 

# A Survey of Construction Management Programs: Publications, Expectations and Compensation

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To-date there has been no comprehensive study of construction management programs regarding how programs self-identify themselves (residential, commercial and/or infrastructure), their faculty and tenure requirements in terms of conferences, proceedings and publications including acceptable (target) journals, salaries for both students and faculty, and the most popular research areas within the field of construction and construction management. To bridge this gap, a survey of 139 construction management programs was conducted. To be comprehensive engineering, technical and non-technical programs that teach construction management were included. 81 programs responded to the survey for a response rate of 58%. Findings included 1) that energy, sustainability, BIM, technology and materials are perceived as the hottest research areas, 2) that the majority of programs are flexible as to where articles get published, and 3) that while publication requirements make little difference for undergraduate salaries, they impact graduate salaries and salaries for assistant, associate and full professors.

**Keywords:** Survey, Construction, Expectations

## Introduction

Construction management programs are housed in multiple schools. While originally housed in civil engineering programs, CM programs have expanded and can be found in engineering, construction management, technical and non-technical schools including business schools as well as stand-alone programs. This has not only changed the focus of many programs but expanded the breadth of programs to include residential, commercial and infrastructure. The resulting expansion of these programs has correspondingly resulted in broad differences in the types of teaching approaches that are now available in the CM area and the type of faculty who are engaged in this domain. From pure teaching programs to Tier 1 research programs, CM now encompasses programs at all types of universities. This expansion has also been accompanied by the emergence of different requirements and expectations of faculty members in terms of research and teaching. The focus of this paper is to examine these differences with the objective of offering some insight as to how these differences manifest themselves as related to publication outlets, expectations and compensation. In order to achieve this objective, the study incorporated a survey methodology with the population being the broad domain of CM programs in the United States. It is intended that the results from this study will enable students, faculty, and industry professionals to discuss appropriate processes for differentiating these programs, not only at the PhD level, but also at BS and MS levels. Finally, the study provides insights into how the different emphases of the programs might influence student salaries and publication levels.

## Literature Review

Construction is an essential industry in every country and accounts for a significant component of most countries' Gross Domestic Product (GDP). Society depends on the construction industry to build residential housing, commercial and industrial facilities, and civil infrastructure for public and private needs (Russell et al, 2007). Construction Engineering and Management (CEM) educational history closely followed the development of the construction industry as an economic powerhouse, both in the US and elsewhere (Chinowsky & Diekmann, 2004). CEM programs developed within civil engineering programs before branching out to other engineering, technical and non-technical schools, including business schools. While one could argue the merits of CEM programs versus CM programs (or vice versus), this is outside the scope of this survey and paper. This survey and paper is simply focused on construction education as a whole. Many universities began offering undergraduate construction education programs in the post World War II era. According to Ledbetter (1985), the growth of the construction management community as an independent academic discipline occurred because; 1) the need to be recognized as a discipline and 2) to survive and develop as an independent academic field of study.

In recent years, numerous attempts have been made to study the field of construction management with the intent of providing a basis for comparing or evaluating the programs. Examples of these studies include surveys attempting to compare graduate CM programs' curriculum to industry needs in Oberlander & Hughes (1987) and Gunderson & Gloeckner, 2007). Similar surveys have been used to compare graduate and undergraduate construction programs (Oberlander & Hughes, 1987 and Lee et al, 2013), perceptions on ethics within the industry (Jackson & Murphy, 1998), prepare students for globalization (Kiisk, 1998) and green building technologies using building information modeling (BIM) (Kim & Shim, 2011), and the role of BIM in teaching CM students (Gier, 2008). Surveys have also examined the role of women in the construction industry (Dainty et al, 2000a and 2000b) and the barriers to women in construction management programs as well as the role and cost of making residential buildings green and the impact of this on climate change (Sewalk & Throupe, 2013). This approach was also used to compare tenure and promotion between construction management and civil engineering (Ciesielski, 2000), propose a ranking system for construction management programs (Badger & Smith, 2007). The breadth of these topics is extensive because construction and construction management have succeeded in developing as a unique research field, leading to research comparing tenure and promotion between civil engineering and construction management (Ciesielski, 2000)

In summary, surveys of construction programs have been accepted as a methodology to assist in bringing potential issues to light and how issues have been resolved.

## Purpose

There were multiple purposes for this survey as the 20 questions asked covered programs, professors and students. Several of the survey questions appear to have not been previously asked, among them numbers of articles for tenure, combined with student and professor salaries, and the most relevant areas of research in construction and construction management as perceived by program directors.

Many times a candidate will finish a PhD program and wonder where to go based on their interests to teach and research and the areas to research. A student may wonder which program to attend, which program might have the highest return on investment or starting salary? Directors or researchers may wonder what areas of research are considered "hot" within the field. The objective of this study was to answer these questions with a detailed questionnaire and investigate whether required levels of publications have an impact on student and professor salaries.

## Methodology

Questionnaires were sent by email to 139 Construction Management programs. The primary criteria in selecting a program was that it led to a degree or concentration/specialization in Construction Management, regardless of where the program was housed. The survey, conducted online, asked the program director of the school to self-identify the

university in order that no duplicates occur. If a director did not respond to the survey, a second email was sent, followed by a third. Senior faculty were identified and contacted if a director failed to reply after the third try. As a result, 102 responses were received, with 17 programs failing to identify the university. Using IP addresses, duplicate responses were eliminated to end with a final pool of 81 programs representing a 58% response rate. The survey was conducted during the Fall Semester of 2013.

## Findings

The survey consisted of 20 questions, a few of which had multiple subsections. The current section summarizes the findings and highlights potential issues for further study.

**Q1. Does your Construction program focus on residential, commercial or infrastructure?**

Three focus sectors were identified as core areas within construction; residential (home building), commercial (apartments, office, shopping) and infrastructure (heavy civil). Eighty-one programs responded and self-identified themselves as presented in Figure 1.

| FOCUS AREAS | # of Programs (Self-Identified) |
|---|---|
| Offered a Single Focus Area | |
| Residential | 6 |
| Commercial | 36 |
| Infrastructure | 5 |
| Offered a Combined Area of Focus | |
| Residential & Commercial | 6 |
| Commercial & Infrastructure | 14 |
| Residential, Commercial & Infrastructure | 14 |
| Total Number of Programs Responding | 81 |

Figure 1: Programs Self-Identifying in Focus Area(s)

**Q2. Do you offer a PhD in Construction Management (compared to a PhD in another field with an emphasis in Construction Management)?**

Of the 81 programs that replied 13 responded that they offer a PhD with a concentration in Construction Management. 16% of the respondents therefore offer a PhD in construction management.

**Q3. Is Your PhD Program technical/engineering?**

Further, an aim of the survey was to determine if the PhD offered was housed either in a technical or engineering program. Of the 81 programs, 18 responded that they offer a PhD through a technical/engineering program, 22% of programs.

 

**Q4. How Many PhD Students?**

Of the 13 programs that indicated that they offered a PhD with a concentration in Construction Management, 12 replied indicating that they have students currently pursuing a PhD with enrollments ranging from 1 to 8 for a total of 30 students with an average enrollment of 2.5.

**Q5. Do you offer a Masters in Construction Management?**

Of the 81 programs that responded, 31 programs (38.3%) replied that they offer a MS with a major or concentration in CM.

**Q6. Please indicate the number of full-time tenure track faculty that teaches construction and construction management.**

For this question 80 programs responded. Fourteen programs responded that they have a single tenure track professor and five programs had more than 10 professors. This resulted in an average of 3.33 tenure track professors per academic program. This is presented in Figure 2.

| Number of Tenure Track Professors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 10+ |
| Number of Academic Programs | | | | | | | | | | | |
| 4 | 14 | 15 | 8 | 14 | 6 | 6 | 4 | 2 | 0 | 2 | 5 |

Figure 2: Programs and Number of Tenured/Tenure Track Professors

**Q7. How many of your full-time, tenure track faculty that teaches construction management has a PhD?**

Seventy-five of the programs replied to this question with an average of 2.29 professors having PhD's. This identified 171 professors as having a PhD. See Figure 3.

**Q8a. In reference to question 6 and 7, of those who have a PhD, how many of these are Engineering?**

**Q8b. In reference to question 6 and 7, of those who have a PhD, how many of these are Technical but not Engineering?**

**Q8c. In reference to question 6 and 7, of those who have a PhD, how many of these are non-technical, non-engineering?**

Seventy of the programs replied to Q8a, with 52 programs reporting to have 112 professors with a PhD in Engineering, an average of 1.60 professors per program. Twenty-eight programs replied to Q8b and identified 49 professors with a technical PhD, an average of 1.75 professors per program. And 14 programs replied to Q8c that they had 1 or more professors with a non-technical, non-engineering PhD, accounting for 15 professors, for an average of 1.07 professors per program. See Figure 3.

| Professors w/ PhD | | Professors w/ Engineering PhD | | Professors w/ Technical PhD | | Professors w/ Non-Technical PhD | |
|---|---|---|---|---|---|---|---|
| Number of Professors | Number of Programs | Number of Professors | Number of Programs | Number of Professors | Number of Programs | Number of Professors | Number of Programs |
| 0 | 19 | 0 | 18 | | | | |
| 1 | 13 | 1 | 23 | 1 | 15 | 1 | 13 |
| 2 | 12 | 2 | 12 | 2 | 6 | 2 | 1 |
| 3 | 11 | 3 | 8 | 3 | 6 | | |
| 4 | 8 | 4 | 6 | 4 | 1 | | |
| 5 | 7 | 5 | 2 | | | | |
| 6 | 2 | 6 | 0 | | | | |
| 7 | 2 | 7 | 1 | | | | |
| 8 | 0 | | | | | | |
| 9 | 1 | | | | | | |
| Avg. = 2.29 | Total = 75 | Avg. = 1.60 | Total = 70 | Avg. = 1.75 | Total = 28 | Avg. = 1.07 | Total = 14 |

Figure 3: Number of Professors with PhDs of Different Types

**Q9. Does your department/school have a "target" journal list?**

Of the 81 programs responding, only 8 (9.9%) noted that they have a target journal list. Of these, seven noted that they allow assistant professors to modify the list to reflect their research interests. Only one program reported not modifying the list, this was the Burns School of Real Estate and Construction Management, and this may be because of a combined target journal list covering interests of both the real estate and construction faculty.

**Q10. How many journal publications do you require…**

**Q11. How many conference proceedings/publications do you require…**

**Q12. How many conference presentations do you require…**

**…of your Assistant Professors for them to become tenured?**

The answers for the next three questions are combined given that the answers provided were uniformly the same for all of the universities that answered. Fifty-six programs replied to this question. Of those 33 (59%) require from 0-5 journal publications, proceedings and presentations for tenure, which corresponds to between zero and one publication, one conference presentation and one proceeding per academic year. Eleven programs replied 11 (20%) that they require from 6-9 journals publications, proceedings and presentations for tenure, an average of between 1 and 1.5 publications, proceedings and conference presentations per year. The remaining 12 (21%) require 10+ journal publications, proceedings and conference presentations for tenure. While this works out to more than 1.5 publications, presentations and proceedings per year, these programs identified that for tenure success it is safer to be at two or more per year for each activity.

**Q13. With regards to research occurring in the area of Construction and Construction Management, please rank from HOT (5) to COLD (1) each of the key words based on your faculty's research interests. We are trying to ascertain the HOTTEST areas of research within Construction and Construction Management.**

Using first place votes, Energy, Sustainability and BIM (in this order) received the highest number of votes for the popular areas of research, while BIM, Technology and IPD (in this order) received the highest number of second place votes. Based on a weighted average, the rank ordering of the areas reported and their rankings are: Energy (3.39), Sustainability (3.31), Building Information Modeling (3.28), Technology (3.20), Materials (3.17), Project Execution (3.11), Integrated Project Delivery (3.06), Project Planning/Design (3.00), Project Development (2.95), Education/Research (2.86), Construction Law (2.73), and Enterprise Forces (2.35).

Responders also added additional fields of research that they believe are important to the field of construction management. This shows that the research within construction management is vibrant and growing and encompasses diverse interests that are very important for the built environment.

Other areas of research interest identified in the survey were: 1) Lean Construction, 2) Human Resource Management, 3) Smart Buildings (Integrated sensors), 4) Wood Engineering, 5) Optimization, 6) Life-Cycle Analysis, 7) Project Management (including web-based decision support), 8) Automation and Robotics for Construction, 9) Scheduling, 10) Cost Estimating, 11) Site Logistics, 12) Site Safety, 13) Safety and Health, 14) Sustainability in Developing Countries, and 15) Innovation.

**Q14. Please indicate by checking the following journals if you would prefer / accept them to count towards Tenure / Target Journal List for your Assistant Professors.**

Question 14 was initially phrased a as which Journals would not be accepted towards tenure. This was subsequently changed to ask in the positive way which journals would be preferred as publication outlets based on feedback received by the responders. Surprisingly of the 23 selections listed, all were above 83.5% and 21 were above 90.6%. In the majority of cases, construction management programs are flexible and encourage research in general with a bent towards accommodating the individual's area of research. The preference is for journals with impact factors to enhance the likelihood that others will reference the articles as the research topics are further developed. (Note: List of journals is omitted due to the page length restriction but is available from the authors upon request.)

**Q15. Please fill in the average salary for your students who complete a BS in Construction Management.**

Of the 55 programs responding, salaries ranged from $31,280 to $70,000, with an average of $51,690 and a median of $51,750. The salary range was larger than expected but could be an important indicator of program quality or program location.

**Q16. Please fill in the average salary for your students who complete a MS in Construction Management.**

Of the 22 programs responding, salaries ranged from $40,800 to $80,000, with an average of $59,222 and median of $59,000.

**Q17. Please fill in the average salary for hiring an Assistant Professor (no prior experience)**

Fifty programs replied with an average salary of $65,412. The salary range was from $40,000 to $90,000 with a median of $65,000. The range increased to $120,000 for an Assistant Professor with prior industry and teaching experience.

 

**Q18. Average salary for an Associate Professor.**

Forty-eight programs replied with an average salary of $77,526. The salary range was from $50,000 to $127,500 with a median of $75,000.

**Q19. Average salary for a Full Professor.**

Forty-five programs replied with an average salary of $97,694. The salary range was from $65,000 to $200,000 with a median of $91,000.

**Q20. In this paper, may we identify your program by name?**

Of the 81 programs included in this study, 56 (69.1%) provided their names. Of these, 26 (46.4%) responded that they could be identified in public forums while 30 programs asked that they not be identified publically.

## Discussion

One aim of the survey was to investigate what impact, if any, research (as evidenced by publications) appears to have on student salaries and on professor salaries according to the information reported.

Figures 3 & 4 present the BS Salary and MS Salary for students. It was reported that students with a BS receive an average starting salary of $51,690. Professor research does not appear to make a difference in salary levels for entry-level employment from undergraduate programs. However, programs that had the highest requirements for tenure-track professors showed the largest range of salaries. As research does not make a difference with regards to salary, future research might examine what types of jobs BS graduates take that results in the salary difference.

Graduates from master level programs reported an average starting salary of $59,222 or $7,662 more (14.8%) than the undergraduate starting salary of $51,690. Additionally, it appears that faculty research does have an impact on the graduates starting salary. As faculty research and publications increased so did the starting salaries. Quantified, MS students benefited from research to the tune of $288.69 per faculty publication.

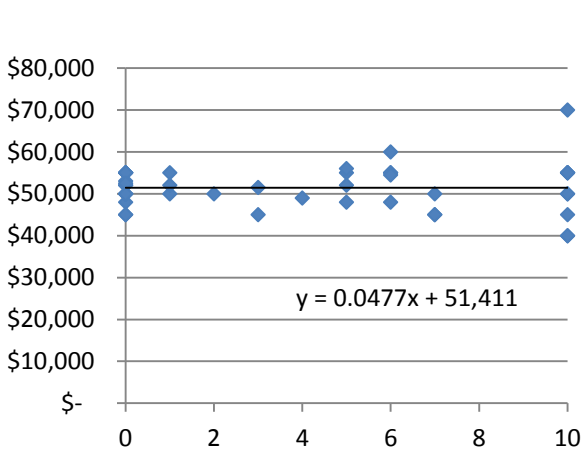


Figure 3: BS Salary vs. Expected Pubs

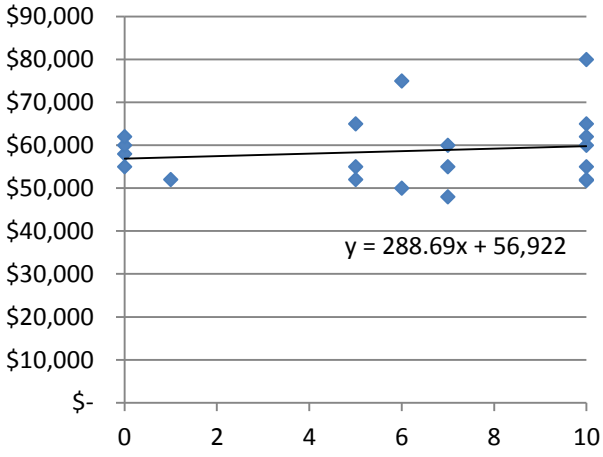


Figure 4: MS Salary vs. Expected Pubs

Data gathered indicates that tenure-track and tenured professor salaries, at each level, vary proportionately with the number of publications expected by the institution. The more publications expected, the higher the salary. The data received and trend lines generated indicate that the average salary for an assistant professor is a base of approximately $59,734 with an additional $1,487 per expected publication. Given the publications are expected and not actual, it makes sense that the rewards increase for a professor getting tenured and promoted. Associate professors reported an average salary of $69,205, plus an additional $1,637 per expected publication. The average for full professors was reported as $84,480 with an additional $3,288 for each expected publication.

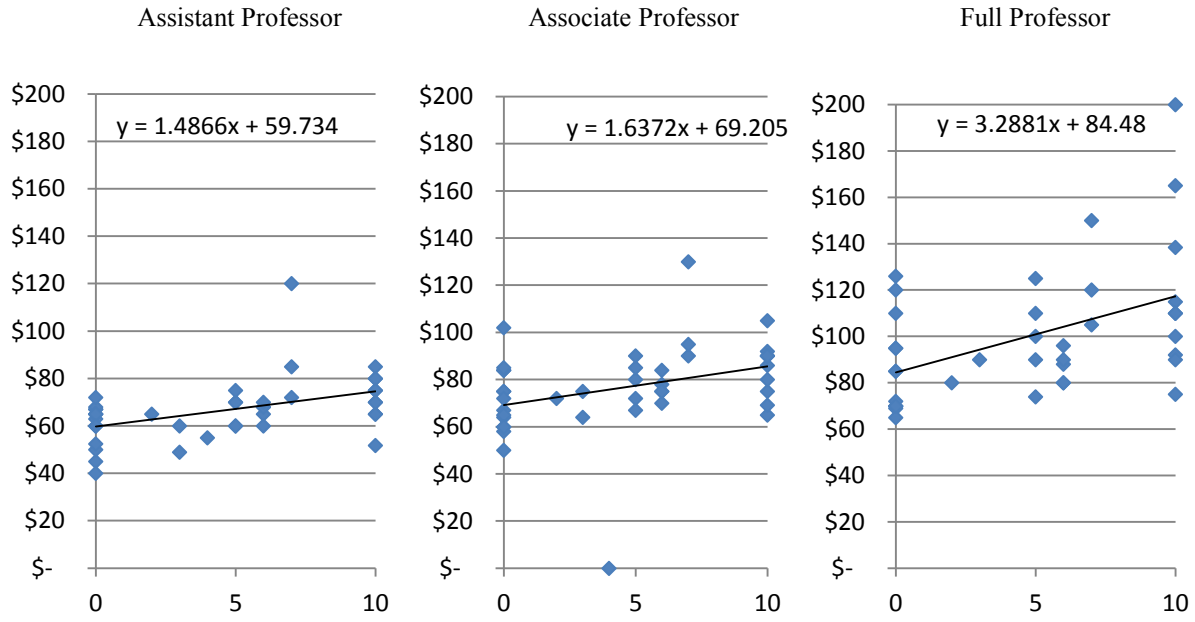


Figure 5: Assistant, Associate and Full Professor Salary vs. Expected Pubs for Tenure

## Conclusion

Understanding the relationship between faculty research and salaries, both for students and professors is an important measurement and will help guide faculty and program directors in determining where their program fits and how to potentially involve students in faculty research. More detail as to both student and professor salaries as well as the research produced by professors is in order to ascertain if it is volume of publications or a combination of quality of those publications along with quantity that impact salaries. It is reasonable that professor research would impact graduate student salary due to many programs encouraging student research and professors having more flexibility in coursework to instruct students on the latest materials within the field. As is often the case, this survey and research led to other unanswered questions. Would it be a worthwhile approach to expand this to the undergraduate curriculum, or allow undergrads an opportunity to contribute to the research? Do programs need to incorporate a greater research component? Does it make a difference if the faculty member has a PhD in engineering, technical or non-technical field in terms of research publications and salary, and can this be changed solely by greater efforts to publish?

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