

# The Utilization Of Accounting Cost Controls In Conjunction With Information Technology In The Home Building Arena

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## ABSTRACT

*This article examines how cost controls are emphasized and utilized in conjunction with information technology in the home building business by Pennsylvania's contractors. The results of the analysis showed significant differences existed in the implementation of cost controls; the periodic use of cost variance; adjustments made based on cost variance feedback; the use of past projects to prepare estimates on future projects, and the use of information technology between and among firms when examined by firm size. The outcome of the study has led to several important implications for the home building industry.*

## INTRODUCTION

Historically, construction organizations have been slow-moving in recognizing the importance and value of implementing information technology in managing this process (Egbu & Botterill, 2002). In their brick-and-mortar business, the construction industry has been slow in realizing and accepting new technologies. One of the reasons affecting information technology implementation is the project-based nature of the business. There is a perception that software developers lack the expertise in the unsynchronized workflow of the construction industry and are geared more to the synchronized workflow of the manufacturing industry (Issa, Flood, & Caglasin, 2003). Other issues affecting information technology implementation are governmental regulation, cultural and organizational issues, the fragmentation in the makeup of the industry, and the emphasis on temporary or short-term goals which inhibits innovations considering the long-term goals (White, Bouchlaghem, & Thorpe, 2002).

The construction industry is predicated on the flow of information, and that information is the vehicle that drives the business. There are many information flows in a construction project which makes it difficult to manage; however, the management of this information is vital for a successful project (Mead, 2001). One of the most important flows of information revolves around the cost variance calculation which is determined by subtracting the actual costs from the estimated (budgeted) costs. Calculating cost variance is the foundation for controlling costs on a project. Cost variance can make the difference between success and failure on a job in a highly competitive market (Christofferson, 2000). Subsequently, information is only valuable if it is accurate, relevant, and delivered to the appropriate people in a timely manner. Information technology can help manage the flow of information to increase the accuracy and efficiency of the business operations and ultimately the business process ("Partnership for", 2001). Nevertheless, few studies show how home building contractors make use of cost controls with information technology in accordance with their business processes in their practices to provide essential information.

## PURPOSE

The purpose of this study was to examine the timing and emphasis placed on cost controls by Pennsylvania's home building contractors to help minimize the difference between estimated costs and actual costs. The study included an examination of the periodic use of cost variance, adjustments made based on cost variance feedback, the use of past projects to prepare estimates on future projects, and the use of computers in the control of

costs by Pennsylvania's home building firms related to the scale of operations. The researcher was concerned with the end-to-end job process with a standardized two-way flow of information, utilizing to a greater extent factors that affect cost variance.

## **LITERATURE REVIEW**

The complex, project-oriented approach and the risk inherent nature of the construction business create unique and intricate management decisions for contractors when applied to the home building industry. According to the "Partnership for" (2001), "the greatest challenges faced by most home builders revolve around the execution of a production process that is complex, unpredictable, and always subject to change" (p. 27). Operating within a complex and challenging environment, many builders still underutilize information technology for cost controls. Many builders employ information technology for only a small part of the daily operations overall management process. However, in an increasing competitive environment, construction firms must have a better understanding of information technology in relation to the management of projects to facilitate operations in a complex environment ("Partnership for", 2001).

In order for a project to accomplish these objectives, an understanding of risk is important in dealing and managing these risks in an effective and systematic manner (Kartam & Kartam, 2001; Santoso, Ogunlana, & Minato, 2003). Unfortunately, risk and uncertainty are not taken into consideration or accounted for at all by many contractors. Subsequently, many contractors are not experienced or have the knowledge to deal properly with and control risk and uncertainty. The consequences of lack of control over risk and uncertainty play a significant factor into several negative outcomes of the construction business (Baloi & Price, 2003). Most notably, the results of not recognizing and managing risk and uncertainty can be best illustrated in the sizable number of reported projects that incurred cost overruns. There are numerous reports showing cost overruns at over 50% for construction projects. These estimates tend to favor the conservative side with some reports even reporting a higher percentage of overruns (Gardner & Stewart, 2000). These overruns were seen not only in larger sized projects but also in smaller sized projects. Other consequences, all too common, involve disputes and conflicts on and about the project, lack of overall quality, and business failures within the construction industry (Baloi & Price, 2003).

In summary, the home building industry consists of a wide array of builders. The industry has a range of small, medium, and large builders. With increasing demands from customers for quality, progressively more complex building forms, and growing competition in a global marketplace, the challenge to deliver profitable projects for home building contractors becomes increasing difficult. The task is complicated even further when factoring in timelines and budgets. In the immediate future, without efficient use of methods which include information technology to control costs, the ability to be competitive in the construction arena will be significantly altered ("Partnership for", 2001). Currently, there is an abundance of hardware and software on the market to support the small to medium size construction firms. The process of linking the estimating system to the job cost system has become obtainable and affordable. Such information systems allow for not only high performance but also low cost. Construction firms can cost effectively use information technology to monitor and improve the job cost and estimating functions (Rammes & Noel, 2001; Jackson, 2001). However, it appears that many firms are not taking advantage of the technology in managing a complex building process ("Partnership for", 2001).

## **RESEARCH QUESTION AND VARIABLES**

*Research Question: To what extent are the differences in the implementation of cost controls related to the scale of operations?*

The variables used in this study were informed from the theoretical framework and review of literature in consideration of the posed research question. For this study, the independent variable used was firm size based on the concept of "scale of operations". Accordingly, participating firms were arranged into three categories of size: small, medium, and large, according to the following indicator variables: the number of employees, number of homes built per year, and annual revenue.

The dependent variables used for the investigation were the periodic use of cost variance, adjustments made based on cost variance feedback, the use of past projects to prepare estimates on future projects, and the use of computers in the control of costs. The dependent variables, based on the concept of “cost controls”, were then examined by firm size. Data for the variables was collected through the distribution of a survey to Pennsylvania home building firms.

**DATA**

According to Babbie (2004), “in social research, there is virtually no limit to what or whom can be studied, or the units of analysis” (p. 94). Units of analysis can range from, but are not limited to, individuals, groups, organizations, and social artifacts. The use of these units as classifications provides levels for better examination and analysis of the research and research questions (Babbie, 2004). Pertinent to this research, organizations with similar characteristics may be represented as a classification to be used as a unit of analysis. Accordingly, Pennsylvania home building firms served as the unit of analysis for data analysis, results, and conclusions.

**FINDINGS**

*Research Question: To what extent are the differences in the implementation of cost controls related to the scale of operations?*

In order to answer the research question four survey items were used to gauge the home builder’s use of cost controls in relation to their home building practice. In order to examine the use of cost controls by firm size, one-way analysis of variance (ANOVA) and Tukey multiple comparison tests were utilized. First, the one-way analysis of variance (ANOVA) was performed. Table 1 shows the statistical results of the one-way analysis of variance (ANOVA) for the four survey items related to the use of cost controls.

**Table 1**  
**Cost Control Practices Examined by Firm Size**

Cost control	n	Mean				Total	F	p
		Small	Medium	Large				
Periodically monitor cost variance	365	3.76	4.05	4.24	4.02	6.242	0.002	
Make adjustments based on cost variance feedback	361	2.75	2.82	3.14	2.91	3.580	0.029	
Use past projects prepare estimates on future projects	365	3.73	4.12	4.07	3.97	5.456	0.005	
Computers used in the "control of costs"	365	2.58	3.33	4.15	3.35	41.974	<.001	

*Note.* Application Scale: 1 = Never; 2 = Seldom; 3 = Sometimes; 4 = Most Times; 5 = Always

The data reveal that there are significant differences based on firm size on the periodic use of cost variance ( $F = 6.242$ ;  $p = .002$ ), adjustments made based on cost variance feedback ( $F = 3.580$ ;  $p = .029$ ), the use of past projects to prepare estimates on future projects ( $F = 5.456$ ;  $p = .005$ ), and the use of computers in the control of costs ( $F = 41.974$ ;  $p < .001$ ) by Pennsylvania home building firms.

Secondly, a post hoc analysis was performed. A Tukey multiple comparison test was utilized to examine differences between the individual firm sizes; small, medium, and large. The post hoc results for the periodic use of cost variance showed  $s = m$  ( $p = .090$ );  $s < l$  ( $p = .001$ );  $m = l$  ( $p = .351$ ). The use of adjustments made based on cost

variance feedback showed  $s = m$  ( $p = .890$ );  $s < l$  ( $p = .033$ );  $m = l$  ( $p = .103$ ). The use of past projects to prepare estimates on future projects showed  $s < m$  ( $p = .008$ );  $s < l$  ( $p = .021$ );  $m = l$  ( $p = .940$ ). The last item, the use of computers in the control of costs showed  $s < m$  ( $p < .001$ );  $s < l$  ( $p < .001$ );  $m < l$  ( $p < .001$ ).

## **CONCLUSIONS**

The research question was designed to address the home builder's cost control practices in regard to the home builders' scale of operations. The survey questions dealt with the use of four items; the periodic use of cost variance, adjustments made based on cost variance feedback, the use of past projects to prepare estimates on future projects, and the use of computers in the control of costs by Pennsylvania home building firms. The data exemplified that there are significant differences in the utilization of cost control practices by Pennsylvania home builders. The most glaring item is the use of computers to control cost. Although significant differences existed among firm sizes regarding all four items relating to cost control practices, the use of computers in the control of costs by Pennsylvania home building firms was the area of greatest difference.

In the home building process, construction firms try to accomplish three goals referred to as the golden triangle, which is to complete the home on time, on budget, and of high quality. The ability to manage this risk of not meeting these objectives is crucial. Using a system to monitor the golden triangle is a vital component in addressing risk for any home building firm. The future of the construction industry revolves around utilizing various information technology tools for the estimating and accounting subsystems in accordance with each other not in isolation. Most importantly, cost variance factors can no longer be looked at in isolation but rather as a system of interrelated and interacting components. Implementing cost variance in a holistic approach while incorporating both the estimating and accounting functions into a system can lead to greater synergy in the cost control.

While the data show the majority of Pennsylvania home building firms periodically calculate cost variance in the control of cost in their practices, the results of the study showed that many firms are not using technology to its fullest potential extent. The data unmistakably show that the Pennsylvania home building firms, on whole, are not using a dynamic systems approach incorporating information technology for cost control. In addition, the lack of usage of a dynamic systems approach becomes more distinct as the size of the firm decreases. The data show that many small and medium firms are not taking advantage of the technology in managing a complex building process.

## **RECOMMENDATIONS**

There are several areas of the home building process identified for investigation in this study. These areas revolved around the use of controls and information technology in the home building arena. These are all areas in which Pennsylvania home building firms can potentially benefit from to increase productivity in their firms. However, in order to implement these areas and meet the future demands of the industry, a transformation in the cultural mindset of the home building industry is needed in respect to the use technology and the processes of traditional work practices. The first recommendation, based on the results of this study, is for firms to take advantage of the commercial packages available for estimating software and accounting software for implementation in their practices. In addition, increase the emphasis placed on integrating the functions of estimating and accounting through the use of information technology in the management of construction projects. A more accurate and reliable cost variance calculation can help firms to complete projects on time and budget. This more accurate cost variance calculation will provide a competitive advantage to a firm in an increasing competitive environment. According to the FMI Corporation (2005), "experience with up-to-date technologies that include software programs for job costing, scheduling, and estimating is becoming much more critical to successfully managing jobs" (p. 5). Advances in technologies of commercial estimating and accounting software have reduced costs and have broadened the economy of scale of technology to smaller firms. Small and medium firms can now use technological developments to improve the efficiency of operations and benefit from scale of economies that were once limited to larger firms.

The second recommendation involves improving the ability to incorporate technology to improve the business functions, stay competitive in the field, and meet future needs of the industry. Goulding and Alshawi, (2004) state “construction organizations could certainly benefit from a greater understanding of how IT skills contribute to company performance, which, from an IT standpoint, means aligning IT resources with business imperatives (to support the core business process)” (p. 252). Increased technology requires more training, and accordingly, training in the home building industry as a whole has lagged behind training of other industries (“Partnership for”, 2001). Correspondingly, the researcher recommends more training for builders and contractors, especially in the information technology field so home builders can compete in an increasingly competitive environment, keep projects on time and budget, and reduce the risk and uncertainty of projects. Clearly, as the results of the study show, Pennsylvania home building firms are not operating cost control with great synergy. They are not, on average, incorporating technology in an efficient systems approach to the extent needed to manage risk and uncertainty in their projects effectively. According to Harrington (1991), “synergy is achieved through the interaction of a system’s subsystems which allows it a greater performance than the total of the subsystems as individuals” (p.87). A holistic approach using information technology while incorporating both the estimating and accounting functions into a system can lead to greater synergy in the cost control practices.

Finally, the focus of this study was to examine the timing and emphasis placed on cost controls in conjunction with information technology by Pennsylvania’s home building contractors to help minimize the difference between estimated costs and actual costs. One of the limitations of the study was the fact the study’s parameters were limited to the Commonwealth of Pennsylvania. It would be interesting to see how the periodic use of cost variance, adjustments made based on cost variance feedback, the use of past projects to prepare estimates on future projects, and the use of computers in the control of costs are emphasized and utilized in other geographical regions of the country and/or other parts of the world. With this said, the author recommends a replicate study in other states in the United States, on a national level, and on an international level in either individual studies or in a series of studies.

## REFERENCES

1. Babbie, E. R. (2004). *The practice of social research* (10th ed.). Belmont, CA: Wadsworth/Thomson Learning.
2. Baloi, D. & Price, D. F. A. (2003). Modeling global factors affecting construction cost performance. *International Journal of Project Management*, 21(4), 261-269.
3. Christofferson, J. P. (2000). *Unlocking the power for home builders: Estimating with Microsoft excel*. Washington DC: Home Builder Press.
4. Egbu, C. O. & Botterill, K. (2002). Information technologies for knowledge management: Their usage and effectiveness. *Electronic Journal of Information Technology in Construction*. 7, 125-137. Retrieved June 14, 2003, from <http://www.itcon.org/2002/8>
5. FMI Corporation. (2005). *The 2004-2005 U. S. Construction Industry Training Report*. Raleigh, NC.
6. Goulding, J. S. & Alshawi, M. (2004). A process-driven IT training for construction: core development issues. *Construction Innovation*, 4(4), 243-254.
7. Harrington, J. (1991). *Organizational Structure and Information Technology*. New York: Prentice-Hall.
8. Issa, R. R., Flood, I., & Caglasin, G. (2003). A survey of e-business implementation in the U. S. construction industry. *Electronic Journal of Information Technology in Construction*. 8, 15-28. Retrieved June 14, 2003, from <http://www.itcon.org/2003/2>
9. Jackson, J. (2001). That “@@!\*#” is bidding below costs! Retrieved February 1, 2004 from, <http://www.fminet.com/sc.asp?t=3&s=18&p=180&at=5>
10. Kartam, N. A. & Kartam, S. A. (2001). Risk and its management in the Kuwaiti construction industry: A contractors’ perspective. *International Journal of Project Management*, 19(6), 325-335.
11. Mead, S. P. (2001). Developing benchmarks for construction information flows. *Journal of Construction Education*, 6(3), 155-166.
12. Partnership for Advancing Technology in Housing. (2001). *Information technology to accelerate and streamline home building*. (NAHB Research Center). Upper Marlboro, MD.

13. Rammes, J. & Noel, P. (2001). Technology in construction. *Journal of Construction Accounting & Taxation*, 11(5), 13.
14. Santoso, D. S., Ogunlana, S. O., & Minato, T. (2003). Assessment of risks in high rise building construction in Jakarta. *Engineering, Construction and Architectural Management*, 10(1), 43-55.
15. White, J., Bouchlaghem, D., & Thorpe, T. (2002). IT implementation in the construction industry. *Engineering, Construction, and Architectural Management*, 9(5), 371-377.

**NOTES**