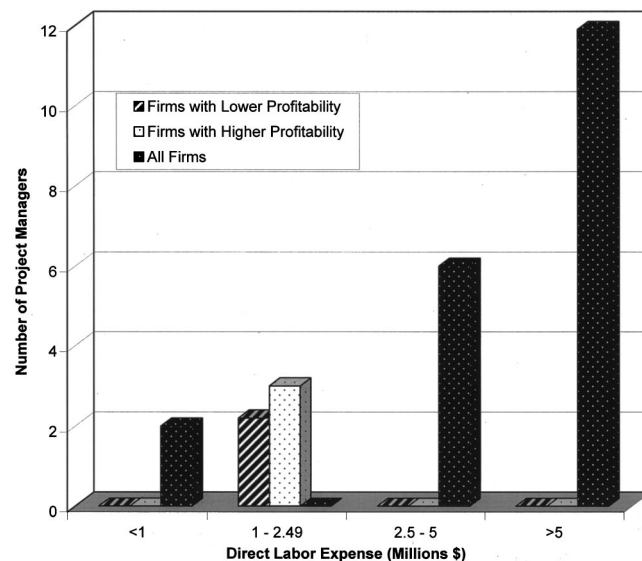




**Fig. 2.** Annual company cost for supporting continuing education with time off with pay

As can be expected, the number of project managers employed increases as the firm size increases. Fig. 4 shows how Group 1 firms employ 2 project managers to handle the project load. This number increases to 6 for Group 3 firms and to about 12 for Group 4 firms. It is interesting to note that less profitable Group 2 firms employed approximately 2 project managers, while the more profitable Group 2 firms employed 3 managers.

Fig. 5 identifies the number of projects worked on at one time by each project manager. Less profitable Group 1 firms had their project managers working on approximately 10 projects at one time (average project size is \$203,098). On the other hand, more profitable Group 1 firms had their project managers working on 4 projects at one time. Group 2 electrical contractors had their project managers working on approximately 6 projects at a time (average size is \$312,783). Group 3 contractors had their project managers working on approximately 8 projects at one time (average size is \$358,932). Less profitable group 4 contractors had

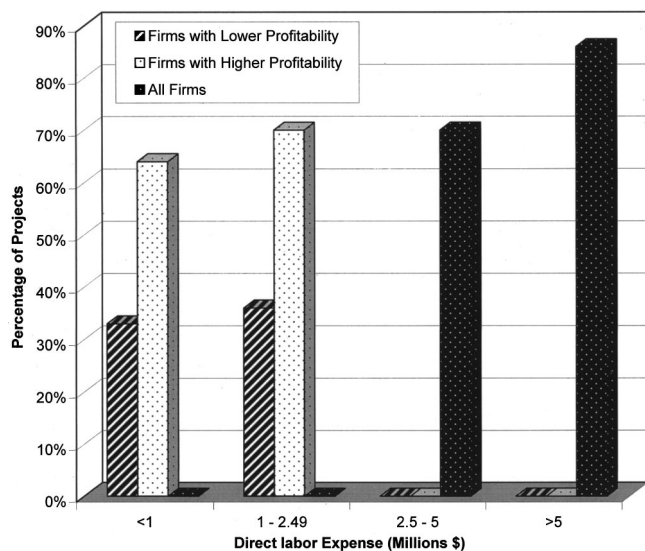


**Fig. 4.** Number of project managers normally employed by firm

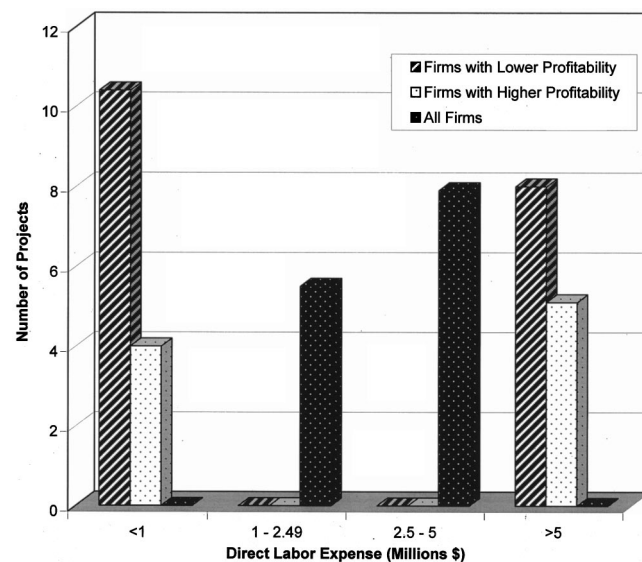
their project managers working on 8 projects at one time (average cost is \$472,910), while the more profitable firms in this group size had their project managers working on about 5 projects concurrently. Clearly, more profitable contractors allow their project managers to concentrate on fewer projects at one time compared to the less profitable contractors.

It appears that incentives play an important role in achieving better firm profitability. Only 10% of the less profitable Group 3 firms provided incentives to its project managers compared to 60% for the more profitable firms. Approximately 37–45% of the other firms provide such an incentive to project managers (Fig. 6). The amount varies depending on the firm size but ranges from 1 to 8.3% (refer to Scorecard).

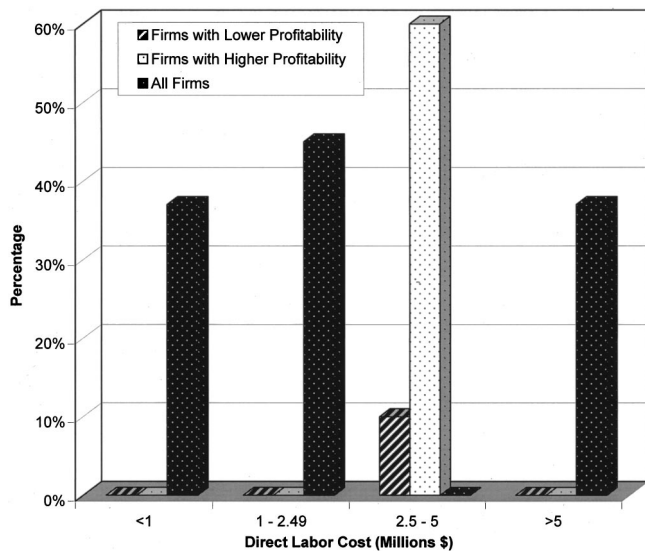
It appears that several firms included design as part of their service. Annual revenues by direct labor expense category range from \$145,000 for Group 1 firms to \$4,100,000 for Group 4 firms. Maintenance services are provided by all companies except for a few Group 1 firms. The Scorecard reveals that there is a signifi-



**Fig. 3.** Projects that use field tool control system



**Fig. 5.** Number of projects worked on at one time

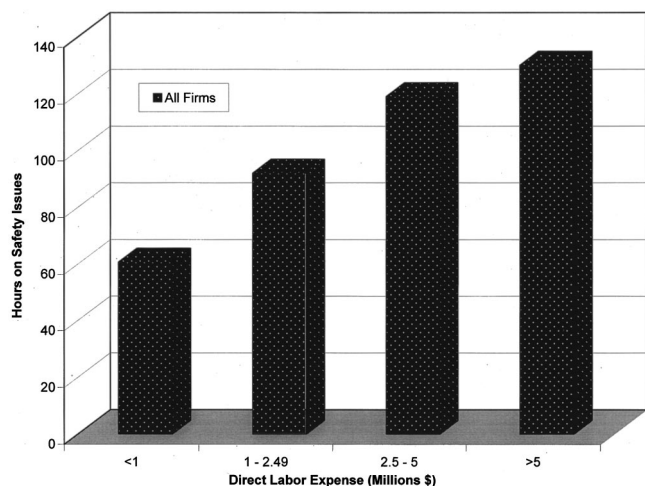


**Fig. 6.** Firm incentives to project managers

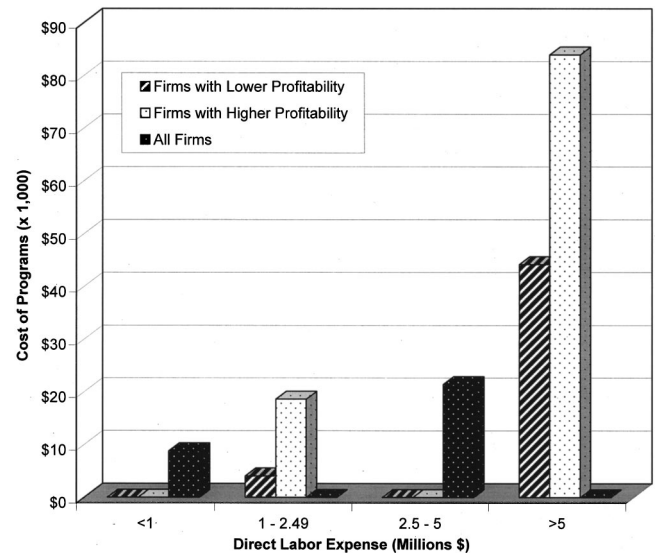
cant difference in the amount of maintenance revenues generated for Group 2 firms with higher versus lower profitability (\$1,117,000 and 241,000, respectively).

The Scorecard shows that almost all firms have a written safety program with the exception of approximately 11% of the Group 1 firms and 5% of the Group 2 firms. Fig. 7 shows how the amount of time spent by upper management discussing safety issues increases as firm size grows from approximately 61 hours per year for Group 1 firms to 130 hours for Group 4 firms. Approximately 80% of the Group 1 and 2 firms have a corporate safety representative, and 100% of the Group 3 and Group 4 firms have one.

The Scorecard also shows that the safety representative makes about 2 to 2.4 site visits per month for Group 1, 2, and 3 firms and slightly over 5 site visits for the Group 4 firms. The amount of money spent on the corporate safety program is shown in Fig. 8. Note the increasing progression of expenditures by firm size. Also note that there is a significant difference in safety expenditures for firms with higher and lower profitability for Group 2 and 4 firms.



**Fig. 7.** Time spent by upper management on safety issues at the project level



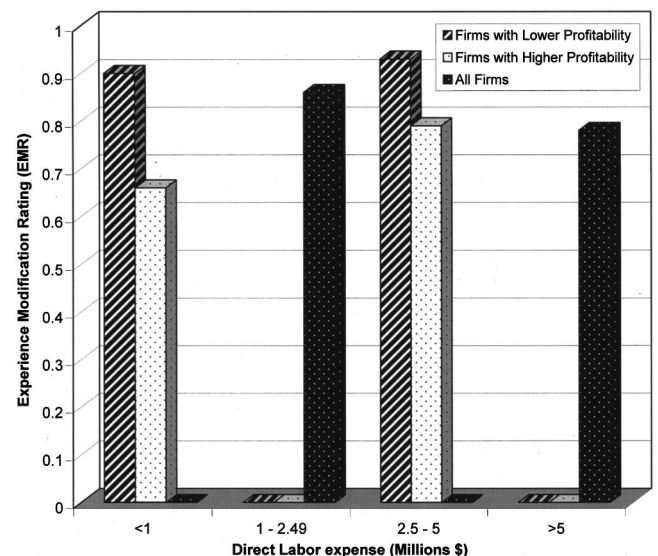
**Fig. 8.** Annual cost of administering firm safety program

It clearly shows that not spending sufficiently in this area can lead to lower profitability. Company experience modification rating is shown in Fig. 9. Clearly, one can see that electrical contractors with higher profitability also maintain lower experience modification ratings.

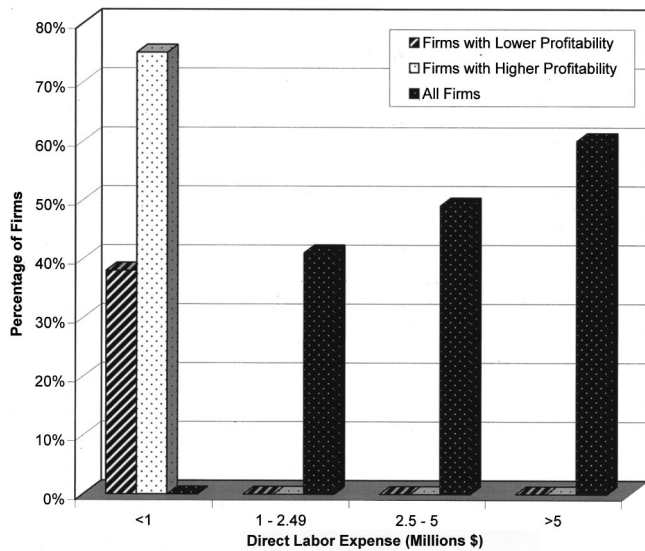
### Marketing Initiatives

The Financial Success Scorecard demonstrates that over half of the firms are members of a formal alliance with the purpose of providing continuing education presentations. Fig. 10 shows the percentage of firms that are members of a formal alliance with the purpose of offering a trade school program in conjunction with a union. Note that Group 1 firms show a difference in this percentage for firms with higher and lower levels of profitability (75 versus 38%, respectively).

Fig. 11 shows the percentage of firms entering into a partnering relationship with the owner. Notice how this percentage increases as firm size increases. Also note that 70% of the more



**Fig. 9.** Company experience modification rating

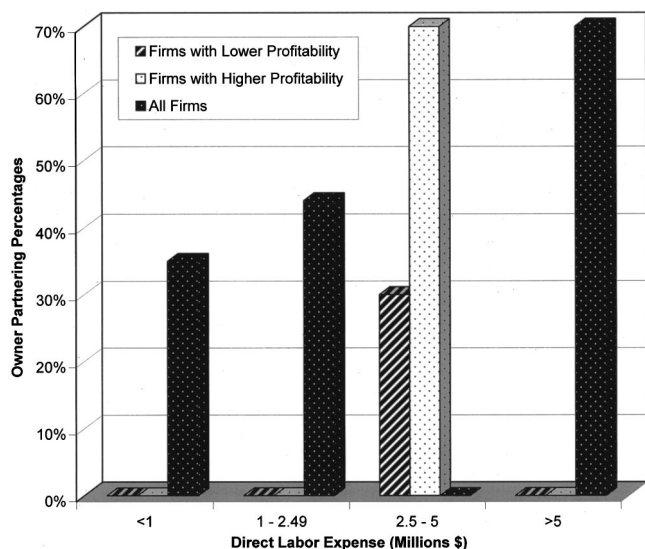


**Fig. 10.** Firm a member of a formal alliance with purpose of offering a trade school program in conjunction with a union

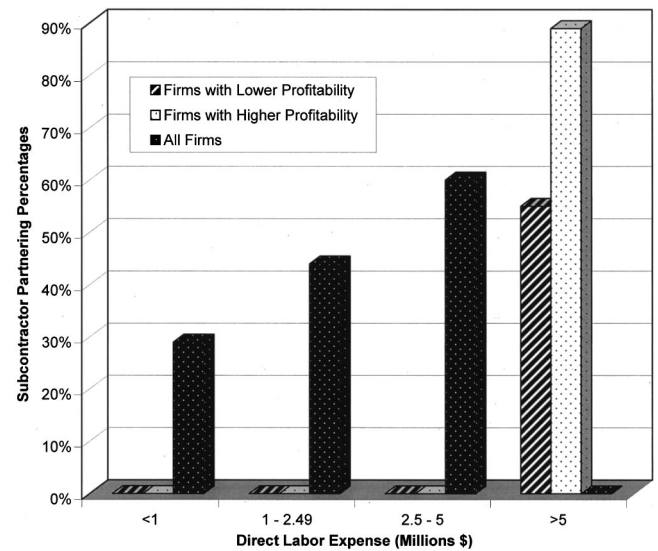
profitable Group 3 firms partner with owners versus 30% for the firms with lower profitability. Fig. 12 shows the percentage of electrical contractors that partner with subcontractors. Again, more of the larger firms establish partnering relationships. Note that 89% of the more profitable Group 4 firms establish partnering relations compared to only 55% of the less profitable firms in this category.

### Technology Initiatives

Fig. 13 shows the estimated annual cost for new computers or system improvements. It is not clear why less profitable Group 1 firms spent more in this area compared to the more profitable firms. For the other firm sizes, it seems that more funds are expended in this area as firm size increases and that more profitable firms spend more in this area than less profitable firms. Fig. 14 shows the estimated annual cost for new software or software



**Fig. 11.** Firms entering into partnering relationships between owner and contractor

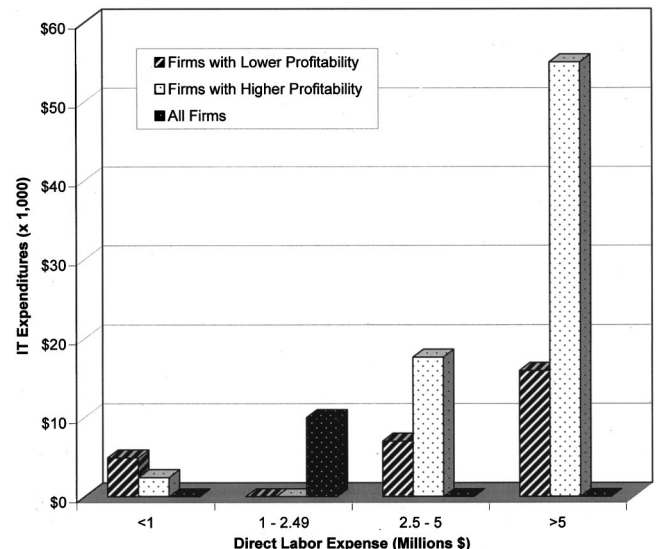


**Fig. 12.** Firms entering into partnering relationship between contractor and subcontractor

improvements. Note how the amount of expenditures increase as firms size grows. Also, note the significant difference in spending for more profitable versus less profitable Group 4 firms.

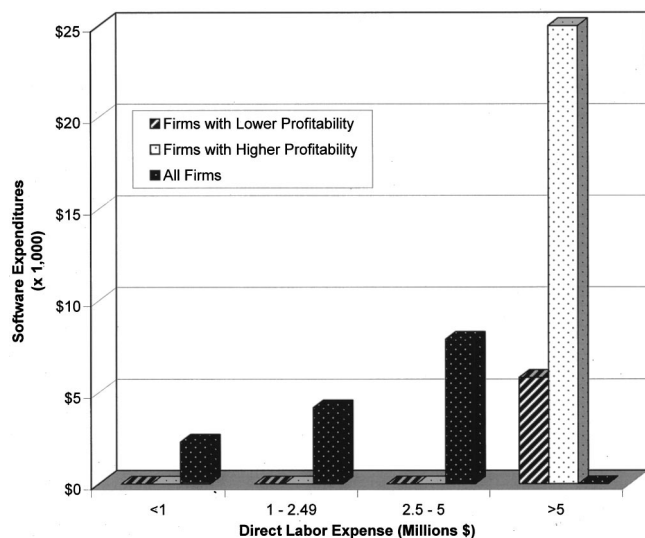
### Financial Ratios

Financial success can also be predicted based on certain financial ratios as identified in this section. For example, Fig. 15 shows the gross margin (gross income/total sales ratio) for each of the four firm sizes. Notice that there is a decreasing trend as firm size increases. Group 4 firms with higher profitability had a gross margin of 19% compared to 16% for these firms with lower profitability levels. Fig. 16 depicts the operating income to gross income ratio. In general, firms with higher ratios tend to experience better financial success. Fig. 17 reveals that firms with higher operating income to equity ratios tend to experience better financial performance.

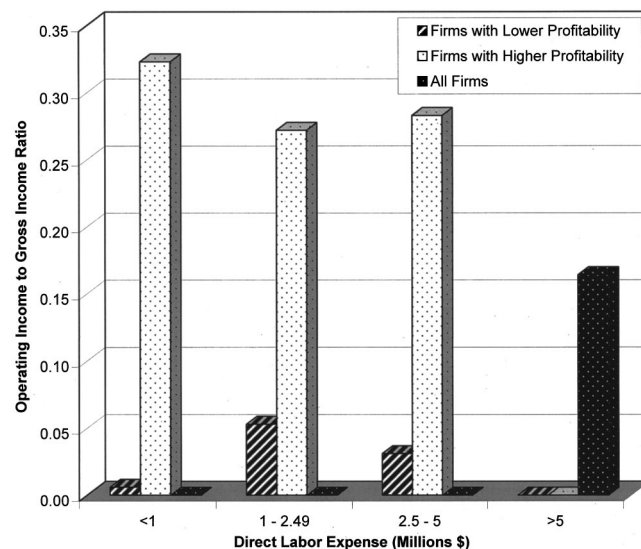


**Fig. 13.** Estimated annual cost for new computers or system improvements





**Fig. 14.** Estimated annual cost for new software or software improvements



**Fig. 16.** Operating income to gross income ratio

Moreover, Fig. 18 shows the retainage to total sales ratio for the four group sizes. Note that this ratio seems to be between about 2.1% to 3.2% for most firms. This percentage is approximately 1.4% for Group 2 firms with lower profitability.

Fig. 19 shows the inventory to total sales ratio results for all group sizes. Note that this ratio has a decreasing trend as firm size increases. It is interesting to realize that this ratio is approximately 4% for Group 1 firms with lower profitability compared to 2.1% for the more profitable firms.

Fig. 20 depicts the total fixed assets to net profit after tax ratio. It is interesting to note that firms with lower profitability have significantly greater total fixed assets relative to their net profit after taxes. This ratio also appears to be a reasonable indicator of financial success.

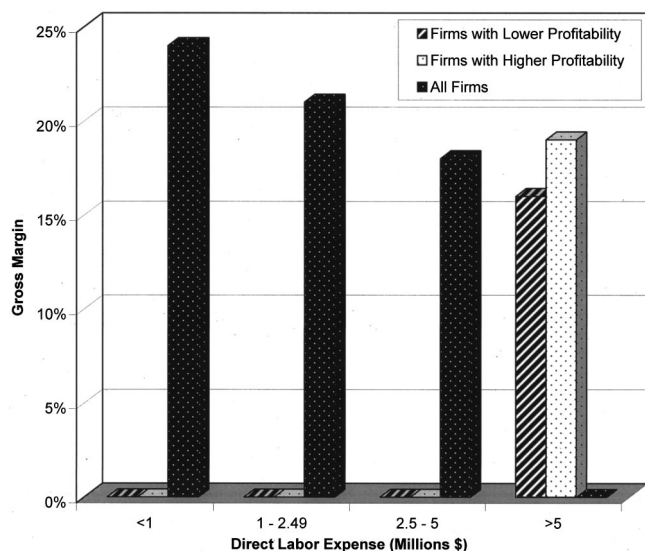
Fig. 21 depicts the total overhead expenses to total sales ratio. It appears that firms with higher overhead expenses, relative to their total sales, experience lower levels of profitability. Firms with higher levels of profitability tend to have a ratio of approxi-

mately 13% to 15% (depending on firm size) compared to the higher percentages for less profitable firms.

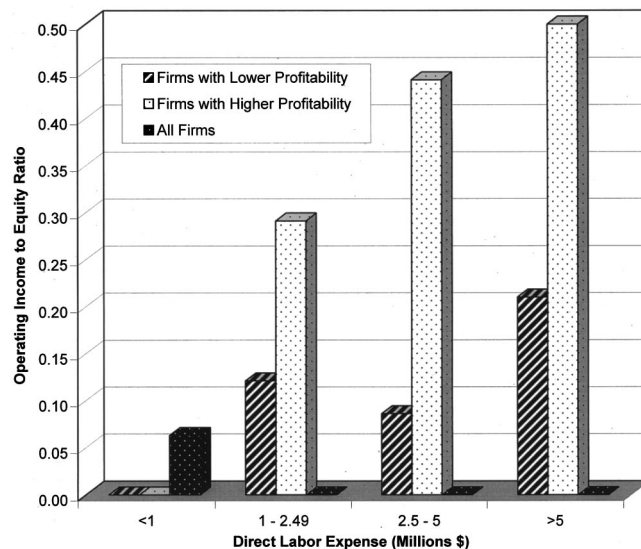
Fig. 22 shows the inventory to total assets ratio. Notice there is a significant difference in ratio value between Group 1 firms with lower and higher profitability (12% versus 6%, respectively). Ratios for the other firms did not express a significant difference and vary from a low of 4.5% for Group 4 firms to 8.7% for Group 3 firms.

Fig. 23 shows the current assets to current liabilities ratio (quick ratio), which is a measure of the firms short term liquidity. Notice that there are differences in the quick ratio for Groups 2 and 3 firms with higher and lower levels of profitability.

It is hoped that these results will be useful to electrical contractors trying to improve their financial performance. The next section provides recommendations for achieving financial success as it relates to the future of the electrical contracting industry.



**Fig. 15.** Gross margin (gross income/total sales)



**Fig. 17.** Operating income to equity ratio

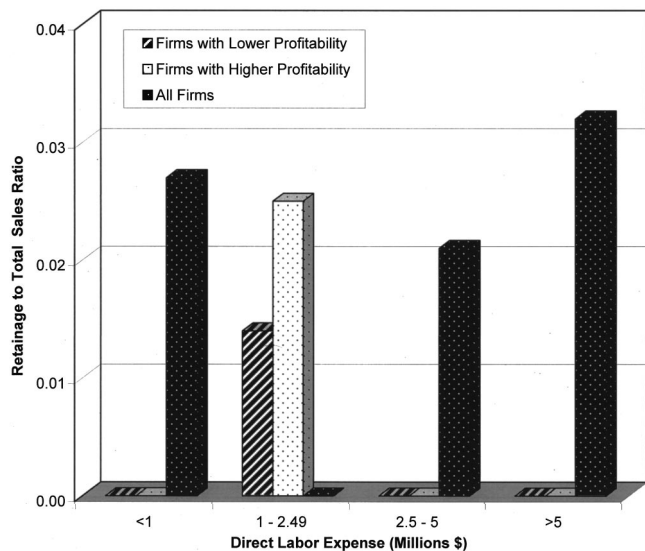


Fig. 18. Retainage to total sales ratio

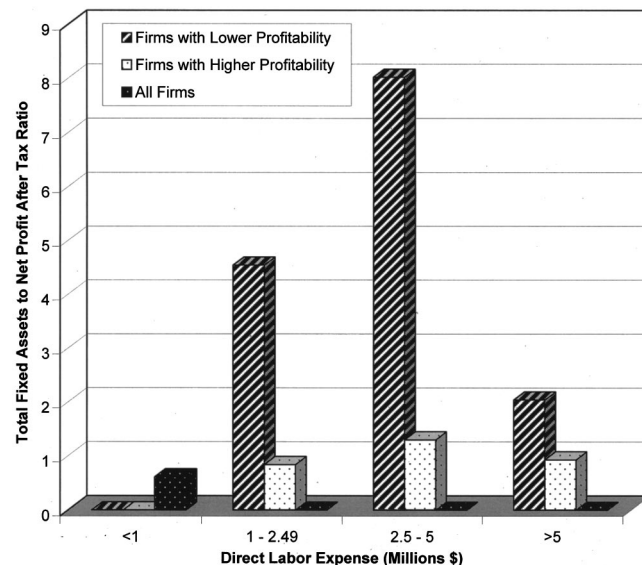


Fig. 20. Total fixed assets to net profit after tax ratio

## Recommendations for Achieving Financial Success

There are many changes on the horizon for the electrical contracting industry that will present challenges and opportunities. This section contains recommendations for achieving financial success and is based, in part, on the results from this study and comments from experts in the electrical contracting industry.

### Management Initiatives

Due to increased competition and more demanding owner requirements (tighter budgets and shorter schedules), electrical contracting firms will need to become more efficient and provide a sharper focus on core competencies. Firms should continue to play on their strengths by obtaining a larger share of their traditional markets. It appears that firm strength and long-term sustainability will be dependent on the firm's ability to grow through mergers and acquisitions or remain smaller operating in niche markets (e.g., LEIS or removal of PCBs and asbestos). Successful

firms will also outsource core administrative functions (information technology, financial management, and inventory management) where it makes the most sense from an efficiency standpoint. The results from this study demonstrate that firms with lower inventory to sales ratios tend to experience better financial success. This is as a direct or indirect result of outsourcing the inventory management function.

It is anticipated that there will be a growing demand for design-build requests from owners who want single source contracts. Firms will most likely need to establish partnerships or joint ventures with other firms to fulfill these bid solicitations. Furthermore, it will be essential to provide employees with continuing education support to keep them current on the latest project delivery systems and information technologies that will play a vital role in meeting owner requirements.

Other financial success considerations relate to project management at the job site. Good safety performance will continue to be essential for long-term firm financial stability. Successful firms

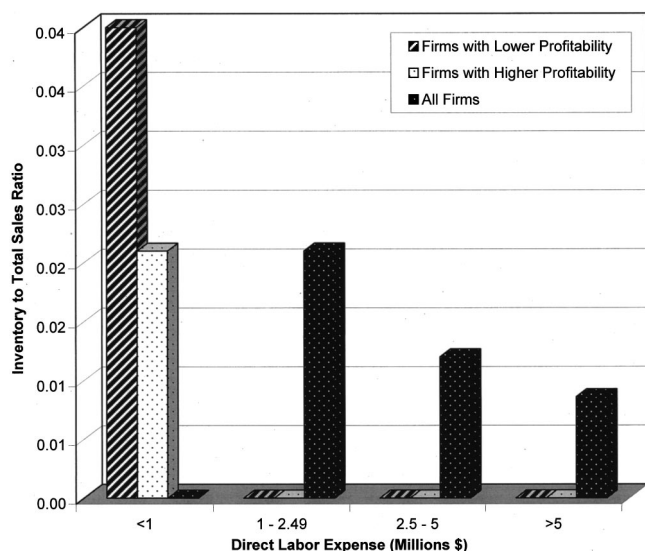


Fig. 19. Inventory to total sales ratio

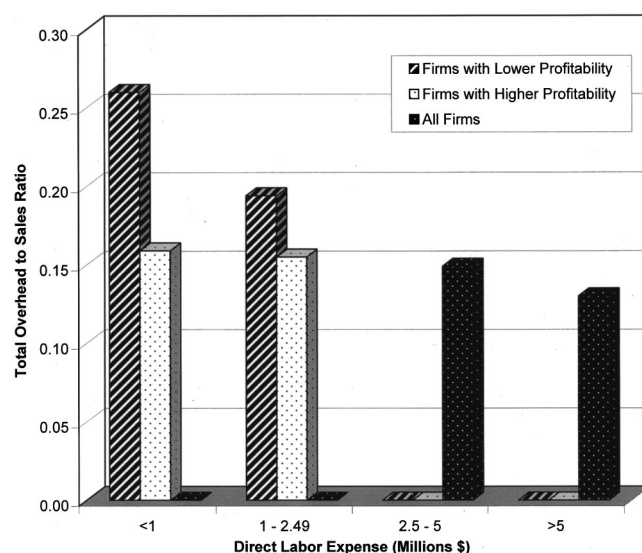


Fig. 21. Total overhead to sales ratio



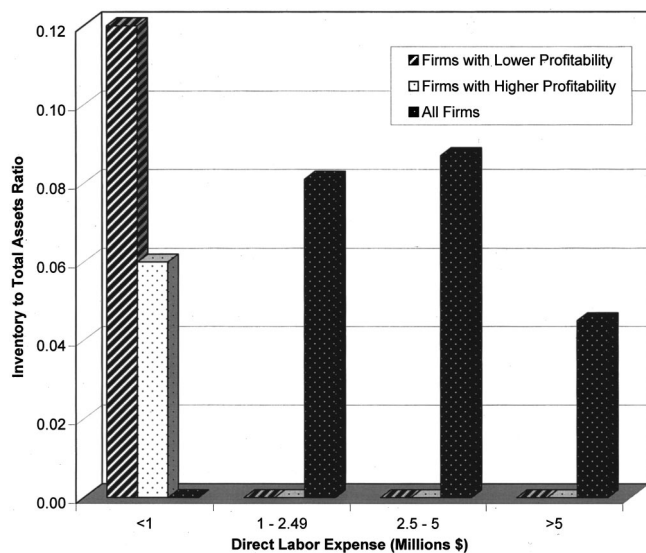


Fig. 22. Inventory to total assets ratio

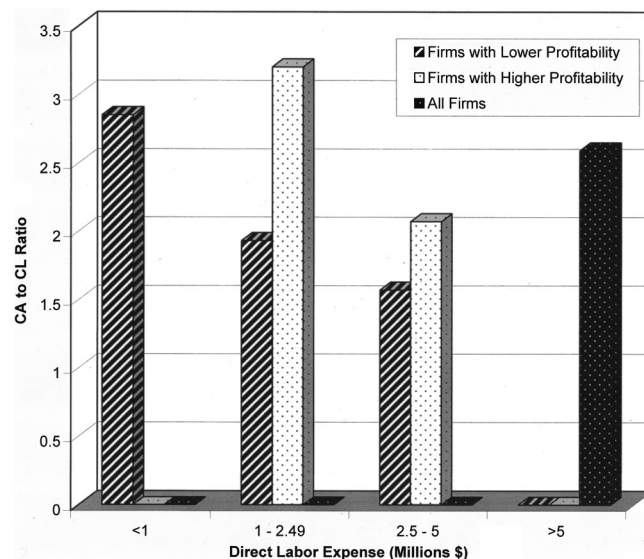


Fig. 23. Current assets to current liabilities ratio

will need to maintain and continuously improve their corporate and project level safety programs and make zero injuries an essential goal. It was demonstrated that firms with lower experience modification ratings had greater financial success. Also, project managers should be provided incentives for successfully completing project objectives and be given a reasonable number of projects to manage at one time. The data from this study show that firms with greater financial success employ more project managers to manage projects and provide performance incentives compared to firms with lesser financial success.

### Marketing Initiatives

Due to the anticipated shortage of labor in the future, certain marketing initiatives should be considered to attract more employees into the electrical contracting area. One is to become a member (or continued membership) in a formal alliance with the purpose of providing continuing education presentations and supporting trade school programs. It is important to keep in mind that relationships with potential employees need to be formulated, possibly as early as the high school level.

### Technology Initiatives

Successful electrical contracting firms will need to adapt quickly to emerging technologies and construction techniques to remain competitive, meet owner requirements, and obtain desired profit margins. Companies will need to continue investing in computers, software, and the necessary support to maintain these systems. It will be important for firms to remain current on upcoming technologies, as well. The authors feel that the more successful firms will be proactive, informing technology companies of their needs and maintaining a role in shaping the technology products of the future.

### Financial Considerations

Successful electrical contractors will most likely grow using their own working capital. As revealed by the study results, it is important to maintain a sufficient line of credit with a lending organization with minimal restrictive covenants. Use of the Financial

Success Scorecard might also be useful in guiding firms to higher levels of financial prosperity in the future.

## Conclusions

This article has investigated the determinants of financial success for electrical contractors. This was accomplished by performing an extensive literature review related to achieving financial success in the electrical contracting industry. Financial success was based on the financial ratio related to a firm's net profit to total sales. A two-part survey (management characteristics and financial performance) was developed and distributed to appropriate respondents in the electrical industry. Data were collected and analyzed using appropriate statistical analysis techniques. Results clearly show that there are several management inputs that lead to higher profit margins in the areas of management initiatives, marketing initiatives, and technology initiatives. Several financial ratios also reveal some interesting trends that can be useful for enhancing firm profitability. The future financial success of these contractors depends on their ability to foresee changes in the electrical contracting industry and to take appropriate business planning actions. It is hoped that this research can assist electrical contractors in achieving their financial goals. Some of the results might also be useful to other contractors, as well.

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## Appendix

See Table 3.

**Table 3.** Financial Success Scorecard

Firm Characteristics	Group 1 Firms \$1 Million (direct labor expense)	Group 2 Firms \$1 to 2.5 Million (direct labor expense)	Group 3 Firms \$2.5 to 5 Million (direct labor expense)	Group 4 Firms \$5 Million or more (direct labor expense)
Median profitability (net profit after tax/total sales)	2.6%	1.5%	1.0%	2.6%
Management Initiatives				
Total amount of line of credit	\$179,375/\$335,000	\$642,105	\$1,077,500	\$3,599,474
Restrictive covenants on LT liabilities?	44%/10%	10%	44%/0%	29%
Closely held stock by senior management	40%	40%/10%	42%	32%
Firm growth attributed to obtaining a larger percent of traditional market	77%	61%	69%	75%
Firm growth attributed to expansion into new geographic markets	11%	7%	10%	7%
Firm growth attributed to expansion into additional market segments or niches	18%	24%	23%	18%
Percentage of firm's growth financed by cash from operations (working capital)	88%	95%	93%	90%
Percentage of firm's growth financed by new debt issues	10%	5%	8%	11%
External auditor used (percent)	73%	86%	84%	96%
Annual audit fee	\$3,090	\$5,111/\$10,800	\$8,227	\$20,153
Annual company cost for supporting continuing education with time off pay (dollars)	\$317/\$4,000	\$3,430	\$8,277	\$5,667/\$23,980
Annual company cost for supporting continuing education with tuition support (dollars)	\$738	\$4,500/\$1,375	\$7,208	\$1,917/\$14,375
Projects have a field tool control system (%)	33%/64%	36%/70%	70%	86%
Projects have a computerized field tool control system (percent)	17%	38%	69%	84%
Annual administrative cost of field tool control system (dollars)	\$2,700	\$2,125	\$18,111	\$34,125
Firm provides incentives to project managers to complete projects as planned (percent)	37%	45%	10%/60%	37%
Incentive amount (% of total project revenues)	2.5%	3.9%	1%/8.3%	2.5%
Number of project managers normally employed by firm	2	2.2/3	6	11.9
Number of projects worked on at one time	10.4/4	5.5	7.9	8/5.1
Average size project worked on (direct job cost per manager)	\$203,098	\$312,783	\$358,932	\$472,910
Firm systematically supports legislation to promote electrical construction research (percent)	50%	38%	40%	36%/73%
Firm systematically support legislation to local business expansion which might bring high tech construction projects to the community (percent)	33%	38%	26%	18%
Firm's services include design (percent)	77%	65%	90%/60%	91%
Annual revenue for design services (dollars)	\$145,000	\$373,333	\$517,727	\$2,583,334
Firm's services include maintenance (percent)	94%	100%	100%	100%
Annual revenue for maintenance (dollars)	\$131,250	\$241,145/\$1,116,667	\$871,818	\$4,100,000
Firm have a corporate safety program (percent)	90%	95%	100%	100%
Safety program in written form (percent)	89%	95%	100%	100%
Time spent by upper management discussing safety at the project level (hours/year)	60.6	92	119	130
Firm have a corporate safety representative (percent)	78%	80%	100%	100%
Safety representative site visits to job site (number/month)	2.4	2.1	2.3	5.1
Annual cost of administering safety program (dollars)	\$8,788	\$4,083/\$18,600	\$21,400	\$44,143/\$83,800
Company experience modification rating	0.9/0.66	0.86	0.93/0.79	0.78

**Table 3.** (Continued)

Firm Characteristics	Group 1 Firms \$1 Million (direct labor expense)	Group 2 Firms \$1 to 2.5 Million (direct labor expense)	Group 3 Firms \$2.5 to 5 Million (direct labor expense)	Group 4 Firms \$5 Million or more (direct labor expense)
<b>Marketing Initiatives</b>				
Firm a member of a formal alliance (consortia, joint venture, etc.) with purpose of providing continuing education presentations (percent)	53%	61%	53%	59%
Firm a member of a formal alliance (consortia, joint venture, etc.) with purpose of offering a trade school (post-high school) program in conjunction with a union (percent)	38%/75%	41%	59%	60%
Firm enters into partnering relationships between owner and contractor (percent)	35%	44%	30%/70%	70%
Firm enters into partnering relationships between contractor and subcontractor (percent)	29%	44%	60%	55%/89%
<b>Technology Initiatives</b>				
Estimated annual cost for new computers or system improvements (dollars)	\$4,917/2429	9967	\$7,000/\$17,643	\$15,938/\$55,000
Estimated annual cost for new software or software improvements (dollar)	\$2,289	\$4,167	\$7,892	\$5,813/\$25,000
<b>Financial Ratios</b>				
Total sales/total assets (asset turnover ratio)	3.04	4.01/3.29	5.29	4.88
Gross income/total sales (gross margin)	0.24	0.21	0.18	0.16/0.19
Operating income/gross income	0.006/0.323	0.053/0.272	0.031/0.283	0.164
Operating income/equity	0.063	0.121/0.291	0.086/0.441	0.21/0.50
Total sales/accounts receivable	8.11	7.53	6.68	7.66
Retainage/total sales	0.027	0.014/0.025	0.021	0.032
Retainage/accounts receivable	0.195	0.08/0.21	0.13	0.181
Inventory/total sales	0.04/0.021	0.021	0.0122	0.0086
Total fixed assets/net profit after tax	0.61	4.54/0.84	8.02/1.3	2.04/0.93
Accounts payable/total sales	0.064	0.044	0.064/0.04	0.05
Total liabilities/total sales	0.306	0.143/0.111	0.172	0.162
Net profit after tax/total liabilities	(0.118)/0.719	0.026/0.465	0.026/0.227	0.174/0.504
Total sales/total net worth	16.8/5.6	9.65/5.38	10.6	9.02
Net profit after tax/total net worth	(0.46)/0.43	0.073/0.224	0.049/0.306	0.078/0.378
Total overhead expenses/total sales	0.26/0.159	0.194/0.155	0.149	0.13
Repairs and maintenance/total sales	0.0069	0.00149/0.00256	0.0023	0.0017
Inventory/total assets	0.12/0.06	0.081	0.087	0.045
Current assets/current liabilities	2.85	1.93/3.2	1.57/2.07	2.59
Net profit after tax/total assets	(0.046)/0.24	0.023/0.141	0.0147/0.198	0.034/0.263

## References

- Becker, B. E. (1995). *Single vs. separate prime contracting: A national study*. The Electrical Contracting Foundation, Bethesda, Md.
- Brownsword, A. W., Hartzler, G. J., and Hartzler, M. T. (1994). *Improving apprentice training with personality assessment*. The Electrical Contracting Foundation, Bethesda, Md.
- Rounds, J. L. (1993). *Productivity enhancement focusing on labor efficiency*. The Electrical Contracting Foundation, Bethesda, Md.
- Rowings, J. E., Jr., and Federle, M. O. (1996). *Electrical contractor's guide to partnering*. The Electrical Contracting Foundation, Bethesda, Md.
- Severson, G. D., Jaselskis, E. J., and Russell, J. S. (1993). "Trends in construction contractor financial data." *J. Constr. Eng. Manage.*, 119(4), 854–858.