

Skills Required of IT Project Managers

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Abstract

The purpose of this study is to determine the qualifications required for employment as an IT project manager. Factors such as education, experience, proficiency with specific software, as well as “soft skills” such as leadership were studied. In addition, demographic data was studied to determine if particular areas offered better opportunities to prospective IT project managers.

Data was collected from Monster.com over a 3 month period (during the fall of 2008) by the 3 authors.

Our findings include the fact that IT project manager jobs are equally distributed among the 4 geographic regions of the United States. We also found that a Bachelor’s degree is the only educational requirement for most IT project manager jobs. In addition, we found that the Northeast region requires the least experience, while the Western region requires the most. Our study also found that proficiency with project management software, leadership skills, and system analysis skills are the most important to employers.

We conclude that a prospective IT project manager needs only a Bachelor’s degree and 4 to 6 years of experience. PMP certification is not required, but skills in systems analysis and project management software are.

A future study could use this data in order to test a hypothesis. There was little correlation analysis applied to the data. A future study could more completely discover relationships between the data. A future study could gather data on Monster.com and report on the trends observed. This data could be compared to data gathered on other job sites and any differences noted could constitute new knowledge.

Introduction

In 1995 the CHAOS study by the Standish Group reported that only 16.2% of the IT projects in the United States were counted as successful. A follow up on the study in 2003 by the same group reported an increase of successful IT projects to 34% (Brewer, 2005). While this study documented improvement over ten years, it has also focused managers on the skills needed for successful IT project management (Cheney, Hale, & Kasper, 1990).

This leads to the question, “What specific skills are needed for IT project management?” As early as 1990 Cheney, Hale & Kasper noted that trends of future skills for IT professionals, especially project managers were placing less significance on specific technologies such as operating systems or application languages and placing more significance on statistical decision theory, business abilities and human factors (Cheney, Hale, & Kasper, 1990). By 2005, Brewer wrote that while project management and business skills are important, innate personality traits and people skills, while difficult, if not impossible to teach, are more critical for project managers than technical skills (Brewer, 2005). Another study concluded that “IT managers should possess both behavioral and technical skills; it is not either/or but both.” (Lee & Lee, 2006). An IEEE study concluded that “the cumulative task skills” (of a team) “can compensate for a lack in certain other skills in a team setting” (Chan, Jiang, & Klein, 2008).

Statement of the Problem

The focus of this research paper is to help Computer Information Systems students prepare for a career in Information Technology Project Management. However as Colvin discovered when trying to measure a fit between IT job types and skills in students and professionals new to the field, respondents may not have enough experience to judge accurately “what is important” (Colvin, 2008). Certain questions if answered would likely make students efforts more efficient.

One of these questions might be, “What skills should an IT Project Manager possess?” Cheney, Hale and Kasper argued in 1990 that human factors and managerial skills were increasing in importance as opposed to technical skills, at least in the viewpoint of senior managers (Cheney, Hale, & Kasper, 1990). Howard affirms this and adds that an IT Project Manager should staff his project with “finishers” (Howard, 2001). Another study reports that successful IT Project Managers are skilled at adapting and can bend or break rules when it is required (Horner Reich, Sauer, & Yong Wee, 2008). The last two mentioned studies seem to imply experience and a proven track record.

Another question might be, “Will the students’ education prepare them for entry into their desired specialization?” VanLengen argued in 2003 that CIS curriculums should shift away from student preparation for entry level positions as programmers and programmer analysts to business systems and technology liaisons. He argues that American IT professionals need to be more involved planning, integrating and implementing solutions, especially in an outsourcing environment (VanLengen, 2003). Noll and Wilkens in 2002, went as far as to develop a model curriculum for Information Systems that differentiates between needs for the Programming, Analyst, and user Support concentrations. The model for analysts lists specific languages, namely C++ and Java (Noll & Wilkins, 2002). The student might ask, “Is this still the case?”. This study may answer that question.

The students may wonder, “Are additional education, degrees or certifications a major consideration to potential employers?” According to Lee & Lee, while surveying job ads in

2006, of the 75% of ads that specified educational requirements, 73.25% required a bachelor degree and only 7.7% referred to a certification (Lee & Lee, 2006).

Objectives

The primary objective of this study is to provide those new to the field of IT project management and educators an awareness of the qualifications required to successfully obtain employment as an IT Project Manager. In order to accomplish this we attempted to determine the skills, experience, and education required for employment as an Information Technology Project Manager from job postings on Monster.com.

Secondary objectives include determination of specific skill sets required for employment as an Information Technology Project Manager. Specific skill sets include a requirement for PMP certification, proficiency with a specific office software product, project management software product, programming language, database package, ERP package, networking technology, operating system, the need for leadership and presentation skills.

Other secondary objectives include a determination of the effect region, division, and state have on the preceding variables as well as salary, and job status (employee vs. contract) and which industries present the most job opportunities. Determination of the effect regions, divisions and states have on experience requirements can prove to be very helpful to those who are new and wish to enter the field of IT project management because those new to the field of IT project management will lack the amount of experienced required and will benefit from starting out in a location where the experience requirements are not as high.

Methodology

The study attempts to discover the necessary qualifications of IT project managers in the United States by analyzing job postings on Monster.com. It was determined that Monster.com was the best internet job site to conduct our research because at least one other study was conducted at Monster.com and because as of the spring of 2002 Monster.com is the largest job search site on the Internet (Backhaus, 2004).

Our minimum sample size was 384 and had a confidence level of 95 percent and an acceptable sampling error of 5 percent. Our sample size was computed as shown in Formula 1 below:

$$.25((1.96)/(0.05))^2 \quad (\text{Formula 1})$$

The sample size was computed based on the sample size for the proportion formula as shown in Formula 2 below:

$$N = (Z^2 * P * (1-P)) / e^2 \quad (\text{Formula 2})$$

In Formula 2, N is the sample size, Z is the confidence level, e is the sampling error and P is the population proportion, which in our case is 0.5 (Berenson, 2006).

PMP certification and skills related to operating systems, project management software, ERP software, database software, programming languages, networking technologies, Office application software were gathered to provide our study with up to date skills and certification

requirements demanded by employers in order to qualify for IT project management jobs. There have been several studies noting that skills obsolescence is a chronic problem in the IT workforce (Cheney, Hale, & Kasper, 1990) and another study notes that the “specific skills required for the variety of positions in IS” are not clear (Noll & Wilkins, 2002).

Industry sector was chosen to provide the study with information about the business environment in which IT project managers work, this can be very significant, one study noted that 60% of the IT project manager jobs of the fortune 500 companies required functional knowledge, otherwise known as the business environment (Lee & Lee, 2006).

Team leadership and presentation skills were chosen to confirm other what other studies have noted that behavioral skills such as leadership and effective communication are important for all IT professionals, but especially for IT project managers (Noll & Wilkins, 2002).

Education level was chosen to provide our study information on how much education is required of IT project managers.

Starting salary was chosen because those interested in the field of IT project management would likely want to know how well IT project managers are compensated.

Job Title, Employment status, Company name, city, state, zip, and address were chosen to insure that duplicates were not allowed into the database and state was also used to determine the census region where the job is located.

Experience was chosen because it is a necessary qualification for employment and a very significant obstacle for those new to the field of IT project management.

The research consisted of gathering the job title, industrial sector, years of experience, employment status, education level, starting salary, PMP certification and skills required or preferred with relation to operating systems, office applications, project management software, ERP software, database software, programming languages, networking, systems analysis, team leadership and presentation skills from Monster.com’s job postings. The gathering of this data occurred over a three month period in the fall of 2008. The company name, city, state, zip, and if possible the company address were also gathered. Employment status could be full-time employee, part-time employee, full-time contract, part-time contract. Education level could be high school, associates, bachelor, master or PhD.

Project Management Software refers as to whether Microsoft Project or other miscellaneous project management software is preferred or required. ERP software could be General knowledge of ERP, SAP, PeopleSoft, MS Business Solutions or other miscellaneous enterprise software.

Database software could be oracle, MS SQL, MySQL or miscellaneous. Programming languages could be general knowledge of programming, Visual Basic, Java, C#, C++ or miscellaneous. Networking skills could be TCP/IP, Novel, IPX, Token-Ring or Miscellaneous. Systems analysis refers as to whether any skills of systems analysis were mentioned, such as systems development life cycle, requirements gathering, process modeling, data modeling, UML, systems design, and object oriented methodologies such as Agile programming. The criteria gathered was then summed and analyzed as a percentage of all job postings or within its response rate. All of the variables were gathered with the help of an ASP.NET/SQL Server web application that insured that duplicates were not allowed into the database. Data gathered was then downloaded as a CVS file and analyzed using Microsoft Excel 2007.

Findings

The percentages given for each of the findings are with relation to all of job postings collected, unless otherwise noted.

The job postings we collected are more or less equally distributed among the South (24 %), Northeast (24.8 %), West (26.6%) and Midwest (24.6 %) census regions of the US. The divisions within each of the regions are not equally distributed and were not used to draw conclusions. Because the job postings are more or less equally distributed among the four regions, they can help us identify the differences in the amount of demand for requisite skills. The response rate for region of job postings was 100%.

Our data shows that the Top 5 Cities with the most jobs for an IT Project manager are New York (4.09%) followed by Phoenix (2.56%), Chicago (2.05%), Seattle (2.05%) and Austin with (1.53%). The Response rate is 100% for this finding.

Our data shows that the top 15 states with the most jobs for an IT Project Manager are California (12.5%), New York (7.9%), Ohio (5.8%), Illinois (4.86%), Pennsylvania (4.86%), Texas (4.86%), Florida (4.09%), Massachusetts (4.09%), Virginia (4.09%), Washington (4.09%), New Jersey (3.84%), Arizona (3.32%), Missouri (2.81%), Minnesota (2.56%), and Georgia (2.30%). The Response rate is 100% for this finding.

90.28% of all jobs postings specified or implied the industry sector, of which 2.3% were categorized as miscellaneous. Within the jobs postings that included industry sector information the top 7 industry sectors were IT (44.5%), Medical (11%), Financial (4.46%), Public/Government (6.14%), Insurance (5.63%) and Manufacturing (5.63%). The IT Industry sector was by far the most demanded industry sector with 44.5% of job postings that specified or implied industry sector.

According to our findings the most demanded Education in all four Regions is a Bachelor degree with 69.05% (of the total data). Table 5 shows that only a Bachelor degree is necessary to become an IT Project Manager, it is not necessary to have a Master. The demand for Education is also equally distributed in the four Regions (Midwest, Northwest, South and West) of the Census Regions of the US. The Response rate is 74.74% for this finding.

Education	% of Responses
Associates	3.07 %
Bachelor	69.05 %
High-School	0.26 %
Master	2.05 %
Unknown	25.58 %
Sum	100.00 %

Table 5: Education

Table 6 shows that the most demanded amount of experience is between 4 and 6 years (36.32% of the total data). Examining Table 6, we could say that it is enough to have at least 4 years of Experience to become an IT Project Manager. The Response rate for the amount of experience demanded is 85.68%.

Experience (years)	% of Responses
10 or more	11.00 %
3 or less	20.46 %
4 to 6	36.32 %
7 to 9	17.90 %
unknown	14.32 %
Sum	100 %

Table 6: Years of Experience Demanded

The years of work experience required are more or less equally distributed among the four regions. Table 7 shows the break down of job postings that included work experience information and require 3 years or less of experience. Of job postings that required 3 years or less of work experience 32.5% were in the Northeast Region.

Experience	Region	% of Responses for Those that Listed this Requirement
3 or less	Midwest	22.50 %
3 or less	Northeast	32.50 %
3 or less	South	20.00 %
3 or less	West	25.00 %
Sum		100 %

Table 7: Experience 3 Years or Less

Table 8 shows the break down of job postings that included work experience information and require 10 years or more of work experience. Of job postings that required 10 years or more of work experience, 41.86% are in the West region.

Experience	Region	% of Responses for Those that Listed this Requirement
10 or more	Midwest	16.28 %
10 or more	Northeast	20.93 %
10 or more	South	20.93 %
10 or more	West	41.86 %
Sum		100 %

Table 8: Experience 10 years or more

90.54% of the job postings collected included employment status information. Of the job postings that included employment status information 67% specified full time employee and 21.99% specified full time contract.

PMP certification was required or preferred in 33% of all job postings. 67% of all job postings did not mention PMP certification therefore our response rate for PMP certification is

33%. The job postings that required or preferred PMP certification were more or less equally distributed among the four regions.

The category of pay with the highest demand for PMP certification is between \$90,000 to \$109,000, which is 8.45% of all the jobs that require or prefer PMP certification. However the response rate for salary is very low at only 22.5% of all jobs, so the 8.45% of jobs that require or prefer PMP certification and pay between \$90,000 and \$109,000 appear low because salary response rate is low.

22.5% of job postings mentioned salary or compensation, so the response for salary was 22.5%, which is low. The most often mentioned pay for an IT Project Manager was between \$90,000 to \$109,000; which was 28.41% of job postings that mentioned pay. Table 11 lists the salary ranges, with their corresponding occurrences as a number and percentage of job postings that mentioned pay.

Salary	Amount	% of Responses for Ads with Salaries
110,000 to 129,000	9	10.23 %
130,000 to 149,000	2	2.27 %
150,000 to 179,000	1	1.14 %
30,000 to 49,000	5	5.68 %
50,000 to 69,000	13	14.77 %
70,000 to 89,000	30	34.09 %
90,000 to 109,000	25	28.41 %
above 200,000	3	3.41 %
Sum	88	100 %

Table 11: Salary Range

With regard to the four regions we noticed differences in the pay. The West is the region with the best pay, it is leading in the category of pay above \$200,000, \$150,000 to \$179,000, \$130,000 to \$149,000 and \$110,000 to \$129,000 with 2.24%, 1.14%, 1.14%, and 4.55% of job postings that mentioned pay respectively. The categories of \$70,000 to \$89,000 and \$90,000 to \$109,000 are equally distributed in the four regions. The south dominates the category of pay between \$30,000 to \$49,000 and \$50,000 to \$69,000 with 2.27% and 7.95% of job postings that mentioned pay respectively.

We categorized database software, programming, system analysis, networking, enterprise resource planning and operating systems as technical skills. Table 12 lists technical skills with their corresponding occurrences as a number and percentage of all job postings.

Skills	Amount	Respond Rate
Operating System	55	14.07 %
Database	101	25.83 %
Programming	80	20.46 %
System Analysis	125	31.97 %
Networking	41	10.49 %
ERP	64	16.37 %

Table 12: Technical Skills And Their Response Rate

According to Table 12 System Analysis skills are the most important technical skills for an IT Project Manager followed by Database and Programming skills with 31.97%, 25.83% and 20.46% of all job postings, respectively. The most mentioned Database Engine is MS SQL (38 counts) followed by Oracle (26 counts). The most mentioned programming language is Java (19 counts) followed by C# (9 counts) and Visual Basic (8 counts). Because technical skills were only demanded within 10.49% to 31.97% of all job postings, we could infer that technical skills are not critical for IT Project Managers. Technical skills were more or less equally distributed in the four regions.

We categorized Presentation, Communications, leadership and Project Management Software as business skills. Table 13 lists business skills with their corresponding occurrences as a number and percentage of all job postings.

Skills	Amount	Respond Rate
Presentation & Communication	91	23.27 %
Team leader	143	36.57 %
Project Software	169	43.22 %

Table 13: Business Skills and Their Response Rate

Within the project management Software category Microsoft Project is the most demanded Project Management Software with 159 counts (40.66% Response rate). MS Project is followed by Oracle Projects with 6 counts (1.53% Response rate). Business skills are in general much more frequently demanded than technical skills with lowest demanded business skill at 23.2% to the highest demanded business skill at 43.22% of all job postings. Business skills are more or less equally distributed in all four regions.

We categorized office software as general skills. According to our data Microsoft Office is most demanded software product in the Office Software category with 39.38% of all job postings. Besides Microsoft Office there was just one mention of general office program skills. The general skills are more or less equally distributed in the four regions.

Limitations

A limitation of this study is that the data collection was limited to job listings in the United States on Monster.com. According to Lee & Lee “iLogos Research reports that 81% of Fortune 500 companies announce their job offerings on their corporate Web sites. The number of jobs on all of the Fortune 500 Web sites is estimated to be three times greater than the online job boards, such as Monster and Hotjobs” (Lee & Lee, 2006). Another limitation is the inconsistency of job descriptions, even with a “header field” on the Monster.com Website. Some employers chose to adhere to the use of the Monster “header field” completely, while others only posted partial information, and others used the “header field” trivially. Another potential limitation is that large corporations may enter a budget cycle and “flood” the listings and skew the data at a particular time. It is also possible that some employers use a vehicle such as Monster.com to screen applicants and the detailed requirements are discussed in another venue such as a phone interview.

Conclusions

The major conclusions of our study are that IT Program Management job opportunities are equally distributed across the 4 regions of the United States. The division with most IT Program Management job opportunities is the Pacific, and the State of California contributes to this with the highest IT Program Management job opportunity count. New York City has the most IT Program Management job opportunities of any American City. The industry with the most IT Program Management job opportunities is the IT industry. A Bachelor's degree is the sole educational requirement (if mentioned) nearly all of the time. The most common requirement for relevant experience is 4 to 6 years, but the most promising region for prospective employees with 3 or less years of experience is the Northeast. Most positions are full time, employee positions. The demand for PMP certification is small, but higher within the salary category of \$90,000 to \$109,000. The most common salary for IT Program Managers is \$70,000 to \$89,000. Among technical skills, systems analysis skills were the most demanded at 125 counts. Among business skills, proficiency in project software led the way with 169 counts, followed by Team Leadership skills at 143 counts.

Implications

A recent Baccalaureate graduate may need to relocate in order to pursue a career in IT Program Management, but job opportunities exist in all regions of the United States. After 4 years of experience, the IT Program Manager will enjoy greatly enhanced opportunities. PMP certification is not a requirement, but systems analysis, and project management software skills likely are.

Future Studies

This study did not begin with a hypothesis. A future study could use this data in order to test a hypothesis. There was little correlation analysis applied to the data. A future study could more completely discover relationships between the data. A future study could gather data on Monster.com and report on the trends observed. This data could be compared to data gathered on other job sites and any differences noted could constitute new knowledge.

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