

IDENTIFYING AND PRIORITIZING THE FUNDAMENTAL FACTORS THAT
LEAD TO INACCURATE PERCEPTIONS OF THE CONSTRUCTION INDUSTRY

A Thesis

by

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ABSTRACT

The shortage of skilled workers that the construction industry is currently experiencing can be attributed to the fact that the public perception of construction careers is not positive. This study describes the perceptions of Hispanic 11th grade students toward the construction industry based on elements such as demographics, family unit impact on decision making, and information sources for decision making. In particular, this study identifies and prioritizes barriers that prevent a student from pursuing a career in the construction industry. A survey was administered to Hispanic high school juniors attending public high schools in five cities in Texas. The data were analyzed using descriptive statistics. It was found that “Low Wages” is the main perceived barrier that prevents students from pursuing careers in the construction industry. In addition, the study proposed efforts that would be effective in overcoming the perceived obstacles and increasing the awareness of construction careers.

DEDICATION

This thesis is dedicated to the soul of Hazrat Ali Al-Murtaza, a man who was the door to the city of knowledge.

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First and Foremost I would like to thank the God who was supportive during all of my life.

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NOMENCLATURE

IRB	Institutional Review Board
ISD	Independent School District
STDEV	Standard Deviation
AVG	Average

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CHAPTER I

INTRODUCTION

The construction industry is an integral part of the US economy (Szymanski, 2007) and is beginning to recover from a formidable recession, which caused \$300 billion in losses in this sector (The American Institute of Architects, 2011 and Gilbane, 2013). But as the economy recovers, many barriers still remain in this industry (Olsen et al., 2012). As 78 million baby boomers slowly age out of the prime age group, which constitutes 83.5% of the labor force for 2014, (Toosi, 2006) the shortage of skilled workers will only increase. Moreover, there are numerous factors that impact the labor shortage, including insufficient training (Olsen et al., 2012), an inadequate pipeline of new labor, and the lasting effects of the recession (McGraw-Hill Construction, 2013). In addition, other reasons underpin the skills gap in the construction industry, such as “insufficient age-appropriate candidates, decline in interest to work in construction and insufficient skill-appropriate candidates” (Heimbach et al., 2006). As a matter of fact, an unskilled workforce can adversely affect an organization’s productivity, morale, and profits (Elkeles and Phillips, 2007).

In response to this challenge, more students must be attracted to careers in the construction industry; however, research shows that the perceptions of high school students toward the construction industry are negative. For example, construction worker was ranked 247 out of 250 occupation options by high school students (Krantz, 1999). Similarly, Jobs Rated researchers reported that the preference for employment

as a construction laborer ranked 191 out of 200 career options (Strieber, 2011). As a result, it is imperative to identify factors and variables that cause this poor image and attenuate their effects.

Background

Hispanics play a significant role in the construction industry. As seen in Figure 1, the number of Hispanic employees in the construction industry is more than any other industry; they constitute 25.5% of the US construction industry workforce (Bureau of Labor Statistics, 2013a). However, statistics shows that “Latinos lag behind every other population group in attaining college degrees, especially bachelor’s degrees” (Fry, 2002).

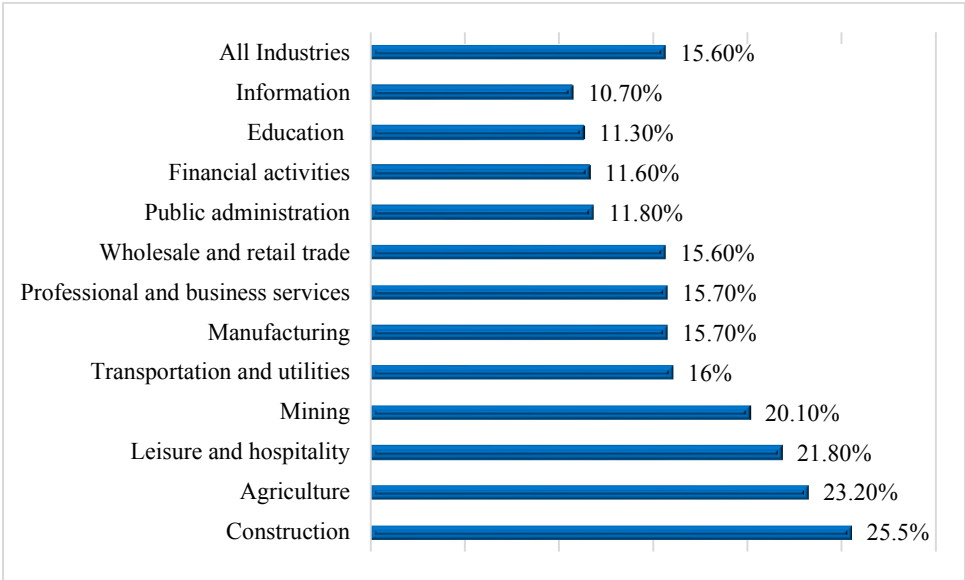


Fig. 1. Percentage of Hispanic Employees by Industry (2013).

According to the National Center for Education Statistics (2012), only 14.5% of Hispanics have a bachelor's or higher degree. Moreover, as presented in Figure 2, 48% of Hispanics in the construction industry have less than a high school diploma, and only 6% of them have a bachelor's or higher degree (CPWR Data Center, 2010). On the other hand, there is a soaring demand for post-secondary education in the US labor market (Holzer and Lerman, 2007). Carnevale et al. (2010) project that 63% of total occupations and, in particular, 54% of construction occupations will need a post-secondary degree by 2018.

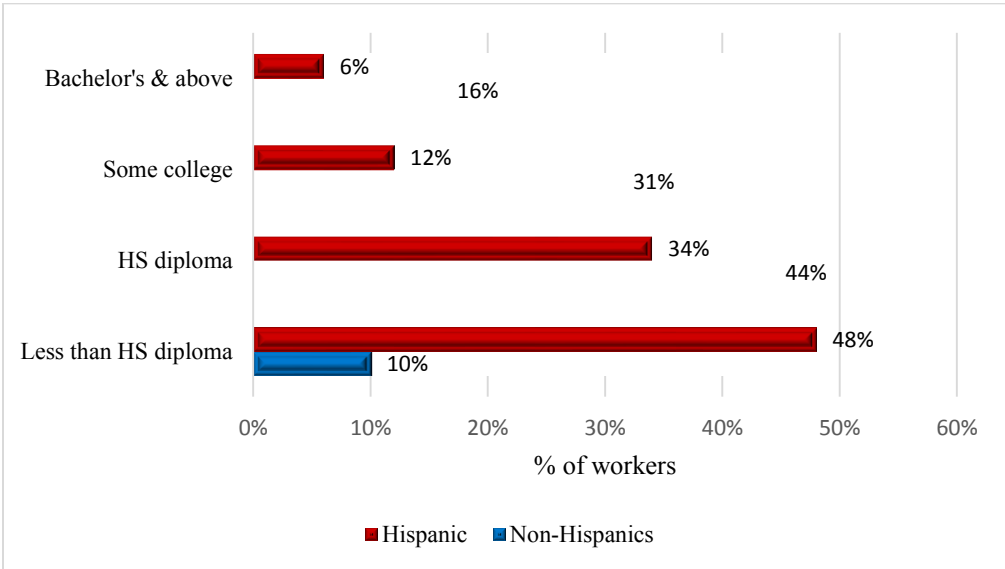


Fig. 2. Educational Attainment among Hispanic Construction Workers (2010).

According to Bureau of Labor Statistics (2013b), Hispanics constitute 44.3% of US construction laborers. In particular, as seen in Figure 3, more than 70% of construction laborers in Texas are Hispanic, which can be attributed to the fact that

Hispanics have a remarkable influence on Texas' construction activities (US Census Bureau, 2010). As a result, this study focuses on Texas Hispanic high school students' perception of the construction industry.

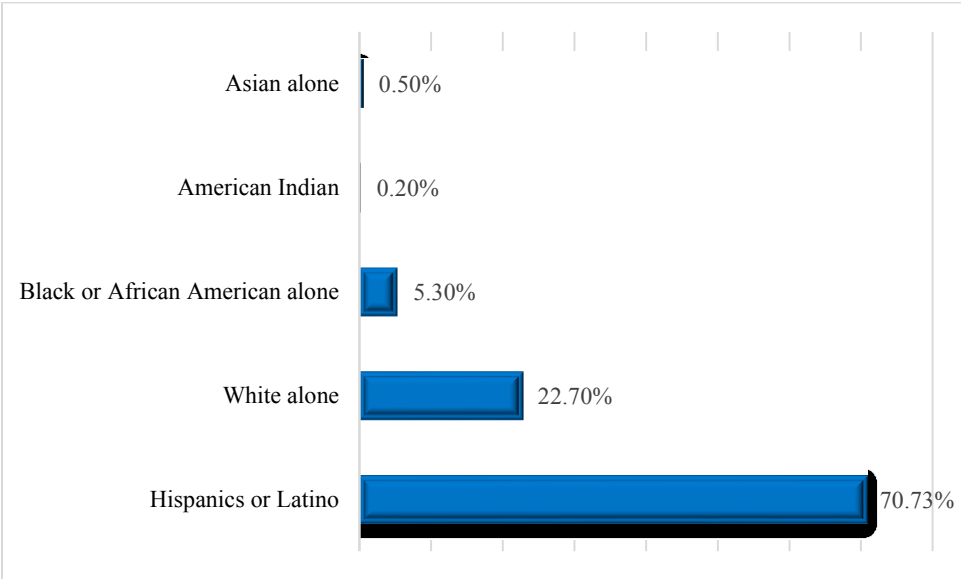


Fig. 3. Number of Construction Laborers in Texas.

Problem Statement

The research problem addressed by this study is that a shortage of skilled workers remains a major obstacle in the construction industry and is projected to get worse.

Research Objectives

The purpose of this study is to evaluate Hispanic 11th grade students' knowledge about construction industry careers, identify and prioritize the

fundamental factors that lead to those perceptions of the construction industry, and propose means to attract more students to careers in the industry.

Significance

The significance of this study will be to propose efforts that would be effective in increasing the construction workforce. This research is needed to reduce the skilled labor shortage. In addition, it would enable industry professionals to identify optimum solutions to train students.

Assumptions

It is assumed that high school students' responses are unbiased. In addition, it is assumed that respondents had enough knowledge to answer the survey.

Delimitation

This study is delimited to 11th grade Hispanic students at predominantly Hispanic high schools in Texas.

CHAPTER II

LITERATURE REVIEW

Introduction

The construction industry has a poor image in general (Swoboda and Cieslik, 1997; Kashiwagi and Massner, 2002; Bilbo et al., 2009). According to Fielden et al. (2000), “the construction industry has an industry-wide problem with ‘image,’ which makes both men and women reluctant or uninterested in the industry.” This review of literature summarizes the specific factors that have been reported as contributing to this negative image.

Family Unit and School Teachers

Misinformation from trusted sources is a primary factor contributing to this negative image. Family unit affects the occupational behavior of students (Beauregard, 2007; Hurley and Thorp, 2002; Wong and Liu, 2010). A survey administered for parents of 9,000 students who were ready to enter college from all 50 states demonstrates that 90% of parents would help their child during the college decision-making process (Longmire & Company, Inc., 2010). Whiston and Keller (2004), by reviewing many research papers, indicate that parents influence their child’s career path in both positive and negative ways; they especially emphasize that parents play a significant role among ethnic minorities. The impact of family, friends, counselors, and teachers on student perceptions is seen in various studies. Bilbo et al. (2009a), confirm that family, friends, those who work in the construction industry, and the media have a remarkable influence

on student perceptions of the construction industry. Bilbo et al. (2009a), asked high school juniors and seniors at 10 high schools in Houston if their families agreed with their choice to pursue a career in the construction industry, and only 29% responded, “yes,” which means that a majority were neutral or disagreed with that choice. In addition, some research shows that “no parent wants their kid to be a construction worker” (Erlich, and Grabelsky, 2005). Family, friends, school counselors, and teachers all appear to negatively affect student perceptions of the construction industry.

Koch (2007) finds that high school counselors have a minimum level of influence on construction management students’ career choice and school teachers view construction industry careers as more compatible with people who have a lower educational attainment (Barthorpe et al., 2000). Moreover, the construction industry is recognized as a relatively low-status industry without an appropriate working environment (Caplan et al., 2009). The findings of Bilbo (2009b) indicate that negative perceptions are accompanied by high school counselors’ little knowledge of the industry, which shows the perpetuation of misinformation about construction.

Gender and Ethnic Barriers

For women, gender represents an additional barrier. According to Bureau of Labor Statistics (2011), annual averages of employed men in the construction industry were nearly 9 and 10 times greater than women in 2009 and 2010, respectively. Therefore, women are underrepresented in the construction industry (Chun et al., 2009). Although women have remarkable talent in emotional intelligence and communication and are also inclined toward transformational leadership (Wangle, 2009), they comprise

just 7.3% of construction managers (Bureau of Labor Statistics, 2013b). Therefore, construction careers are still a non-traditional occupation for women, as they constitute less than 25% of total people employed in this industry (Dabke et al. 2008). In addition, data collected by the National Women's Law Center (2012) demonstrate that women's participation in "dirty, dangerous and male dominated" careers, such as firefighters and heavy equipment mechanics, has risen from 1983 to 2010. However, their presence in construction vocations has not shown any growth. While more women need to be attracted to careers in the construction industry, many barriers, such as a male-dominant environment and masculine culture, keep them away (Menches and Abraham, 2007). Overcoming these stereotypes will generate a diverse and effective labor force (Wangle, 2009). In addition to women, ethnic minorities confront a plethora of obstacles in the labor market and construction industry, including racial and ethnic discrimination (American Sociological Association, 2005).

Construction Careers' Conditions and Requirements

The perceived conditions and requirements for construction work constitute a barrier. One of the serious problems in the construction industry is safety (McGraw-Hill Construction, 2013). The construction industry has the highest fatality rate across various industries, accounting for 18% of fatal injury cases. In 2012, 775 workers died in the private construction sector (Bureau of Labor Statistics, 2013c). Among various causes of fatal injuries, such as "fall, transportation accident, contact with objects and equipment, and exposure to harmful substances or environments," falls were the chief

cause of fatalities in the private construction sector in 2012 (Bureau of Labor Statistics, 2013c). Besides the greatest number of fatal injuries, the construction industry is also plagued by a high rate of non-fatal injuries (Levin, 2008). 71,730 out of 905,690 non-fatal injury cases of private sector workers occurred in the construction industry in 2012 (Bureau of Labor Statistics, 2013d). A survey conducted by Build a Better Texas (2012) in Texas, revealed that despite the existence of a considerable number of young workers who are available to the construction industry, low wages, dangerous and risky conditions, few benefits, and lack of training keep them from pursuing careers in the construction industry. According to Agapiou (2002), the predominant perception of the construction industry is that one needs a high level of strength and a considerable tolerance for outdoor conditions, brutal and severe weather, and bad language. Ling and Ho (2013) mention that careers in the construction industry are considered dirty, dangerous, harsh, and unattractive choices. In addition, Ling and Ho (2013) notice that harsh and dangerous conditions are the most significant factors that lead to the negative awareness of the construction industry. Alongside these factors, Schleifer (2002) finds that the main factor resulting in a poor perception of the construction industry is a negative attitude toward blue collar workers.

Integrity Concerns

A perceived lack of integrity in construction activities is yet another barrier. On one hand, a study conducted on 270 owners, architects, construction managers, contractors, and subcontractors had 84% of respondents say they had experienced or confronted unethical performances associated with construction industry activities

(Doran, 2004). According to the Global Fraud Commentary (2013), various forms of fraud occur in the construction industry, such as billing fraud and tax avoidance. Billing fraud is more predominant than other types in the US construction industry (Global Fraud Commentary, 2013). The construction industry is an integral part of Texas business, but wage theft and payroll deception are a considerable expense for this state (Build a Better Texas, 2013). For instance, an estimated \$117 million in lost wages and \$8.8 million in absent sales tax led to a lack of sufficient money for state and local governments (Build a Better Texas, 2013). On the other hand, a study on youths between 15 and 18 years of age demonstrates that only 27% of youth believe that those who work in the construction industry are trustworthy and honest (Clarke and Boyd, 2011). If workers in the construction industry are not perceived to be honest, that could certainly lead to a negative perception of the industry.

Conclusion

The review of literature demonstrates that the fundamental barriers to students entering the construction industry are perceptions of dangerous and dirty conditions, low wages, family disapproval, negativity of blue collar work, a male-dominated culture and environment, race discrimination, school teachers and counselors' lack of knowledge, and a lack of integrity in the industry. As a result, this study explores which of these poor perceptions have the strongest effect and proposes means to attenuate their effects through the possible sources in order to enhance the industry image.

CHAPTER III

METHODOLOGY

This section describes the data collection instrument, research population and sample, data analysis, and validation procedures. In addition, limitations of the study will be explained.

The data collection instrument for this study was a self-administered survey. The survey utilized Likert scale, multiple choice, and ranking order questions. The study survey was reviewed and approved by the Texas A&M University Institutional Review Board (IRB).

This research was conducted in five cities. High schools included the following:

- Kenedy High School, Kenedy Independent School District (ISD) in Kenedy, Karnes County, Texas
- Ben Bolt High School, Ben Bolt-Palito Blanco ISD in Ben Bolt, Jim Wells County, Texas
- Santa Rosa High School, Santa Rosa ISD in Santa Rosa, Cameron County, Texas
- La Feria High School, La Feria ISD in La Feria, Cameron County, Texas
- Lasara High School, Lasara ISD in Lasara, Willacy County, Texas

Santa Rosa High School has 359 high school students, 90 of whom are 11th grade students. About 97.8% of students at Santa Rosa High School are Hispanic (The Texas Tribune Public Schools Explorer, 2010a). La Feria High School was another predominantly Hispanic high school, with 93.5% Hispanic, and a total population of 919 students, 195 of whom are 11th grade students. (The Texas Tribune Public Schools Explorer, 2010c). Ben Bolt and Lasara High Schools are two relatively small schools, with 186 and 109 students, respectively. More than 90% of students at Ben Bolt and Lasara High Schools are Hispanic. 20 of Lasara's students are 11th graders . In addition, there are 44 11th grade students at Ben Bolt high school (The Texas Tribune Public Schools Explorer, 2010b; The Texas Tribune Public Schools Explorer, 2010e). Kenedy High School has 197 students, 53 of whom are 11th graders. Like the previous high schools, the majority of students are Hispanic (79.40%) at Kenedy High School (The Texas Tribune Public Schools Explorer, 2010d).

External Validity

In order to improve the external validity, population validity and ecological validity were taken into consideration.

Population validity. Population validity is one aspect of external validity; it deals with the sampling method and sample size in order to generalize results to the population (Gliner et al., 2009).

Sampling method. Purposive sampling is defined as type of non-probability sampling (Tongco, 2007) in which “the participants are hand-picked from the accessible population so that they presumably will be representative or typical of the population”

(Gliner et al., 2009). Because this research aimed to study Hispanic students, it utilized purposive sampling as the participants were from predominantly Hispanic high schools.

The theoretical sample of participants was calculated based on formulas proposed by Israel (1992):

$$n_0 = [z^2 \cdot p \cdot q] / e^2$$

$$n = n_0 / [1 + ((n_0 - 1) / N)]$$

n = actual sample size

N = number of Hispanics in 11th grade, 149,874 (Texas Education Agency, 2012)

Z = Z value (1.96 for 95% confidence level)

p = estimated proportion of an attribute that is present in the population; we

assumed p = 0.5 for maximum variability

q = 1 - p

e = confidence interval (6% here) (Israel, 1992)

By employing the formula mentioned above, this study should have been conducted with at least 266 students. But the total number of participants who completed surveys was 251. As this study was aimed to focus on Hispanic students, non-Hispanic participants (25 students) were taken out, and for that reason, the actual sample was composed of 226. There were approximately 369 Hispanic students at the high schools, which means the response rate was 61%. As each question had a different response rate, this study didn't have one confidence interval. Thus, the confidence interval for each

question was calculated individually. The lowest and highest confidence intervals were 6.51% (225 participants) and 6.68% (215 participants), respectively.

Ecological validity. Ecological external validity is another aspect of external validity associated with the “naturalness of conditions,” and whether the results can be generalized beyond the current study environment (Gliner et al., 2009). As this study utilized questionnaires, it was somewhat artificial because “it was not a direct measure of the participants’ actual behavior in a typical environment” (Gliner et al., 2009). In addition, the participants answered the surveys in the high schools’ libraries, which may have affected the ecological validity.

Internal Validity

In order to remove unclear questions from the survey, ensure that the survey was apprehensible for high school students, and eventually improve the internal validity, a pilot study was employed prior to starting the research. Hundley and van Teijlingen (2002) mention some guidelines for pilot study procedures, which can result in enhancing the internal validity of a survey instrument. The guidelines include the following: “discard all difficult or ambiguous questions, ask the subjects for feedback to identify ambiguities and difficult questions, and administer the questionnaire to pilot subjects in the same way as it will be administered in the main study.” Therefore, 10 high school juniors (five Hispanic and five White) were selected from a high school in College Station, Texas. It should be noted that students in college station (pilot subjects) might not be as same as Hispanic students who participated in the study as majority of high school 11th grade students in College Station are White. A pilot study was

conducted for those students in two different trials. The first trial was composed of two males and three females, while a second trial consisted of two females and three males. Each trial took about 10 to 12 minutes. The members of each group were asked to read the survey questions one by one, and they were requested to review and comment on the clarity of the questions. Corrections and revisions were performed at the end of each trial based on students' input.

In accordance with the IRB approval letter, this study was obligated to conduct the surveys with parental permissions; therefore, parental permission was obtained for the students who participated in the study. This study collected both male and female participation. Surveys were collected immediately following completion. The data were analyzed using descriptive statistics.

Limitations

Although the sample size was big and had enough precision (confidence level) to conclude substantial results, it was smaller than the targeted sample size of 266. Another limitation of this study is that the data were collected at only five high schools, and not all high schools in Texas were represented, which limits the generalizability of the findings.

CHAPTER IV
DATA ANALYSIS AND FINDINGS

Demographics

Participants in this study all self-identified as Hispanic. 49.8% were male and 50.2% were female, with a mean age of 16.8 years old. The majority of students (66.4) plan to attend a 4 year college, while 17.9% plan to attend a 2 year college, 8.1% plan to enter the military, 2.2% plan to enter trade school, and 2.2% plan to earn an online degree. Only 3.1% do not plan to pursue any further education. It is noteworthy to mention that the percentage of students who plan to attend 4-year College is somewhat consistent with the Hispanics 4-year college enrollment rate which is approximately 55% (Texas Higher Education Coordinating Board, 2010). Figure 4 displays this data.

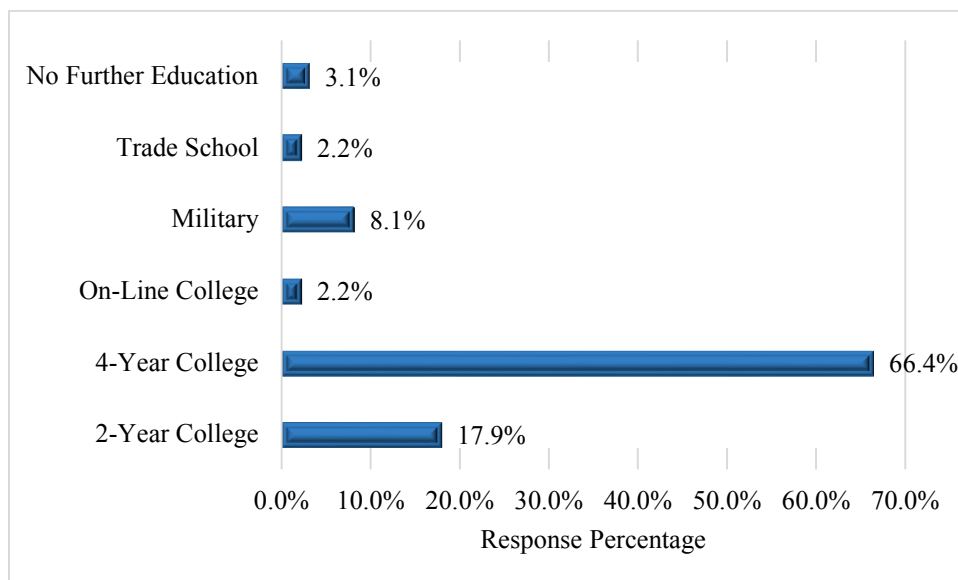


Fig. 4. Descriptive Analysis of Participants' Immediate Plans after Graduation.

Perception of Family Unit Impact on Decision Making

The next survey questions try to discover who makes important decisions in the family unit in order to develop recruitment strategies focused on those decision makers. Each of the following statements is rated on a scale from “Strongly Disagree” to “Strongly Agree.” Family unit is defined as a group of people related by blood or marriage or a relative who plays the role of a guardian.

Right before the statements, the respondents were asked which family unit person(s) has the most impact on making important decisions that affect their lives. While 44.3% of responses show that the father and mother have the most influence on making significant decisions, only 25.6% of respondents reported that they would make their own decisions. It should be noted that the results do not support what was found in the literature review that Longmire & Company, Inc. (2010) stated 90% of parents would help their child during the college decision-making process (See Table 1).

Table 1. Family Unit Person(s) with the Most Impact on Making Important Decisions

Answer Options	Response Percentage	Response Count
I make my own decisions	25.6%	56
Grandfather or Grandmother	4.1%	9
Father and Mother	44.3%	97
Father	3.2%	7
Mother	20.1%	44
Uncle or Aunt	1.4%	3
Cousins	1.4%	3
Other		5
	Answered question	219
	Skipped question	7
	Confidence Interval	6.62%

One of the questions asked the students if they think the family unit plays a major role in making decisions on future educational plans (Table 2). The responses demonstrate that the family unit has a significant role in Hispanic students' decision-making process, as 79.56% somewhat agreed or strongly agreed with the statement provided. In addition, responses were mostly in agreement with the statement, "Family unit is persistent in stressing the importance of education to me," as only 12.5% somewhat disagreed or strongly disagreed. On the other hand, the responses for the statement, "Family unit would be supportive of you pursuing a career in the construction industry" were more inclined to the negative side, as 58.6% somewhat disagreed or strongly disagreed. It can be inferred from the results that the construction industry doesn't have a positive reputation among most Hispanic family units.

Table 2. Family Unit Influence on Decision Making

Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Response Count	Confidence Interval
Family unit plays a major role in making decisions on future educational plans.	5.78%	14.67%	40.89%	38.67%	225	6.53%
Family unit is persistent in stressing the importance of education to me.	3.57%	8.93%	32.59%	54.91%	224	6.54%
Family unit would be supportive of you pursuing a career in the construction industry.	15.91%	42.73%	27.73%	13.64%	220	6.60%
				Answered question		225
				Skipped question		1

Perception of Information Sources for Decision Making

The next question asked the respondents about the types of media their family unit relies on for important information. This question tries to discover the media preferences for information delivery of construction career opportunities. The choices are radio station, television (TV) shows, newspapers, magazines, computer online access, and person-to-person interaction. Respondents were able to check all that apply to them. As presented in Table 3, non-English media are considerably less significant than English media for the respondents' family unit to obtain essential information. In addition, the results indicate that traditional media, such as TV and newspaper, are still effective means of information for these family units.

Table 3. Types of Media the Family Unit Relies On

Answer Options	English	Non-English
Radio stations that are broadcast in English/Non-English	74.63%	25.37%
TV shows that are broadcast in English/Non-English	78.97%	21.030%
Newspapers that are written in English/Non-English	83.33%	16.67%
Magazines that are written in English/Non-English	80.50%	19.50%
Computer online access to information in English/Non-English	81.94%	18.06%
Person-to-person interaction in English/Non-English	75.60%	24.40%
Answered question		223
Skipped question		3
Confidence interval		6.56%

The next survey questions were associated with factors-impacting information on construction industry careers and career opportunities; they aim to discover how well respondents think their schools are providing information to students.

The responses display student satisfaction with the information provided by school teachers and counselors regarding a variety of colleges and universities (52.23% well, 16.52% extremely well).

On the other hand, responses for the statement, “providing information on construction industry careers” are more inclined to the negative side, as 66.7% of the respondents reported “Not Well” or “Not at All.” The results support Bilbo et al. (2009b) findings that high school teachers and counselors have a limited knowledge of construction vocations, and there is an absence of representation of the construction industry in high schools. The distribution of results can be found in Table 4.

Table 4. Participants’ Perception of Information Provided by Schools

Answer Options	Not at All	Not Well	Well	Extremely Well
Providing information on a variety of colleges and universities	9.38%	21.88%	52.23%	16.52%
Providing information on construction industry careers	30.80%	35.27%	26.79%	7.14%
		Answered question		224
		Skipped question		2
		Confidence interval		6.54%

The next question asked participants to assign a unique rank value to the different social networking websites they visit. The rank values consist of 1, 2, ..., 8, in which 1 refers to the most important and 8 refers to the least important. This question aims to find out social networking preferences in order to develop strategies. Choices included Skype, Instagram, Vine, Google+, LinkedIn, Twitter, WhatsApp, and Facebook.

Instagram, Facebook, and Twitter are ranked 1, 2, and 3, respectively. As can be seen in Table 5, the competition between Instagram and Facebook is quite tight. While the percentage of respondents inclined to Facebook as the most important social networking Website is equal to Instagram, Instagram was ranked first overall. In addition, Google+ is ranked 4, so it can be inferred that Google+ is not as successful as Facebook and Instagram in attracting high school students. Furthermore, the respondents ranked Vine as 5 and Skype as 6. According to the results, it was found that LinkedIn and WhatsApp are the least important social networking Websites, as they are ranked 7 and 8, respectively. The results are sorted in ascending order, from the most important to the least important in Table 5. The choices are ranked based on the average ranking.

Therefore, the lowest average ranking demonstrates which answer option is ranked first overall. Average ranking was calculated using the following formula:

$$\text{“Average Ranking} = (x_1w_1 + x_2w_2 + x_3w_3 \dots x_nw_n) / (\text{Total Responses})$$

w: weight of ranked position(1,2,...,8)

x: response count for answer choice” (Survey Monkey, 2014)

Table 5. Ranking Social Networking Websites for Hispanic High School Students

Answer Options	1	2	3	4	5	6	7	8	Avg Rank	ST DEV
Instagram	29.63 %	31.02 %	12.96 %	12.96 %	5.09 %	3.24 %	3.70 %	1.39 %	2.64	1.71
Facebook	29.63 %	18.99 %	22.69 %	10.65 %	6.02 %	3.70 %	3.70 %	4.63 %	2.94	1.95
Twitter	18.53 %	21.77 %	17.59 %	12.96 %	9.27 %	10.19 %	8.33 %	1.39 %	3.44	1.97
Google+	16.67 %	11.11 %	9.72 %	12.96 %	20.8 3%	19.91 %	4.63 %	4.17 %	4.09	2.03
Vine	1.85 %	7.41 %	18.98 %	24.07 %	21.7 6%	11.11 %	7.87 %	6.94 %	4.56	1.68
Skype	2.31 %	5.09 %	10.19 %	18.52 %	25.4 6%	27.78 %	8.80 %	1.85 %	4.88	1.49
Linkedin	0.46 %	2.31 %	1.85 %	3.70 %	8.33 %	15.28 %	36.57 %	31.48 %	6.67	1.44
WhatsApp	0.93 %	2.31 %	6.02 %	4.17 %	3.24 %	8.80 %	26.39 %	48.15 %	6.79	1.7
										216
										10
										6.66
										%

The next question asked respondents to rank the barriers considered to prevent them from pursuing a career in the construction industry. Choices included the factors identified by reviewing the literature: low wages, family disapproval, lack of integrity in the construction industry, dangerous and dirty conditions, race discrimination, poor perceptions toward blue collar work (labor), school teachers' and counselors' lack of knowledge, and male-dominated culture and environment. According to the results, about 41.40% of respondents ranked low wages as the most important barrier; thus, low wages is the top answer choice overall, with a considerable distance from the other choices. Dangerous and dirty conditions are ranked second. Of the remaining choices, there is a close competition between family disapproval, lack of integrity in the construction industry, and school teachers' and counselors' lack of knowledge, which are ranked third, fourth, and fifth, respectively (see Table 6). In addition, as shown in Table 6, the average ranking score for race discrimination is sixth. Eventually, poor perception toward blue collar work is ranked eighth, which implies that an improper attitude toward blue collar workers is the least important barrier hindering students from entering a career in the construction industry. The results are sorted in ascending order in Table 6 from the most important to the least important. The factors were ranked in the same way as the previous question.

Table 6. Barriers Preventing Students from Pursuing Construction Industry Careers

Answer Options	1	2	3	4	5	6	7	8	Avg Rank	ST DEV
Low Wages	41.40 %	16.28 %	11.16 %	7.44 %	7.44 %	5.12 %	4.65 %	6.51 %	2.9	2.24
Dangerous and Dirty Conditions	18.60 %	24.20 %	14.42 %	9.30 %	8.84 %	8.37 %	6.51 %	9.77 %	3.66	2.29
Family Disapproval	9.30 %	17.67 %	17.67 %	15.81 %	8.84 %	5.58 %	9.30 %	15.35 %	4.28	2.3
Lack of Integrity in the Construction Industry	6.05 %	9.30 %	9.30 %	15.35 %	18.60 %	20.47 %	12.09 %	3.72 %	4.6	1.85
School Teachers' and Counselors' Lack of Knowledge	12.56 %	6.98 %	6.98 %	16.74 %	12.56 %	16.74 %	18.14 %	6.05 %	4.63	2.12
Race Discrimination	7.44 %	11.63 %	11.63 %	9.77 %	13.02 %	13.49 %	16.74 %	17.67 %	5.05	2.27
Male-Dominated Culture and Environment	3.72 %	7.91 %	7.91 %	13.95 %	11.63 %	17.21 %	18.60 %	18.14 %	5.39	2.05
Poor Perceptions Toward Blue-collar Work (labor)	0.93 %	6.05 %	6.05 %	11.63 %	19.07 %	13.02 %	13.95 %	22.79 %	5.51	1.95
									Answered question	215
									Skipped question	11
									Confidence interval	6.68 %

Perception of the Construction Industry

The next question aims to understand the students' awareness of career opportunities in the construction industry by attaining a degree in construction science (Table 7). A majority (58%) of respondents reported that they don't plan to pursue a career in the construction industry. Of the remaining answers, the top three most frequent responses are engineer (38.4%), building design (34.7%), and home builder (36.1%). It's worth noting that only 4.6% and 4.1% of the respondents reported estimating and scheduling, respectively. It can be concluded that the students don't have an accurate knowledge of what careers they can pursue by getting a degree in construction science. The results are presented in Table 7.

The next survey questions aim to discover the students' perception of a professional construction career. Like family unit questions, each of the following statements is rated on a scale from "Strongly Disagree" to "Strongly Agree."

Table 7. Students' Awareness of Opportunities in the Construction Industry

Answer Options	Response Percentage	Response Count
Home Builder	36.1%	79
Laborer	15.1%	33
Skilled Trades Workforce	10.5%	23
Crew Leader	18.3%	40
Foreman	7.8%	17
Field Engineer	26.5%	58
Superintendent	6.4%	14
Construction Inspector	24.2%	53
Project Manager	22.8%	50
Estimator	4.6%	10
Engineer	38.4%	84
Scheduler	4.1%	9
Building Information Modeler	20.5%	45
Drafting	11.0%	24
Building Design	34.7%	76
Materials and Product Sales Representative	11.9%	26
Equipment Operator	18.3%	40
I don't plan to work in the construction industry	58.0%	127
Other		1
	Answered question	219
	Skipped question	7
	Confidence interval	6.62%

The responses for “I want to have a career in the construction industry” demonstrate a significant disagreement, as 41.96% of the respondents strongly disagreed to pursue a career in the construction industry. It is noteworthy to mention that no other statement displays this amount of disagreement. It can be inferred that majority of students are reluctant to enter construction careers. The data continue to break down as follows:

- 17.94% strongly disagreed and 32.29% somewhat disagreed with “I believe I will have equal opportunities for advancement in the construction industry.”
- 9.91% strongly disagreed and 24.77% somewhat disagreed with “People with a bachelor's degree in construction science receive job offers averaging more than \$53,000 a year.”
- 11.16% strongly disagreed and 17.41% somewhat disagreed with “Job duties include planning, directing, and coordinating construction projects.”

In addition, the responses for the statement associated with the construction industry jobs and academic achievements don't show significant disagreement, as only 54.91% disagreed or strongly disagreed. Furthermore, 69.19% of the respondents were in disagreement with the statement, “I believe a career in the construction industry is a safe working environment.” Thus, it can be concluded from the results that construction vocations are not perceived as having a safe working environment (see Table 8).

Table 8. Perception of a Professional Construction Career

Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Response Count	Confidence Interval
I want to have a career in the construction industry.	41.96%	25.89%	28.13%	4.02%	224	6.54%
I believe I will have equal opportunities for advancement in the construction industry.	17.94%	32.29%	42.60%	7.17%	223	6.56%
I believe a career in the construction industry is a safe working environment.	29.46%	39.73%	25.00%	5.80%	224	6.54%
People with a bachelor's degree in construction science receive job offers averaging more than \$53,000 a year.	9.91%	24.77%	55.86%	9.46%	222	6.57%
Job duties include planning, directing, and coordinating construction projects.	11.16%	17.41%	49.555	21.885	224	6.54%
I believe that construction industry jobs are better suited to low academic achievers.	21.43%	33.48%	37.05%	8.04%	224	6.54%
Answered question						224
Skipped question						2

The last question is associated with public awareness of the construction industry. When the respondents were asked if they believe the public has a positive perception of the construction industry, only 23.3% of participants answered with a

positive response, which means the majority of them (76.7%) hold a negative or neutral opinion (See Table 9).

Table 9. Public Perception of the Construction Industry

Answer Options	Response Percentage	Response Count
Yes	23.3%	52
No	33.2%	74
I don't know	43.5%	97
	Answered question	223
	Skipped question	3
	Confidence interval	6.56%

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

This research focuses on Hispanic 11th grade students in five cities in Texas. In discovering the students' perspective on the construction industry, it was found that less than 24% answered with a positive response. Furthermore, the current study demonstrates that Hispanic 11th grade students are reluctant to enter construction careers. These results can be attributed to the fact that the 11th grade students' knowledge of construction careers is poor (Kashiwagi and Massner, 2002).

The study adds to the body of knowledge by prioritizing the perceived barriers that prevent students from pursuing careers in the construction industry. It was found that low wages are the main obstacle. This is consistent with Bilbo et al. (2009b) findings that industry can tackle this barrier by improving its marketing programs and promoting its strategic plan in order to add construction jobs to the list of high-paying careers. As dangerous and dirty conditions were ranked second, it is imperative for the construction industry to take steps in order to increase awareness about construction careers' safety. In addition to low wages and dangerous and dirty conditions, it was found that family disapproval is the third most important barrier that negatively affects student perceptions of the construction industry. Moreover, the results of this study reveal school teachers' and counselors' lack of knowledge of construction careers, as they are not properly providing information on vocations in the construction industry for students. Implementing culturally diverse education modules derived from family unit

input will prepare high school counselors with knowledge of construction education and construction professional positions so that they can advise high school students of the educational and professional opportunities in construction.

To encourage more Hispanic students to enter accredited construction education programs, students must first be aware of the opportunities in construction careers. This will be accomplished by shattering the negative perceptions of the construction industry and informing the family unit, students, and high school counselors about the benefits of construction careers while the students are juniors in high school. Utilizing social networking Websites in addition to traditional media and providing infrastructure established by local school districts and accepted by the public will efficiently improve high school students' awareness of the many opportunities in construction education and professional careers.

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APPENDIX

Student Decision Making- Survey

1. What is your ethnicity?

White

Hispanic or Latino

Black or African-American

American Indian or Alaskan Native

Asian

Native Hawaiian or other Pacific islander

Other (please specify)

2. What is your gender?

Male

Female

3. What is your age?

14

15

16

17

18

19

20

21+

4. After Graduation from high school, my immediate plans are...

2-Year College

4-Year College

On-Line College

Military

Trade School

No Further Education

5. (Family Unit is defined as a group of people related by blood or marriage, a relative who plays the role of guardian) The Family Unit person(s) that have the most impact on making important decisions that affect my life...(Check one that applies)

I make my own decisions

Grandfather or Grandmother

Father and Mother

Father

Mother

Uncle or Aunt

Cousins

Other (please specify)

6. Family Unit influence on Decision Making. (For each statement, please check appropriate box.)

Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Family unit plays a major role in making decisions on future educational plans.				
Family unit is persistent in stressing the importance of education to me.				
Family unit would be supportive of you pursuing a career in the construction industry.				

7. What types of media does your Family Unit rely on for important information?

(Check all that apply)

Answer Options	English	Non-English
Radio stations that are broadcast in English/Non-English		
TV shows that are broadcast in English/Non-English		
Newspapers that are written in English/Non-English		
Magazines that are written in English/Non-English		
Computer online access to information in English/Non-English		
Person-to-person interaction in English/Non-English		

8. Please rank the different social networking websites you visit.(Please rank, 1 being the most important thru 10 being least important)

Vine

Skype

Instagram

Google+

Linkedin

Twitter

Facebook

Whatsapp

9. Rank the Answer Options you consider to prevent you from pursuing a career in the construction Industry.(1 being the most important thru 8 being the least important)

Low Wages

Dangerous and dirty conditions

Family disapproval

Lack of integrity in the construction industry

Race discrimination

School teachers and counselors' lack of knowledge

male-dominated culture and environment

poor perceptions toward blue-collar work(labors)

10. How well do you think your school is providing information to students. (For each statement, please check appropriate box.)

Answer Options	Not at All	Not Well	Well	Extremely Well
Providing information on a variety of colleges and universities				
Providing information on construction industry careers				

11. A degree in Construction Science will prepare me for opportunities to work as a... (Check all that apply)

Home Builder

Laborer

Skilled Trades Workforce

Crew Leader

Foreman

Field Engineer

Superintendent

Construction Inspector

Project Manager

Estimator

Engineer

Scheduler

Building Information Modeler

Drafting

Building Design

Materials and Product Sales Representative

Equipment Operator

I don't plan to work in the construction Industry

Other (please specify)

12. Perception of a Professional Construction Career. (For each statement, please check appropriate box.)

Answer Options	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
I want to have a career in the construction industry.				
I believe I will have equal opportunities for advancement in the construction industry.				
I believe a career in the construction industry is a safe working environment.				
People with a bachelor's degree in construction science receive job offers averaging more than \$53,000 a year.				
Job duties include planning, directing, and coordinating construction projects.				
I believe that construction industry jobs are better suited to low academic achievers.				

13. Do you believe the public has a positive perception of the construction industry?

Yes

No

I don't know