

Analysis of the Need for Skilled Workers in
the Construction Industry

by

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ABSTRACT

The need for skilled workers in the construction industry is critical now and in future years. With 'baby boomers' nearing retirement this need is magnified. A surge of recruiting and developing youth and non-traditional labor pools has begun in pursuit of these workers. However, the current trend will not be sufficient to supply the United States with enough skilled workers. Sixty-six percent of the employees currently in the construction industry will be retiring within the next 20 years. The focus of this research is to identify the current trends and recommend additional steps that need to be taken. This study provides solutions to the challenge of maintaining an adequate supply of skilled workers in the construction industry.

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Chapter I: Introduction

The construction industry today is one of the most dynamic and growing industries in the United States. It provides an abundance of jobs due to its current growth rate and broad scope of employment. Like every growing and complex industry, there are some major issues that demand immediate attention. One major issue involves the quickly approaching *baby boomer* retirement era. As the *baby boomers* begin to retire, many high skill level and executive management positions in the industry will need to be filled. Currently, these positions are of great significance due to the experience level of most future retirees. This creates an immediate need for training and development programs to be implemented. Current measures in technical schools and universities are being taken but more must be done to produce the skilled workers required.

An excerpt from a book written by John Bennett titled, *International Construction Management* (1991) states that,

“...experienced professionals may be appointed to concentrate on the difficult task of creating an original design. Experienced professionals can be appointed to concentrate on the equally difficult task of managing the manufacture and construction of a prototype. The knowledge and skills needed for these distinct tasks tend not to coexist with equal levels of brilliance in single firms. Wise customers, embarking on the unpredictable business of buying innovative projects, ensure that they have independent advice both from an experienced designer and from an equally competent construction manager.”

Bennett’s comments clearly state that construction projects are extremely dynamic and require highly experienced professionals to effectively and efficiently solve problems with their relevant experience. Excellence, experience, and competence can

only stem from an immediate implementation of expanding the pipeline of youth and providing them with the necessary knowledge, skills, and abilities (U.S. Bureau of Labor Statistics, 2006b). This research study pertains to the current needs in the construction industry and a 10-year industry outlook. Finally, this research identifies the vast number of job openings and provides solutions on how to place skilled workers in these positions.

“Many high schools have started four-year programs that have freshmen working in the labs on rough carpentry, plumbing and electrical work. The juniors and seniors get to leave the school to actually build houses... the class emphasizes three things: quality workmanship, showing up to work on time, and learning to communicate on the work site (Ryan, 2007).”

The amount of construction management oriented programs at two or four-year colleges have been growing recently. Many of the educational institutions are aware that there exists a high demand for construction managers and field personnel. A few years ago, there were close to 130 universities that offered construction management oriented programs (*Technical schools guide*, 2007). Excellent employment opportunities for construction managers are expected through 2014 because the number of job openings will exceed the number of qualified individuals seeking to enter the occupation (U.S. Bureau of Labor Statistics, 2007). This situation is expected to continue even as college construction management programs expand to meet the current high demand for graduates.

Statement of the Problem

The problem facing the construction industry now and in the near future is the shortage of skilled workers, including both managers and skilled field workers. With the *baby boomers* nearing retirement and the growth rate of the construction industry, a large

gap will develop. Ten years from 2007, 1/3 of the current workers in the construction industry will be retired (U.S. Social Security Administration, 2007). Twenty years from 2007, another 1/3 of construction workers will retire (U.S. Bureau of Labor Statistics, 2007). This means that 66% of all construction jobs that are currently filled will be open. How will these open positions be filled?

Purpose of the Study

This study will raise awareness of the labor shortage that the construction industry faces. With the number of anticipated retirees and the overall growth of the industry, immediate action must be taken. One practical solution may include the successful integration of new software and methods that will allow less experienced workers to fill needed positions in a more timely manner. Another practical solution would be for educational institutions to focus on the awareness of construction jobs, growth, and dynamics of the industry, potentially leading to an increased interest in field positions. The Department of Labor has recently met with many construction industry officials and identified some plausible solutions. These solutions include:

1. Expanding the pipeline of youth entering the construction industry
by enhancing the capacity of secondary schools to prepare youth to enter post-secondary programs and employment in the construction industry
2. Providing a career lattice approach to the recruitment, education, training, professional development, and job placement of construction workers
3. Helping alternative labor pools, such as women, learn about career opportunities and gain the skills needed in the construction industry
4. Enhancing the capacity of community colleges and the public workforce system to help alternative labor pools enter the industry

developing accelerated training programs that help dislocated workers quickly enter the construction industry

5. Creating comprehensive partnerships that help entry-level workers enhance their skills and utilize apprenticeship and other training programs (U.S. Bureau of Labor Statistics 2007c)

Assumptions of the Study

The assumptions of the study include the following:

1. There are no technological advancements that will eliminate a significant amount of jobs in the construction industry.
2. Positive influences on students in educational institutions will stir interest in more hands-on training opportunities offered at all levels.
3. There will be ample budgets and grants distributed within technical colleges and universities to supply the proper equipment and technology for training students effectively.
4. The retirement age is between 66 and 67 years of age for the calculations performed in this research. Table 3 shows the ages when full Social Security benefits may be received and will be used for future retirement projections.
5. The current demand for construction professionals is going to remain constant.
6. The implementation of new training courses and degree programs will fill to capacity due to the industry's expected growth and demand for skilled workers.

Definition of Terms

Apprentice. "A person who is learning a skill or trade from more experienced craftsmen while at work" (All Business, 2007).

Baby boomers. “The Baby Boom generation includes persons born in certain countries after the end of WWII (1945) but before the end of 1964” (Webster’s, 2007b, para. 4).

Construction Manager. “One who organizes construction work and directs its completion through the services of others” (Webster’s, 2007d, para. 4).

Green. “Green buildings produce less waste, use less energy, less water and fewer natural resources. They offer better air quality for the tenants living inside and may include energy-efficient appliances, water efficient faucets, better ductworks and air filtration systems or low-emissivity windows” (Alsever, 2007).

Incumbent workers. “Workers currently holding an office” (Webster’s, 2007e, para. 4).

Trade. “One of or all the occupations of tradesmen/craftsmen in building” (Webster’s, 2007a, para. 4).

Limitations of the Study

The following describe the limitations of the study:

1. Not implementing the use of a survey instrument may have hindered the incorporation of some original ideas for training and solving the industry’s challenges.
2. The review of literature focused on companies and departments solely based in the United States. If another study were to take place, one may consider an international study of the industry.
3. The assumption that the need for construction professionals will stay constant may not be realistic due to technological advances and the nature of the fast pace of change within the industry.

4. Two-thirds of all Social Security recipients currently choose to receive benefits prior to the full benefit period cutoff. This statistic may not remain constant with time.

Methodology

This research identifies how institutions (public and private) and corporations should fill the need for skilled workers within the construction industry. The literature review discusses the solutions currently underway and identifies key points of each action to be considered. The research was modeled after historical research design. The United States Census Bureau was utilized extensively to provide employment statistics and projections related to the industry.

Chapter II: Literature Review

The construction industry faces a large shortage of skilled workers over the next 20 years. A large number of *baby boomers* are turning 50 this year (Nugent, 2007). Solutions currently in place include an enhancement of the image of the industry to individuals from a variety of backgrounds including youth, parents, guidance counselors, and educators by improving skill requirements, safety practices, and visualization of career ladders. Improving and increasing recruitment will be another factor in the filling of this shortage. Focus will be aimed at recruiting youth, non-traditional, and traditional labor pools. Skill development and education will be high priority concerning all youth entering the industry as well as entry-level workers. *Incumbent workers* in the running for a promotion will also require the knowledge, skills, and abilities developed prior to entering the higher level and more demanding roles within companies (U.S. Bureau of Labor Statistics, 2006).

Enhancement of the Image

The construction industry today is viewed as unsafe, dangerous, male-dominated, environmentally insensitive, and supportive of poor working practices (Fielden, Davidson, Gale, & Davey, 2001). A recent focus group touched on this descriptive image and made the following conclusion that the image and reputation of the construction industry deters both young men and women from considering such a career. The problem surrounding the industry's image is compounded by the poor quality of information provided by career advisers with regard to the opportunities available within the industry and the required qualifications. This issue stems from the lack of knowledge and dealings with high school and junior high school faculty.

Skills to Build America's Future is one such initiative reaching out to involve governors, state legislatures, kindergarten through 12th grade schools, community colleges, the national workforce investment system, national television and public radio service campaigns (U.S. Bureau of Labor Statistics, 2006a). This initiative features the promotion of the skilled trades. The initiative focuses to build awareness of the integral importance each skilled worker plays in the economy and to spread the message that careers within the industry are plentiful, lucrative, and fulfilling (U.S. Bureau of Labor Statistics, 2006a). With such initiatives in place, many high schools are developing *apprenticeship* programs and co-ops to involve and increase awareness of the many options upon graduation (O'Reilly, 2003). More and more high school construction academies are being developed and immersing students as early as the freshmen year. With these programs, many of the students that continue through their junior year end up pursuing a skilled trade, 2-year degree, or 4-year degree related to the industry (McClain, 2007).

Recruitment

The recruitment of individuals at the immediate placement level is a large undertaking (Chandler, 2005). It is necessary to have well defined needs for the positions prior to the selection of workers. This well defined position provides immediate expectations and standards one must meet or exceed. An accumulation of several years of informal O.J.T., (on-the-job training), is a very large factor when looking for qualified individuals. Many prerequisites to entering the industry are mathematics, mechanical drawing, and woodworking (U.S. Bureau of Labor Statistics, 2006b). As more and more skilled laborers are needed, more and more labor unions are teaming up with high schools to develop workshops and small training programs. Their purpose for such workshops is

to provide a glance at the industry and develop a connection for filling their needs. The programs that have been described have developed into *apprenticeship* courses that are offered at many high schools twice a year. When these programs are delivered effectively, they have the potential to be a very good recruiting method. These programs provide the ability for both the company and the individual to “test the waters” before filling a position. It provides the company a preview of the employee and also a chance for the employee to see if the position is a good fit. The following quote exemplifies the impact a young man had during his internship in an organization: "Ray can stay with me as long as he likes. He was willing to work hard and learn and use common sense - which is something you need in this business" (O'Reilly, 2003).

When filling management roles within construction organizations, an associate's degree or bachelor's degree is a necessity (Hainsfurther, 2007). Associations such as the Association of General Contractors, National Association of Home Builders and many more have taken it upon themselves to offer training courses. Such courses include construction leadership as well as many opportunities to engage in competitions between universities. These competitions provide for an intense opportunity for associate and bachelor degree seekers to jump into the profession and showcase their abilities to many companies. Competition experiences offer a great window of opportunity for students to be seen by employers that are in need of aspiring workers of the near future (Levy, 2006).

Programs that involve the recruiting and training of war veterans have been a targeting tool recently implemented (Avalos, 2006). At specific training centers, 42-month programs are available that focus largely on joint apprenticeship training programs. These programs provide returning soldiers a new start and a strong launch into the construction industry with some very important, immediately applicable knowledge.

Skill Development and Education

There is a large amount of education and training required for one to be successful entering into the industry. Without the credentials necessary to support the construction industry, there will be a large pool of willing applicants, but few qualified for the work. Knowledge required at all entry level construction positions include math, language, and excellent communication requirements. In addition to these requirements, there must be a strong work ethic due to the size and complexity of projects.

Many programs at the high school and university levels are under constant industry supervision (Gallaspy, 2007). There are many advisory boards in place that are an integral part of each program. These advisory boards provide direction in maintaining curriculum up to date with the new practices and technologies that are utilized in the field today. These boards are represented primarily by the leadership team among the involved construction organizations and typically encourage companies involved to develop 3 to 6-month internship programs to provide students with the actual field experience prior to graduation.

Summary

The industry has many challenges. Two of the top five challenges facing the construction industry in 2006 included a shortage of trained field help and a shortage of trained project managers (Tulacz, 2006). The Construction Financial Management Association's 2007 Industry's Financial Survey supported the 2006 data. Again, two of the top five challenges include a shortage of trained field help and a shortage of trained project managers (Ellis, 2007). If the image of the industry improved, an increased attraction would supply some amount of the needed workers. If the industry provided a sufficient amount of workers, there would be less of a need to create programs informing prospects about the industry. The focus of the industry's hiring needs to shift from finding any suitable applicant to selecting the best and possibly overqualified applicant. There is a significant need for a continued effort among those in the industry to take responsibility for the future. Each company needs to devote effort in building relationships with high schools, vocational schools, universities, as well as the military and other professions.

Chapter III: Methodology

The process that was used to define ways of filling the future need of skilled and unskilled workers in the construction industry was to review and analyze literature relating directly to the number of workers within the industry. Forecasted numbers provided by various agencies also aided the determination of how many workers will be needed. The need for workers will be caused by the *baby boomers* retiring, immigration declining, and the continued growth of the industry (Dohm, 2000). This chapter is organized to show the selection of literature reviewed, data analyzed, and the data interpretation.

Research Design

Isolation of the skills was modeled after historical research design. The collection of many primary and secondary sources was accomplished during this research. The source of the documents reviewed was validated through their publications. Accurate numbers and statements were composed and derived from the literature reviewed. Hypotheses and conclusions outlined in Chapter V were formed also with an exhaustive literature review determining the necessary actions for the construction industry. The findings will be reported in Chapter IV. These results will discuss the effects of immediate implementation.

Appreciative Inquiry (AI) is a major breakthrough in organization development, training and development, and in 'problem solving.' AI is based on the assertion that 'problems' are often the result of our own perspectives and perceptions of phenomena eg, if we look at a certain priority as a 'problem,' then we tend to constrain our ability to effectively address the priority and to continue to develop in our lives and work. AI is

a philosophy so a variety of models, tools and techniques can be derived from that philosophy. For example, one AI-based approach to strategic planning includes identification of our best times during the best situations in the past in an organization, wishing and thinking about what worked best then, visioning what we want in the future, and building from what worked best in order to work toward our vision. The approach has revolutionized many practices, including strategic planning and organization development. (McNamara, 2007).

This article implements the use of Appreciative Inquiry in its design providing direction for all construction organizations to follow. This research design was put in place in order to expand upon the already seen gap. The article attempts to encourage construction organizations to be a part of the solution. The design method was chosen to correlate directly with the purpose of the study in raising awareness of the issues that face the construction industry if the shortage of workers is not filled effectively. Another trend includes identifying key points for each action to be considered and immediately implemented.

Selection of Literature

The review of literature was done primarily through focusing on industry journals and United States labor statistics. Statistics of employment in the construction industry and age-related tables of those currently holding highly experienced positions were examined. The United States Census Bureau has provided employment statistics and many projections related to the construction industry. Textbooks relating to the industry and periodicals were also utilized. The statistics used provide an avenue to evaluate and project near future outcomes. This method substantiates the rising need for training in the

industry and also the need for skilled workers. This method defines the need for management staff ready to take over the executive positions and all skill needs that will be present.

Research Relatedness

The research was designed to draw upon reliable data records. Using this method, a researcher will have limited bias due to the sole method of interpretation using archival data. The design of a survey instrument may limit the researcher with a false expectation of the survey to be valid by all involved. The design was chosen in order to not place limitations on the experimenter with the subjects. This confines the possibility for interaction to sway any findings and provide ineffective data results. Ultimately, the most significant reason that this design was implemented was to direct data gathering and conclusions out of sight. Clear and accurate statements were in turn made regarding the data interpretations and conclusions.

Chapter IV: Results

The construction industry provides an abundance of jobs due to its current growth rate and scope of employment. The problem with *baby boomers* starting to retire is that it will present a large shortage of skills. The problem that the construction industry faces is the shortage of skilled workers, including both managers and skilled field workers. In ten years from now, one-third of workers currently in the industry will be retired, (Maryland Department of Labor, 2004) assuming that all workers at the age of 67 will retire (U.S. Social Security Administration, 2007) and that these retirees will be fully able to collect full Social Security benefits (Table 1). The research design was specifically aimed to isolate the problem by using historical research design. Further analysis and support for all the assumptions used will be developed through this chapter.

Table 1

Age to Receive Full Social Security Benefits

Year of Birth	Full Retirement Age
1937 or earlier	65
1938	65 and 2 months
1939	65 and 4 months
1940	65 and 6 months
1941	65 and 8 months
1942	65 and 10 months
1943-1954	66
1955	66 and 2 months
1956	66 and 4 months
1957	66 and 6 months
1958	66 and 8 months
1959	66 and 10 months
1960 and later	67

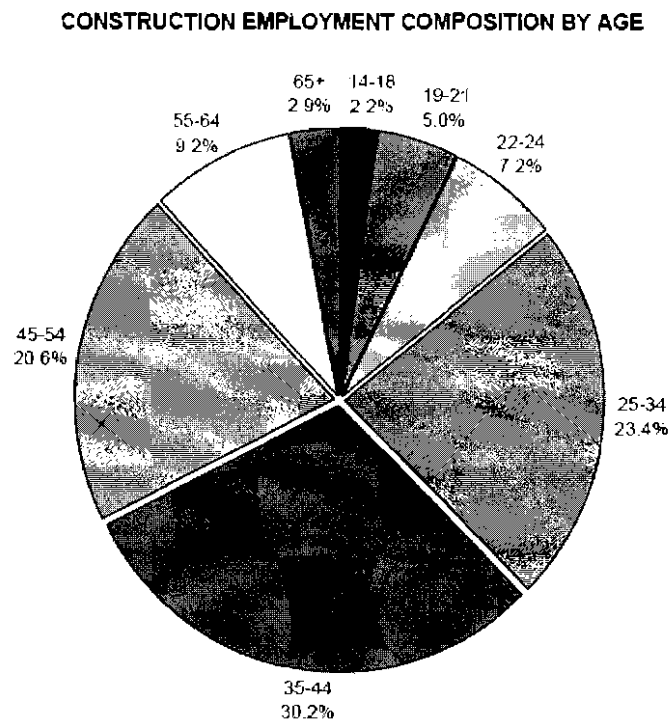
Source: United States Social Security Administration, 2007

Item Analysis

In the year 2027, two-thirds of the current construction workforce will have turned over (Maryland Department of Labor, 2004). This statistic indicates that potentially 66% of all construction jobs will be open. This number one demonstrated in Figure 1 below, which provides a glance of how low the numbers are for the younger generation's involvement within the industry. Nearly 66% of the workforce is over the age of 35. *Baby boomers* make up 33%, relating Figure 1 and the definition of *baby boomers*, of the workforce at present (Figure 1). These statistics point directly to the approaching of a large quantity of new position openings requiring a great deal of training and recruiting.

Figure 1

Number of Workers Listed by Age Employed in the United States Construction Industry



Source: Maryland Department of Labor, 2004

Figure 2 demonstrates the trend line indicating the steady growth of the industry and the number of employees at nearly eight million. These numbers are detailed in Table 2 by age grouping. This data provides the amount of projected openings in the construction industry. The number of construction workers projected to retire by 2027 is 2,530,653 using the Tables and Figures in this section. This assumes that they will retire at 67 years of age with full Social Security coverage. This number does not take into account early retirement and ‘slow retirement’ as workers develop more part-time positions to better fit their near-retirement lifestyle. This ‘slow retirement’ or early retirement has become increasingly more prevalent in the United States today.

Figure 2

Number of Workers Employed in the United States Construction Industry (Millions)



Source: U.S. Bureau of Labor Statistics, 2007

Table 2

*Number of Workers Listed by Age Employed in the United States Construction Industry
(Projection from 2004)*

Age	Percentage	Number of People
14-18	2%	170,258
19-21	5%	386,950
22-24	7%	557,208
25-34	23%	1,810,926
35-44	30%	2,337,178
45-54	20%	1,594,234
55-64	9%	711,988
65+	3%	224,431

Source: U.S. Bureau of Labor Statistics, 2007

Table 3

Average Annual Job Openings (Non-Exhaustive Table)

Title	Openings Per Year	% Growth Per Year	Requirements
Building Inspectors	10,000	13.8	Education/Training/Work Experience
Const. Managers	47,000	12	Education/Training/B.S. Degree
Carpenters	193,000	10.1	Education/Training/Long-term O.J.T.
Laborers	166,000	14.2	Education/Training/Mod-term O.J.T.
Drafters	14,000	4.2	Education/Training/Associate Degree
Architects	8,000	17.3	Education/Training/B.S. Degree
Electricians	65,000	23.4	Education/Training/Long-term O.J.T.
Painters	69,000	11.6	Education/Training/Mod-term O.J.T.
Plumbers	56,000	18.7	Education/Training/Long-term O.J.T.
Plaster/Stucco	8,000	13.5	Education/Training/Long-term O.J.T.
Estimators	25,000	18.6	Education/Training/B.S. Degree
Steel/Iron Workers	9,000	15.9	Education/Training/Long-term O.J.T.
Total	670,000		

Source: Farr & Shatkin, 2007

In the article “Retire Early? Yes, you can,” a statement was made saying that “the next wave of retirees are starting second careers, phasing down to retirement rather than quitting abruptly, and finding new ways to add substance--and income--to the second 50 years” (Wilcox & Lowe, 1994). The rationale behind this statement comes from the growing trend of slow retirement, or as stated above, “phasing down to retirement.” Currently the average age of retirement is 61 and falling. Two-thirds of all Social Security recipients chose to collect before the full benefit period. This reduces collections by 20%. In order to qualify for Social Security or to begin collecting, one must be at least 62 years of age. Table 1 delineates the age necessary compared to date born to receive full benefits (U.S. Social Security Administration, 2007).

Table 3 demonstrates a consistent average of 15% annual increase, thus opening a minimum of 670,000 jobs per year (Farr & Shatkin, 2007). The careers within the industry have been segmented, pin-pointing where the skill training is needed. Development of training programs must be geared to those careers lacking skilled workers. Without developing and initiating these programs, the numbers needed in each *trade* sector of the industry will not be delivered.

Figure 2 indicates the importance and ever so slight continuous increase in growth of the industry (U.S. Bureau of Labor Statistics, 2007a). As population continues to increase throughout the United States, there will continue to be a large demand for new homes. Renovation of existing buildings continues to be an emerging sector in the industry that is implementing new practices such as becoming more *green*, technological challenges, and implementing smart building techniques. These new building techniques are intended for using all the efficiencies of recent years. Figure 2 supports the need for

sufficient training in the construction industry as it demonstrates its continuous and constant growth.

The need for intensive training within the construction industry has clearly been demonstrated by the U.S. Bureau of Labor Statistics, 2006a. This industry is very complex and constantly evolving. New workers must have a technical background relating to new and emerging technologies in order to play an important role in the industry's future. There are four ways which new workers enter the industry; the first is with no experience. This happens with lower level construction laborer positions. Training is typically required on-the-job. The second way is through formal *trade* training. This may occur at a technical college or an accredited construction training center. The third focuses on white collar management, architectural, and engineering jobs and require a bacheloriolate degree. The fourth entrance for workers is out of other industries with similar job roles (U.S. Bureau of Labor Statistics, 2006).

Training for the skills will focus solely be upon the graduates of technical programs and bacheloriolate graduates. The other avenues of workers entering into the industry provide a non-tangible projection not quantifiable due to the industry's constant change and the variance in hiring policies per construction organization. On-the-job training and those switching careers will not be accounted for those reasons.

Shown in Table 4 is the percentage of workers broken down into different occupations. Nearly 67% of the industry is made up of trade professionals, having a variety of backgrounds (Table 4). This indicates that about 67% of most new entrants into the construction industry come from technical schools. Another 11% of the industry is made up of the management, architectural, engineering, and other activities. Most

management, architectural, and engineering positions have established requirements of four-year bacheloriates degrees in related fields for entrance in the industry.

Table 4

Employment of Construction Workers by Job Description

Job Description	Employment in 2004	
	Number	Percent
Management, business, and financial occupations	607,867	7.80
Professional and related occupations	101,311	1.30
Sales and related occupations	155,863	2.00
Office and administrative support occupations	748,144	9.60
Construction and extraction occupations	5,198,046	66.70
Installation, maintenance, and repair occupations	529,935	6.80
Transportation and material moving occupations	296,140	3.80
Total, all occupations	7,637,306	100.00

Note: May not add to totals due to omission of occupations with small employment
Source: U.S. Bureau of Labor Statistics, 2005

Identification of *trade* groups may be made in order to quantify the amount of workers that will be needed in 20 years per occupational grouping. The future gap has been identified as 3,231,807 workers: 67% would be equal to 2,165,311 workers (Maryland Department of Labor, 2004). These workers would be entering in from trade schools and technical colleges. The 11% would equal 355,499 workers and would enter from primarily university programs focused on architecture, engineering and management. The remaining 12% would fall into the category of entrance into the industry with no experience and entrance into the industry with related experience. As

previously identified, these types of entries will be unaccounted for in this research due to the abstract nature and vast amount of uncontrollable variables.

Technical schools will play a very large role in this attempt to fill the gap of a skilled construction workforce (*Technical schools guide*, 2007). Nearly 2.5 million jobs will need to be filled by the year 2027. Can the technical school system push this 'product' out in time? Are the technical schools equipped for this type of demand? Table 5 provides the percent of college attendees. The schools must continue to staff to the needs of the student base as it increases. This is mandatory to maintain the effectiveness of the current training programs with optimal student teacher ratios.

Table 5

College Enrollment Rates by Demographic Group in 1975 vs. 2001

	Immediate College Enrollment Rates		Change (percentage)
	(3-year average)		
	1975 (percentage)	2001 (percentage)	
Low-Income	49	63	+14
African-American	31	48	+17
Latino	45	56	+11
White	53	53	0
Men	49	66	+17
Women	53	62	+9
Total	49	68	+19

Source: Carey, 2004

There are nearly 400 technical schools in the United States that deliver construction related programs in order to prepare students for immediate entrance upon completion (“Technical Schools Guide,” 2007). This suggests that a significant amount of graduates from these programs are needed. The Construction Labor Research Council (CLRC) published a report in 2000 projecting that 100,000 additional construction *trade* workers are needed per year nationally, and that this number could be significantly higher (Searles & Owens, 2003). The 100,000 additional *trade* workers would be on top of those workers soon retiring and moving on. This signifies that *trade* schools at a minimum, must seek to fill 100,000 skilled trade positions annually.

Table 6

Number of Workers Employed in the United States Construction Industry (Thousands)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	5232	5260	5376	5614	5855	6017	6137	6172	6127	6117	6013	5838
1998	5544	5542	5602	5919	6147	6356	6496	6541	6468	6490	6410	6277
1999	5912	5972	6042	6355	6569	6777	6904	6912	6854	6850	6792	6596
2000	6322	6284	6457	6643	6817	7012	7108	7113	7036	7030	6915	6703
2001	6394	6397	6518	6688	6901	7076	7153	7139	7052	7012	6882	6698
2002	6363	6339	6416	6563	6749	6924	6984	7001	6935	6892	6810	6613
2003	6293	6224	6319	6534	6767	6951	7029	7062	7015	6989	6903	6729
2004	6431	6392	6551	6778	7012	7194	7292	7311	7249	7286	7205	7012
2005	6682	6699	6838	7128	7360	7574	7652	7704	7645	7679	7650	7425
2006	7182	7218	7337	7556	7777	7942	8011	8042	7947	7905	7768	7579
2007	7290	7167	7347	7524(p)	7739(p)							

Source: U.S. Bureau of Labor Statistics, 2007

Summary

The tables and figures point to the need and identify the number of positions that will be open in the industry. The statistical analysis supports that action should be taken now to recruit and employ many workers in order to successfully meet the training needs and credentials for the current and future job openings. Defining the image of the construction industry in a positive light will provide an increased attraction to the industry and will account for some amount of workers. Two-thirds of the construction industry's make-up is over 35 years of age (Maryland Department of Labor, 2004). One-

third of the industry's made-up is of *baby boomers*. Assuming both groups retire in 2027, a large gap will be left if no action towards replacement occurs now (U.S. Social Security Administration, 2007).

Chapter V: Discussion

There are many problems that the construction industry must deal with. Which problems deserve the most attention? The construction industry has an incredible need for a skilled labor force and for trained managers. For example, one minor mistake in cost estimating could result in a \$50,000.00 loss in a bid proposal, or a monumental collapse of a foundation wall, delaying a project for months. The financial loss and the project delay clearly provide the cost comparison numbers needed to validate the training costs. The industry has many relational ties. One activity must be completed correctly prior to the next *trade* getting started. The construction schedule has been compressed significantly over the years due to technological advances and process improvements. Time is money. Recruitment and training of competent individuals are critical.

Conclusions

The construction industry requires a highly trained workforce (Bennett, 1991). With many workers nearing retirement, an ample group of applicants must be produced now. The construction industry needs technically-aware, safety-oriented, fast-paced individuals who can handle the complexity of the industry day after day. These workers and managers will primarily emerge from technical schools, universities, or related jobs. The current amount of students in technical training schools will not fill the gap of workers that is quickly approaching. There are about 340,000 workers needed each year to replace retirees or other employees leaving the industry (Searles & Owens, 2003). With the expected population growth in cities and the growing need for restoration, the need for skilled workers each year will only increase. The *baby boomers* will also vacate one-third of construction jobs within a few years.

The industry process has many relational ties (Hainsfurther, 2007). One activity must be completed correctly prior to the next trade getting started. When there is a high reliability on one another, well-trained and knowledgeable workers must be onsite and behind-the-scenes. Without formal training, many workers will be financially behind and not able to effectively implement new technology. Job opportunities are expected to be excellent within the construction industry, especially for skilled *trade* workers. Due to the large number of retirees anticipated over the next decade and fewer workers with the right education entering the skilled *trades*, will amplify this issue (U.S. Bureau of Labor Statistics, 2005). The *trades* are responsible for meeting schedules and delivering the project to the specification. Supervisors are responsible for communicating any changes and scheduling information. These may seem to be quite simple tasks. The fact is that one must have general knowledge with regards to each part of the construction process. One must be able to think through complex problems and make decisions that affect all other contractors down the line.

Apprenticeship training in the construction industry was the standard, but now with less union involvement, there is less formal training for many *trades*. This causes many construction companies to have difficulties encountering the qualified staff needed to be successful. Many areas of the United States are forming partnerships to attack the need (O'Reilly, 2003). One such case where a partnership was formed was in southeast Texas. The Lamar Institute of Technology and the Associated General Contractors have teamed up to help fill the skill gap. They have decided to work together and develop new construction training programs that would include short term training and also offer associate degrees (Gallaspy, 2007). This is a case where a need was identified and action

was taken immediately. Many more cases exist where workers do not have the required training resources. This must change by developing implementing training resources now. All stakeholders in the industry must encourage continuous learning and growth, in order to portray the need for a highly skilled workforce.

The Occupational Safety and Health Administration (OSHA) is an agency that will also be looking over the shoulder of many construction sites (Occupational Safety and Health Administration, n. d.). All workers must be thoroughly knowledgeable with respect to safety and laws. Many fines and hefty financial losses may occur to a firm without this foreknowledge (Occupational Safety and Health Administration, n. d.). Many construction management programs offer 10-hour OSHA training as well as contractors sometimes provide in-house safety training for all its employees. It is everyone's responsibility for a safe jobsite. OSHA governs the action and fines associated with negligence.

The construction schedule has been compressed over the years due to technological advances and process improvements (Highsmith, 2006). Time is money. There is a need for people with knowledge of the entire process.

Project management begins before the design phase of construction from helping the owner develop a program and schedule for the entire project, to figuring out how they are going to finance it. The design process can eat up some time itself. We have assisted the owner in writing up qualifications for the design team, and helped select the designers. (Hainsfurther, 2007)

The statement by this author goes on to further discuss the many teams after the initial design, who then review the construction documents. A further review is done by the sub

contractors. In some instances, sub contractors hire another contractor due to tight production schedules. This chain of a contractor, to a sub contractor, to a sub-sub contractor, can be difficult if communication channels are not kept open. Construction workers need to be knowledgeable of this system and who to contact when there is a change or problem.

One role that must be discussed and thoroughly looked into is the industry's management and coordination.

The model relates to a strategic level of thinking about project organizations and so the concept of skills relates to teams rather than individuals. Some teams may comprise just one individual but most activities in construction are undertaken by small teams. Strategic thinking about construction projects necessarily deals with teams and their composite skills. This means that construction project managers need be more concerned with team building issues than with individual attributes and motivations. Both are important but the one-off character of construction projects inevitably makes team building of central importance. (Benett, 1991)

Construction managers must have the team building mindset. The technical expertise and general knowledge is a very important aspect of the construction world (Gallaspy, 2007). However, as stated, it is only an aspect. There must be a cohesive team effort. Teams are an ever-increasing trend among all successful organizations in the United States today. Teams allow workers to sift through and offer each other their ideas from their experiences to develop a method for achieving the desired outcome. Teams must have

diverse, skilled members to facilitate effective planning and project coordination (Highsmith & Wysocki, 2006). Effective organizations and teams are always made up of the 'right people.'

Summary

There is a large need for a continued effort to keep the construction industry filled with skilled labor. Maintaining relationships with high schools, technical colleges, universities, the military and other professions is critical and must have an increased focus. Without these relationships and without the knowledge and positive image of the industry portrayed, there will be a very large gap of skilled workers within the next 20 years. However, there is hope that some of the gap will close with *trade* schools, universities, and agencies. Some are gearing up their efforts with: training, education, and recruiting measures. A continued effort is critical for all stakeholders to do their part and invest time in these activities. The organizations that invest now will be around in the future and greatly reap the financial benefits of their forward thinking.

Recommendations

A further study could be conducted regarding the numbers of vocational schools or *trade* schools in the United States and their effect on the construction industry. This may provide accurate insight into the effectiveness of those programs.

An instrument to study the *baby boomer* generation's role within the industry could be developed. This instrument would examine the reactions of the *baby boomers* and their plans for retirement to more accurately portray the exact time these positions would become available.

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