The Effects of Project Management Certification on the Triple Constraint

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ABSTRACT

This research paper describes key information technology (IT) project management activities in terms of project scope, time, and cost management, namely the triple constraint. The authors contend that the ability to properly manage and execute these activities are the quintessential components that oftentimes drives whether projects succeed or fail. The literature shows that IT projects have a dismal success rate but successful projects have been on the rise. We attempt to determine if the increase of successful projects correlates to the increase in the number of certificated project managers. Empirical evidence is presented that indicates certified project managers do not perform project scope, time, and cost management activities better than uncertified project managers.

INTRODUCTION

IT projects are constrained in various ways based primarily on their scope, time, and cost goals. These three project dimensions are known as the triple constraint and must be balanced in order to most likely ensure successful project outcomes. Failure to consider the triple constraint throughout the life-cycle of IT projects generally leads to failed projects [9]. IT project failures typically manifest themselves as late deliverables, exploded budget costs, a desired system not functioning as intended, namely not meeting project scope, as well as project cancellations [1], [15], [29]. Practitioners sometimes apply improved variants of structured analysis and design or object-oriented analysis and design techniques to address and help correct these issues [14]. However, IT project failures represent more of a systematic managing problem not solely analysis and design issues and therefore must be addressed at the project management level [25]. The published literature describes that the primary reasons for project failures are due to various inadequacies in the project management process [7]. Therefore to help correct these failures

ways are needed to ensure that project managers are properly trained in their discipline to avoid common pitfalls.

In recent years, failed IT projects have been decreasing, thereby leading to a higher number of successful projects. In 1995, only 16% of IT projects were successful in meeting the triple constraint [32]. In 2002, the number of successful IT projects increased and approximately 34% of IT projects did meet project scope, time, and cost goals [34]. In a more recent study, Anderson [3] reported that in 2000, successful projects were at 28% and increased to 32% in 2008. The numbers reported in these studies represent a 112.5% and 14.3% improvement respectively, which naturally asks the question, why the improvement? One explanation is better skilled project managers [33]. The project management profession has been improving due to advances in project management training, tools and techniques. In addition, project managers are beginning to follow a more systematic and holistic approach to project management, especially in the area of project scope management. A systematic process is an essential element to process improvement [4].

There are many programs that provide advanced training and certification in the project management profession. The focus of these programs is to train project managers to take a systematic, repeatable and verifiable approach to all activities of the project development process. For example, the Project Management Institute (PMI) Project Management Profession (PMP®) certification credential is the most widely recognized project management certification and one of the post popular [31],[8],[35]. In addition, the PMI has played and continues to play a central role in the project management profession [20]. In 1993, there were 1,000 PMP® certified project managers, in 2008 that number grew to 318,289, and at the end of 2010, there were 412,503 as reported by PMI. This represents a continually large increase in the number of trained project managers certified as PMP®s. Other institutes offer similar certificates based on providing similar training. Clearly the project management profession recognizes the need to provide advanced training. Does the increased number of successful projects correlate to the increased number of certified project managers? Our research paper attempts to answer this question by surveying 93 project managers and provides results that examine the effects of certification and project success rate based on effective project scope, time, and cost management.

RESEARCH METHODOLOGY

The literature indicates that the triple constraint of scope, time, and cost, must be balanced in order to most likely ensure successful project outcomes. In addition, it has been well documented that IT project failures are due to various inadequacies in the project management process. In recent years, the number of successful IT projects has increased and so has the number of certified project managers. The authors' hypothesize that certified project managers are more successful at balancing the triple constraint than project managers not certified. Thus, the following hypotheses will be tested:

H1: Certified project managers perform project scope management better than uncertified project managers.

H2: Certified project managers perform project time management better than uncertified project managers.

H3: Certified project managers perform project cost management better than uncertified project managers.

To measure these hypotheses, the researchers collected data from project managers in the IT profession. Study participants completed an online survey, using Survey Monkey, and the results are discussed in the next section. In an effort to acquire the largest sample size possible, the survey subjects were elicited from the following diverse sources:

1. Corporations partnered with the college's internship program
2. Project managers actively involved sharing knowledge using an online discussion board, http://www.projectmanagementdiscussion.com
3. Online community for IT project managers using an online discussion board, http://www.gantthead.com
4. Survey participation request contained in a newsletter distributed by Cornelius Fichtner, PMP, host of The Project Management Podcast™
5. Survey participation request contained in an e-mail request by Josh Nankivel, PMP, and author of http://pmstudent.com

Using these five sources, data were collected from June 1, 2011 until August 31, 2011. Although we found this to be a very effective method of data collection, it is arguably a limitation of the study due to participants being self-selected.

FINDINGS, RESULTS, AND ANALYSIS

Data were collected from 93 project managers in the IT profession, whereby 78 completed the survey fully and 87 answered most questions. Only 6 surveys where discarded due to those subjects not actually working in the capacity as a project manager. The results of the surveys are discussed in this section and divided into the following sub-sections:

- Project management experience
- Certification importance
- Project scope management
- Project time management
- Project cost management

Project Management Experience
Question 1: How many years have you been employed as a project manager?

A Chi-Square test was used to determine if there was a significant difference between the distributions of uncertified and certified project managers with respect to years of experience. The sample consisted of 43 certified and 44 uncertified project managers. The frequency and (relative frequency) distribution of their responses are noted in Table 2.

	Within the year	1 to 3 years	4 to 6 years	7 to 9 years	>10 years
Uncertified	3 (7%)	7 (16%)	10 (23%)	5 (11%)	19 (43)%
Certified	3 (7%)	9 (21%)	6 (14%)	6 (14%)	19(44%)

Table 2: Project Management Experience Rates for Uncertified versus Certified

The answer to this question is important since differences in years of experience between the two groups could impact the primary focus of our study, namely do certified project managers perform project scope, time, and cost management better than uncertified project managers. Results depicted in Table 3, show that the mean years of experience of both groups is nearly identical, namely 7.58 and 7.59 years for uncertified and certified project managers respectively. The data also indicates there is not a significant difference between the distributions of the two groups (Chi-square value = 3.28, p-value = .5125).

Topic	Mean uncertified	Mean certified	Chi-Square– value	p-value
Experience	7.58 yrs.	7.59 yrs.	3.28	.5125

Table 3: Mean Project Management Experience for Uncertified versus Certified

The pie charts in Figure 1 show how close the two sample distributions are in terms of years of experience. The participants in each of the samples used in our study are very similar with respect to years of experience. Therefore, experience did not impact the study.
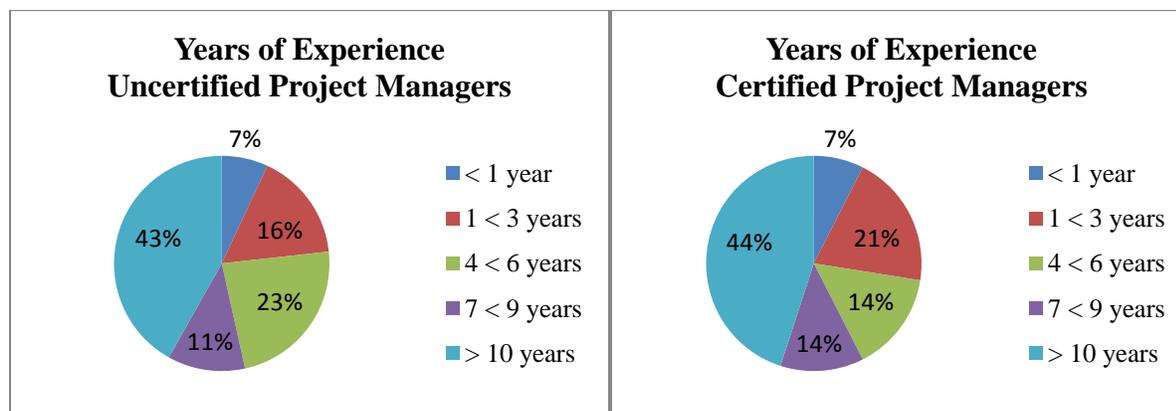

Figure 1: Years of Experience for Uncertified and Certified Project Managers

Certification Importance

Question 2: Please rate the importance of a project management certification on managing projects. (1 is least important and 7 is most important)

A two independent samples means t-test was used to determine if there was a difference in the importance given to certification by uncertified and certified project managers with respect to managing projects. This question is of interest to determine if in general those not having a certification place a higher expectation of the value of certification than those project managers that are already certified. The sample consisted of 43 certified and 44 uncertified project

managers. The frequency and (relative frequency) distribution of their responses are noted in Table 4.

	1	2	3	4	5	6	7
Uncertified	4 (9%)	5 (11%)	7 (16%)	5 (11%)	9 (20%)	8 (18%)	6 (15%)
Certified	8 (19%)	0	9 (21%)	8 (19%)	13 (30%)	4 (9%)	1 (2%)

Table 4: Response Rate to Certification Importance for Uncertified versus Certified

Results depicted in Table 5 show the mean value of certification importance for uncertified and certified project managers are 4.318 and 3.791 respectively. The t-test results indicate there is not a significant difference between the means of the two groups (t-value =1.38, p-value = .1711). A p-value of .1711, however, does indicate a "little" evidence that uncertified project managers place more importance on being certified than certified project managers. The F-test for equality of two variances indicates the variances are relatively similar (F-value = 1.28, p-value = .4245).

Topic	Mean uncertified	Mean certified	t–value	p-value
Certification importance	4.318	3.791	1.38	.1711

Table 5: Mean Certification Importance Rates for Uncertified versus Certified

However, further analysis using a Chi-Square test on the equality of the two distributions does show a significant difference (Chi-square value = 18.67, p-value = .0009). The column charts of Figure 2 show the distributions in terms of importance placed on having certification. This question could be explored further with additional studies.
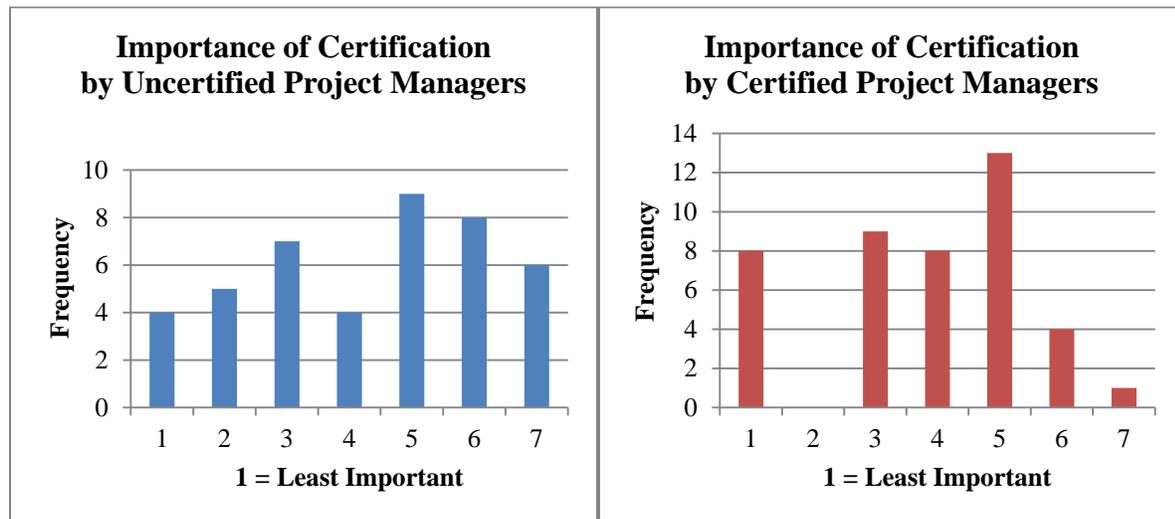

Figure 2: Importance of Certification by Uncertified and Certified Project Managers

Whether certified project managers are better at managing the triple constraint (project scope, time, and cost management) than uncertified project managers is the primary focus of our study. As mentioned earlier, Hypothesis 1, Hypothesis 2, and Hypothesis 3 focus on each of the components of the triple constraint, respectively and the results are contained in the following three sub-sections:

Project Scope Management
Questions 4, 12: What percentage of your projects exceeded original project scope?

A two independent samples means t-test was used to determine if certified project managers are better in managing project scope than uncertified project managers. The sample consisted of 40 certified and 38 uncertified project managers. The frequency and (relative frequency) distribution of their responses are noted in Table 6.

	<5%	5% to 10%	11% to 30%	31% to 50%	51% to 70%	71% to 90%	>90%
Uncertified	9 (24%)	9 (24%)	10 (25%)	6 (16%)	3 (8%)	1 (3%)	0
Certified	9 (23%)	10 (25%)	9 (23%)	4 (9%)	4 (9%)	1 (3%)	3 (8%)

Table 6: Response Rate to Project Scope Management for Uncertified versus Certified

Results depicted in Table 7 show that the mean value of percentage of projects exceeding project scope for uncertified and certified groups are 20.789% and 26.063% respectively. Results of the two independent samples means t-test indicate there is no evidence (t-value =-.95, p-value = .8277) that certified managers are better at managing project scope than uncertified project managers. The negative difference (-.95) indicates that uncertified project managers are better, on average, in managing projects in terms of scope than certified project managers; however this difference is not statistically significant.

Topic	Mean uncertified	Mean certified	t–value	p-value
Project Scope Management	20.789%	26.063%	-.95	.8277

Table 7: Mean Project Scope Management Rates for Uncertified versus Certified

The column chart, Figure 3, shows the sample distributions of the percentage of projects that exceeded original project scope. A Chi-square test (Chi-square-value = 3.27, p-value = .5129) indicates the distributions are relatively similar.
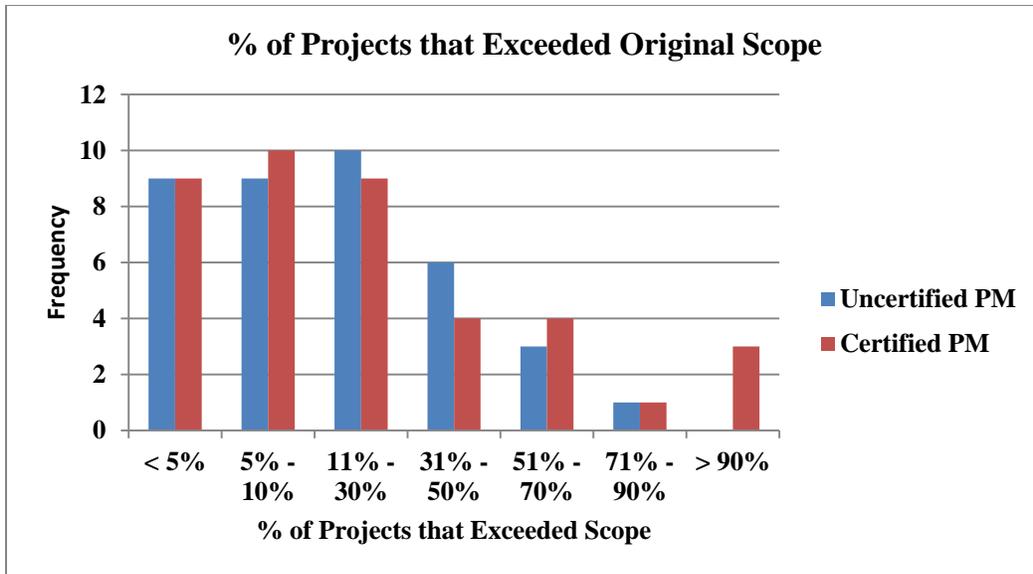
% of Projects that Exceeded Original Scope

Figure 3: % of Projects that Exceeded Original Project Scope

Project Time Management
Questions 5, 13: What percentage of your projects exceeded original project delivery date?

A two independent samples means t-test was used to determine if certified project managers are better in managing project delivery date than uncertified project managers. The sample consisted of 40 certified and 38 uncertified project managers. The frequency and (relative frequency) distribution of their responses are noted in Table 8.

	<5%	5% to 10%	11% to 30%	31% to 50%	51% to 70%	71% to 90%	>90%
Uncertified	10 (26%)	9 (24%)	9 (24%)	4 (10%)	3 (8%)	1 (3%)	2 (5%)
Certified	9 (23%)	8 (20%)	9 (23%)	9 (23%)	2 (4%)	3 (7%)	0

Table 8: Response Rate to Project Time Management for Uncertified versus Certified

Results depicted in Table 9 show that the mean value of percentage of projects exceeding project delivery due date for uncertified and certified groups are 23.224% and 24.563% respectively. Results of the two independent samples means t-test suggest there is not a significant difference between the two groups (t-value =-.24, p-value = .5942). A p-value of .5942 does not provide any evidence that uncertified project managers are better at managing a project's delivery date than certified project managers.

Topic	Mean uncertified	Mean certified	t–value	p-value
Project Time Management	23.224%	24.563%	-.24	.5942

Table 9: Mean Project Time Management Rates for Uncertified versus Certified

The column chart, Figure 4, show the sample distributions of the percentage of projects that exceeded the delivery date. The F-test for equality of two variances (F-value=1.28, p-value = 44.12) indicates the variances are relatively similar.
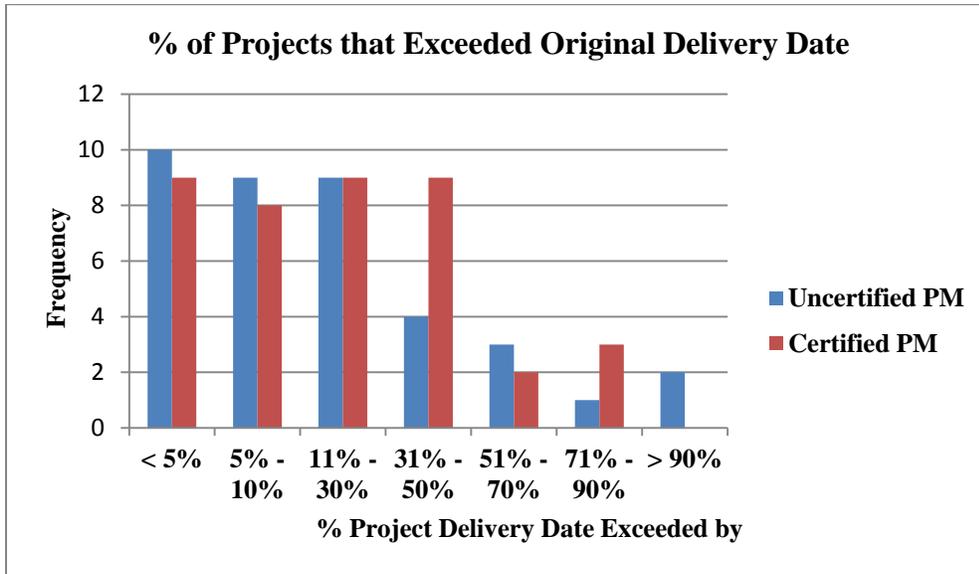

Figure 4: % of Projects that Exceeded Original Project Delivery Date

Project Cost Management

Questions 6, 14: What percentage of your projects exceeded original project cost budget?

A two independent samples means t-test was used to determine if certified project managers are better in managing project cost than uncertified project managers. The sample consisted of 40 certified and 38 uncertified project managers.   The frequency and (relative frequency) distribution of their responses are noted in Table 10.

	<5%	5% to 10%	11% to 30%	31% to 50%	51% to 70%	71% to 90%	>90%
Uncertified	11 (29%)	11 (29%)	10 (26%)	3 (8%)	1 (3%)	2 (5%)	0
Certified	14 (35%)	9 (23%)	5 (12%)	7 (18%)	4 (10%)	0	1 (2%)

Table 10: Response Rate to Project Cost Management for Uncertified versus Certified

Results depicted in Table 11 show that the mean value of percentage of projects exceeding project cost for uncertified and certified groups are 17.105% and 20.438% respectively. Results of the two independent samples means t-test imply there is not a significant difference between the two groups (t-value =-.69, p-value = .7523). **A p-value of .7523 does not provide any evidence that uncertified project managers are better at managing a project's delivery date than certified project managers.**

Topic	Mean uncertified	Mean certified	t –value	p-value
Project Cost Management	17.105%	20.438%	-.69	.7523

Table 11: Mean Project Cost Management Rates for Uncertified versus Certified

The column chart, Figure 5, show the sample distributions of the percentage of projects that exceeded the original cost estimate. The F-test for equality of two variances (F-value = 1.32, p-value = .4015) indicates the variances are relatively similar.
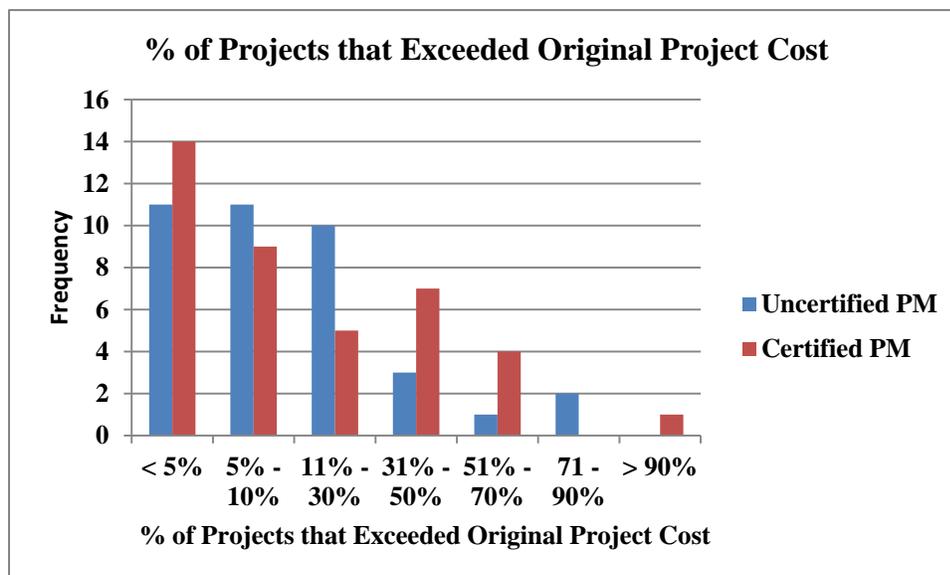

Figure 5: % of Projects that Exceeded Original Project Cost

CONCLUSIONS

The authors' motivation to this research study was to ascertain if the reported increase in successful IT projects correlates to the increase in numbers of certified project managers. The literature describes successful and failed projects in terms of project scope, time, and cost management activities. Therefore the authors' hypotheses were that certified project managers perform these activities better than uncertified project managers. It seemed logical to expect that advanced project management training contributed to the increase in successful IT projects as reported in several studies. However, the results of our research study indicate that there is no difference between uncertified and certified project managers on their performance of project scope, time, and cost management activities. Table 12 provides a summary of the study results detailed in the previous section.

Topic	Mean uncertified	Mean certified	t–value	p-value
Scope	20.789%	26.063%	-.95	.8277
Time	23.324%	24.624%	-.24	.5942
Cost	17.105%	20.438%	-.69	.7523

Table 12: Analysis Summary of Mean Rates for Uncertified versus Certified

Other researchers have also reported that there is no difference in project success rates between PMP® certified project managers and uncertified project managers [31]. The aforementioned study measured project success rates based on cost, schedule, quality, and user satisfaction factors. But, the question still remains, why the increased number of successful projects? There must be other factors that more greatly affect project success rates than advanced training in the triple constraint subset of project management core competencies. For example, leadership, communication, motivation and attitude are examples of factors other researchers have identified that outweigh the importance of certification [31], [3].

The authors do not want to undervalue the importance of core competency training offered by certification programs and believe that it is necessary for a project manager to possess these hard-skills of the profession. However, possessing these hard-skills are not enough to improve effectiveness or ensure project success, but offer a starting point of the skills required by the discipline. The current state of the project management profession is tilting towards the improvement of interpersonal competencies, relationship management, resource management, and strategic alignment [17]. Therefore, advanced training certification programs should supplement their current teachings of the nine knowledge areas, which comprise the core competency, with current trends. To this end, further research is required to concretely identify factors necessary to help ensure successful project outcomes. Once determined, the project management professional discipline and academics should work together to outline and develop the contents of the subject matter of an advanced training program.

FUTURE RESEARCH

The results of this study and other studies indicate that in general, uncertified project managers perform their duties as well as certified project managers. Therefore, a natural follow-up research endeavor will examine the value of project management certification. If employers encourage and financially support their employees to obtain and maintain certification, what benefit does it afford the company?

In addition, the previous section mentioned other factors affecting project managers and project success rates. For example, to what degree do personality traits of project managers' help determine project success or failure? Perhaps amount of customer involvement greatly affects project success rates. Our future research will scientifically address these and other issues.

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