The U. S. News and World Report Rankings: an investigation into the perceptions of engineering deans regarding the survey and the rankings

Christine M. Smallman

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A Dissertation

Entitled


By

Christine M. Smallman

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Higher Education

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May 2015
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An Abstract of

The *U.S. News and World Report Rankings Survey*: An Investigation into the perception of engineering deans regarding the survey and the rankings.

by

Christine M. Smallman

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Higher Education Degree

The University of Toledo
May 2015

The *U.S. News and World Report Survey* of graduate engineering programs is structured around four areas and nine indicators. Area A addresses quality assessment, Area B addresses student selectivity, and Area C addresses faculty resources, lastly Area D addresses research activity. The nine indicators categorized under the areas are: peer assessment, recruiter assessment, mean GRE quantitative scores, acceptance rate, and student to faculty ration (both doctoral and masters), faculty in the National Academy of Engineering, doctoral degree awarded, total research expenditures, and average research expenditures per faculty member. Each area is weighted and each indicator given a percentage towards their final score. The *U.S. News and World Report Survey* has a tenuous relationship with deans of engineering programs; yet is considered the authority by many among institutions who compile data to determine program quality and rankings.

This study examines the perceptions of engineering deans in regards to the *U.S. News and World Report Survey* instrument, data collected, marketing budgets and the information the deans deem important, unimportant and what they would like to see
included in the survey collection. This instrument provided an opportunity to the 198 deans, who participated in the 2011 *U.S. News and World Report Survey*, who in turn provided their perceptions and input into what the *U.S. News and World Report Survey* is currently using to access and rank quality engineering programs. Nine research questions guided this research study which focus on the perceptions of the deans in regards to weights, percentages, what areas and indicators they would leave in the survey and which they would leave out. The questions also address budgets and outcomes of funding put towards increasing survey ranking results. Analysis of the information returned indicate no significance between the *U.S. News and World Report Survey* and discord among the deans of engineering graduate programs. However, this research does reveal areas and indicators the deans of engineering would like removed, such as membership in the National Academy of Engineers, peer assessment review, and student selectivity, as well as, indicators deans would like to add when distributing the *U.S. News and World Report Survey* such as scholarly publications, distance education and research space.
Dedication

To my patient and supportive husband Terry, our children and their partners, for their support and understanding in times when I could not be where I wanted to be, but needed to be, and to all six of my beautiful grandchildren who keep me smiling. To my sister and head cheerleader, Nancy Keefe Bump who held me up and kept me from getting discouraged – your turn is next. To my U.T. cohort family Drs. Karen Hoblet, Gwen Walters and Marty Sexton, I could not have done this without your moral support and encouragement. The pride I feel that we have all finished the journey is unmeasurable.

Lastly, with great love and respect I dedicate this study and my doctoral degree to my mother Beatrice Ann Logan Keefe (1931-1980). My promise to you, made on the night of your passing, 34 years ago is finished. I am so grateful for having been your daughter. What you taught me in the 22 short years you were in my life has been my compass. Your love was unending and your thirst for learning unquenchable. You have given me many gifts my dear mother and because of you I was able to reach the goal - you could not - because you left this earth so young. I owe you my life and am truly indebted to you for all that I am. You are in my thoughts and prayers each day and are a driving force in my life daily. I missed you terribly during this process and will continue to always miss you until I join you.

Most of all I give all glory and recognition to our Lord Jesus Christ who has sustained me through this process and blessed me with his grace.
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Next to God our Father I dedicate this dissertation to my advisor, Dr. David Meabon, who is an incredible mentor and strong supporter of my academic pursuits and total well-being. This journey has been filled with trials, tribulations, sickness, job loss, retirement and a new career path. Dr. Meabon’s silent strength, encouragement and belief in me is an incredible motivator which led me to the completion of this research study. Dr. Meabon’s impact on my life educationally as well as a human being is priceless. He and he alone stood by me every step of the way and for this I am truly in your debt. God Bless You.

I am indebted to several people at The University of Toledo who supported me during this endeavor, specifically Dr. Sonny Arises, Dr. Gregory Stone and Dr. Snejana Slantcheva-Durst who served as committee members.

I am also grateful for the advice, academic and monetary support of the following U.T. colleagues, Interim President Nagi G. Naganathan, Dean Thomas Switzer, President Emeritus Daniel Johnson, Associate Dean Mohamed Samir Hefzy, Dr. Steven Kramer, Dr. Vickie Kuntz, Dr. Frank Calzonetti, Dr. William Logie, Dr. Pat Murphy, Dr. Earl Murry, Dr. William Bischoff, and Mrs. Ruth Anne Easterwood (superwoman) and Ms. Suzanne Martin. I am also grateful to the John Russell family who provided me with a scholarship to offset some of the costs of my survey distribution. I would also like to acknowledge Dr. Douglas Walters and Dr. Russ Sprinkle for their editing and APA guidance. Lastly, I would like to thank The University of Toledo for the three degrees I obtained as a former employee of their institution. Such a wonderful benefit accessible to every University of Toledo employee that is priceless.
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Preface

Individuals reading this doctoral decision may be curious as to the reasons why a doctoral student in higher education would choose to pursue a dissertation topic focused on engineering. This is a reasonable question considering neither my undergraduate nor master’s degree is in engineering. I was employed in a college of engineering for over 27 years, and during that time, I have administered in a variety of roles in a number of different settings. For example, I was involved in academic activities and programs both at the undergraduate and graduate levels, such as assessment, accreditation, fundraising, friend raising and marketing. Through these various roles, I have attended various conferences and meetings at which ranking were discussed in a variety of different forums.

During one particular visit to Washington, D.C., to attend the engineering dean’s yearly Capitol Hill visit, I received a copy of *The Gathering Storm: Can the U.S. Preserve its Lead in Science and Technology?* (Brown, 2006). The publication was distributed by President George W. Bush in an effort to educate those in attendance about the importance of engineering and to warn engineering educators of a potential deficit in the number of engineers in the United States. This publication led to lively discussions regarding education, recruitment and the role that rankings play in the field of engineering education. Furthermore, the rankings are currently being discussed in the Obama administration as to what involvement the government should have in the rankings process and should it be connected to external funding to institutions. These discussions, as well as my association with the academic aspects of engineering education, led to my interest in exploring issues related to ranking systems. In particular,
these experiences led me to explore how deans of engineering colleges view the *U.S. News and World Report Survey* ranking system and the role it plays in recruitment, fundraising, and overall engineering graduate program perceptions.
Chapter One
The Background of the Study

Introduction

Rankings associated with academic institutions are defined as lists of institutions in higher education ranked according to a combination of factors. In addition to institution-wide rankings, there are specific program rankings by academic programs. Additionally, departments, and schools are also individually ranked by various organizations and publications such as the Princeton Review and Washington Monthly. Rankings are conducted by magazines, newspapers, government agencies, and academic associations. When providing rankings, organizations and associations typically consider measures of research excellence, influence, student choices, eventual success, demographics, and other performance criteria. Some organizations and associations provide rankings for institutions within a single country, while others assess institutions worldwide.

College and university rankings generally consist of lists of higher education institutions that are placed in a particular order based on combinations of factors. However, the topic of rankings have continued to generate much debate among stakeholders in higher education regarding their usefulness and accuracy. The growing diversity in ranking methodologies and accompanying criticisms of each method of ranking reflect a lack of consensus in the field of higher education (Hyman and Jacobs, 2009).

The rise in popularity of rankings and their durability is attributed to several conditions: increased student mobility; institutional use of rankings in promotional and marketing campaigns and decision making; the use of rankings in international
discussions of assessment, and accountability, and quality assurance efforts (Sponsler, 2009). For example, prospective students and parents often consult various rankings during the college admissions process. A Cornell University study found that rankings in the United States significantly affected colleges’ applications and admissions (Paget, 2008).

In recent months President Barack Obama entered the rankings discussions by holding the first U.S. Department of Education’s Symposium on Postsecondary Institution Rating System (Morse, 2014). Obama’s involvement with rankings is an effort to address institutional accountability and to address soaring tuition cost (Anderson, 2014). Obama intends to propose to the United States Congress a ranking system wherein institutions are ranked in areas such as student debt, job placement after graduation, share of low-income student and government grants and loans, such as Pell Grants, or a better interest rate on student loans. President Obama’s reasoning for the new rankings is to bring relief to families from high college bills, which in some cases, are three times as high as they were 30 years ago after adjusting for inflation. According to President Obama (Anderson, 2014), “Higher Education should not be a luxury. It is an economic imperative that every family in America should be able to afford”. He further states, “Colleges that keep their tuition bills down and are providing high-quality education are the ones that are going to see their taxpayer money going up”. However, institutions blame rising labor costs and severely reduced state funding for tuition increases. There is concern that Obama’s system will draw criticism from institutions who want to protect their market share and a divided Congress will present an immediate obstacle to elements of the plan that will require legislation. Molly Corbet Broad,
president of the American Council on Education which represents colleges and universities has assured these institutions with the following statement: “We will be vigilant in working to prevent tying the receipt of aid to metrics, which could have a profoundly negative impact on the very students and families that the administration is trying to help.” Republican representative Jim Kline, chairman of the House Committee on Education is concerned that imposing an arbitrary college rankings system could curtail the very innovation we hope to encourage – and even lead to federal price control (Anderson, 2014) According to Anderson, (2014) potential 2016 presidential candidate Republican Marco Rubio, Florida believes this is a slippery slope and one that ends with the private sector giving up more freedom to be innovative. Rubio believes that the United States did not create the best higher education systems in the world by using standards by Washington bureaucrats. Baty, (2012) believes that when governments seek to identify the world’s best university, they increasingly rely on global university rankings which are believed to be reputable and respected.

One individual weighing in on Obama’s interest in creating ranking systems is Robert Morse, director of data research of the *U. S. News and World Report Rankings Survey*. According to Morse (2014) Obama’s ranking system, unlike the *U.S. News and World Report Survey* rankings will not be a measure of academic quality. Morse believes that President Obama’s ranking methodology will lead to more robust data collecting to include student indebtedness, earnings, and job attainment following graduation. Although Morris welcomes this approach he also expresses caution and encourages the Department of Education to be realistic when gathering data and whether rankings should be published. One concern is a rise in misinterpretation of data. Morris, who attended the
symposium, cautioned the department to use their power to take a much tougher stance and stop ongoing debates regarding rankings. Furthermore, Morse believes the stakes will be much higher, than in the past, due to the rankings being tied to institutional funding. Additionally areas of concern that were expressed by Morse are 1) timing of the collection and publication of the data; which the Department of Education believes will occur by 2015, 2) if the data collection will be collected by an internal or external entity, and who will supervise them, 3) the methodology, weights and percentages used in the data collection, 4) who will test the site, and 5) and how the scoring will be established (2014). According to Andrew Keller, (2014), residential scholar and director of the Center on Higher Education Reform, “Unless we tackle the supply side of higher education reform we will continue with a zero sum gain, shuffling students across institutions and wondering why education has come to a slow crawl. He believes Obama’s ranking plan promises more of the same and believes America’s students deserve better than that (Anderson, 2014).

In the field of engineering, several ranking surveys are published each year by newspapers, journals, magazines, and other publications, including but not limited to the following: Princeton Review, the U.S. National Research Council, Washington Monthly College, Trend Topper Media Buzz College Guide, Forbes Magazine, The American Council of Trustees and Alumni and the U. S. News and World Report rankings survey. The US News and World Report rankings survey (Appendix A) is considered the grandfather of rankings for higher education institutions not only because of its longevity but also due to the attention that the results of this survey receive from students; parents; donors; alumni; and, to a lesser degree, the institutions themselves.
The *U. S. News and World Report Survey* each year is distributed to 198 engineering graduate schools within the U.S. that offer doctoral degrees. The survey data from the institutions that respond are calculated based on specific percentages and weighted averages of nine indicators in the survey: (1) peer assessment, (2) recruiter assessment, (3) acceptance rates, (4) faculty resources, (5) student-to-faculty ratio, (6) percent of faculty in the National Academy of Engineering, (7) doctoral degrees awarded, (8) total research expenditures, and (9) average research expenditures per faculty member (Morse and Flanigan, 2009).

**Statement of the Problem**

Over the past decade, presidents and deans, from a variety of universities and colleges, are voicing concern as to whether the percentages assigned to current quality indicators skew the rankings and, as a result, favor larger universities. Skewed indicators may provide larger universities with advantages over smaller universities because larger universities can provide a wider range of research activities, and therefore more doctoral students are able to graduate from these larger institutions (OEDC, 2008). Additionally, a growing number of engineering deans indicate they believe the first two survey indicators (peer assessment and recruiter assessment) represent an unbalanced portion of the overall rankings score (OEDC, 2008). According to Hoover (2007), many participants view the *U.S. News and World Report* rankings survey as more of a “popularity contest” rather than an analytical evaluation of the merits of each school. In fact, many participants report that they believe the consumers of these rankings should not place as much emphasis on the rankings as they currently do and that the rankings should not carry the weight they currently do in the survey (Hoover, 2007).
Because of the influence of the *U.S. News and World Report* the rankings are exerted in recruiting graduate students and research faculty, securing funding, assessing quality, and maintaining quality assurance and accountability, university presidents and deans are expressing concern (Hoover, 2007). The argument is that the rankings are used by consumers when making college choices as well as institutions to promote their institutions. These concerns center around the inequities that are created by (1) the current method used to rank colleges and universities, (2) the percentages currently being assigned to the methodology indicators for rankings, and (3) the rankings themselves. These concerns have arisen as a result of the perception that the current ranking system favors larger universities. The Annapolis Group, which consists of approximately 130 university and college presidents from all types of higher education institutions (predominantly in the category of liberal arts), express concern regarding the unfair distribution of these percentages and the resulting inequities. Subsequently, the Annapolis Group challenged the validity of the rankings and made a concerted effort to contact other institutions and encourage them to boycott the process. The group has gained momentum, and participation in the ranking surveys has declined during the past few years. Katherine Haley Will, president of Gettysburg College and chair of the Annapolis Group, stated, “The dissatisfaction is not with the U.S. News as a magazine but with how they are claiming the conversation about who is better. We are the ones who ought to reclaim that. This isn’t a system we feel comfortable with anymore” (Hoover, 2007, para. 3). Following a two-day meeting, the Annapolis Group announced that a majority of its members, approximately 80 presidents who attended the event, would actively boycott
the *U. S. News and World Report* annual rankings by not participating in the survey (Will, 2007).

*Ad hoc* discussions occur among deans, engineering faculty and other stakeholders at the annual American Society of Engineering Educators (ASEE, 2008) state Deans Conference meetings; the Ohio Engineering Dean’s Council (OEDC) meetings; and other engineering meetings, accreditation meetings, and conference venues across the nation; however, little progress towards formally surveying deans of engineering colleges to determine what percentages and weights they believe should be assigned to each indicator in the current survey (ASEE, 2008; OEDC, 2008).

**Purpose of the Study**

The purpose of this study was to evaluate the *U. S. News and World Report Survey* questionnaire and determine what percentages and weights the engineering deans would assign to each of the nine indicators currently used in the *U. S. News and World Report Survey*. Furthermore, the study provided feedback through questions regarding removal of, adding to and ranking of the current indicators, as well as the relationship between rankings and consumer behavior theory.

**Research Questions**

The following research questions guided this study:

RQ1: What indicators did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?

RQ2: What percentages and weights did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?
RQ3: To what degree did deans of engineering institutions believe that the *U.S. News and World Report* Survey ranking system is a valid assessment of a quality engineering program?

RQ4: How satisfied were deans of engineering colleges with the *U.S. News and World Report* Survey ranking system?

RQ5: How involved did deans of engineering colleges believe they should be in the *U.S. News and World Report* ranking process?

**Theoretical Framework**

When students and parents are in the process of choosing a college or university, emotional responses are often present during every stage of the decision-making process (Mellers, Schwartz, and Ritov, 1999). Many parents and students use rankings as a rationale to “justify” their choice of institutions. According to the Higher Education Research Institute (1995), when a question about the importance of national magazine rankings in student college choice was first asked on the Cooperative Institutional Research Program (CIRP) Freshman Survey, 10.5% of incoming college students reported that such rankings were “very important” in their college decision, while almost 60% reported that rankings were not important at all. However, from 2002 to 2006, the proportion of students reporting rankings as “very important” has steadily increased (2007). Additionally, the percentage of students who reported that rankings were “very important to them varied drastically based on the type of institution that students decided to attend and the economic status of the student (Meredith, 2004).

In general, the more selective the institution was considered, the higher the percentage of students who reported that rankings were an important reason for attending
their institution of choice. In both 1995 and 2006, approximately 11% or fewer of the students at institutions that were not considered highly selective reported that rankings were “very important” to them, compared to approximately 20% or more of students at highly selective institutions (Kallio, 1995). Furthermore, in general, fewer students at public institutions and more students at private and non-sectarian institutions have reported that rankings were a “very important” factor in their choice (LaNasa and Cabrera, 2000).

In light of the large number of marketing theories available the most appropriate theoretical lens through which to explore the role of ranking systems in higher education is consumer theory. Consumer theory is a widely used tool and one of the most basic tools an economist uses in practice (Miller, 2006). One consumer theory is based on the idea of buying on emotion and subsequently justifying that decision with logic or facts (Ahearn, 2011). According to Wenger (2010), consumers rationalize their buying decisions using precise logic with purchasing decisions based on facts. However, Archer (2009) suggests the opposite--i.e., that many consumers make buying decisions based not on logic but rather on emotions. These emotions can include how consumers feel about a particular product, person, company, or institution promoting a product such as the rankings promoted by the U.S. News and World Report.

According to Kuester (2012), consumer behavior is related to the study of an individual, group, institution or organization and the steps taken to choose, secure and eliminate services, products, experiences, choices or ideas that satisfy the consumer’s desires or needs. Consumer behavior blends a series of elements to include, sociology, psychology, social anthropology and economics, and attempts to analyze and understand
the consumers decision making process both individually and in a group. The study accesses individual buyer’s characteristics such as behavior and demographics variables in order to understand consumer wants and needs. Additionally, it attempts to determine any influences on the consumer such as parents, family, friends, peer groups, and society as a whole (Kuester, 2012). In the case of the rankings, influence and prestige play an important role in the perception of the rankings by students and parents. This customer behavior is based on consumer buying behavior, with the customer (students and parents) in the role of user, payer and buyer. Many institutions believe that rankings have more to do with reputation than quality, which certainly is in line with the consumer behavior theory. According to Moschis and Moore, (1979) “The more frequently an individual interacts with peers about consumption matters, the greater is the tendency to use peer preferences in evaluating products”. This supports the belief of engineering graduate programs who believe that the rankings are more about perception and reputation than the quality of the program. Furthermore, a person is more satisfied with their purchase or decision if the purchase or decision exceeds their expectations (Westbrook, 1980). According to Solomon, (2013) consumer behavior is directly connected to buying, having, being and defines identity. Identity is an aid to marketers who strive to be elite, desirable or in the front of their peers. Consumers choose brands that match their identity or the identity they choose to be identified with. This theory involves the selection, purchase, use, and is a twofold processes. One is the consumer perspective (parents and students) and one is the marketer’s perspective (graduate engineering program institutions). From the perspective of the consumer (students and parents) there are prepurchase issues wherein the consumer needs to determine that they need the product
(in this case a graduate engineering degree). These prepurchase issues lead the consumer to seek alternative information through rankings, publications and reputational information and to make choices based on this information as well as to consider at what expense. The second stage is purchase issues such as does the purchase provide a stressful or pleasant experience, and what does the purchase say about the consumer. In the case of the rankings parents and students may look at private versus public, location, reputation and rankings. Lastly, post purchase issues such as did the product meet the consumer’s satisfaction and was it used to its full intent or was it disposed of after dissatisfaction.

From the marketer’s perspective the prepurchase issues are consumers attitudes towards their product formed and or changed? What cues do consumers use to infer which products are superior to others? Stage two involves purchase issues such as how do situational factors, such as time, pressure, or expense affect the consumer’s purchase decisions? In the case of engineering graduate programs brochures and publications to highlight the best of their program and rankings are two factors used by parents and students (OEDC, 2008) Lastly from the perspective of the post purchase issues what determines whether a consumer returns to the product and whether they will purchase the product, in this case a graduate engineering degree. Lastly, and relevant to the claim of reputation versus quality is the consumer satisfaction wherein they influence others to their purchasing decisions.

Engineering graduate programs may strive to understand the wants and needs of the consumer but needs differ depending on demographics such as age (parent versus student), gender, family structure, social class, income, race, ethnicity and geographical
location. The *U. S. News and World Report* market their rankings predominantly to the consumer. However, an institution, even if they disagree with the rankings, use a good ranking as a tool to attract parents and students to consider their engineering graduate programs. A consumer brand relationship may be used to attract parents and students who have an attachment, strong connection or affection for the institution. Such an attachment could be an alumnus of the institution, a sports team at the institution that the parent or student identifies with or a family tradition of attendance (Solomon, 2013).

Technology changed consumer behavior with instantaneous information anywhere and at any time. Social media is a fast and efficient online means of communication, conveyance and collaboration of information among interconnected and independent networks of people, communities and organizations. Gone are the days of students patiently waiting for college information to arrive by U. S. mail, or campus visits to determine what an institution offers to a potential student. Now everything is at the consumers fingertips due to enhanced technology and the capabilities and mobility it brings with it. Consumers strongly connect to other issues in their lives. The area between need and want is no longer black and white, and in the case of rankings, the differences between one engineering graduate program and another is debatable depending on which stakeholder is contributing to the debate. According to the theory of consumer behavior marketing, rankings may have some affect, however long term institutions simply do not know enough about their consumer to manipulate them. Furthermore, institutions have difficulty determining the perspective and approach of the consumer in choosing an engineering graduate degree program. A consumer who has a set of beliefs (such as reputation and rankings), that guide their understanding of the
competitive world of college choice and has a basic set of assumptions is experiencing positivism or modernism which is one of two strong approaches of consumer behavior. The other approach is interpretivism or postmodernism questions assumptions. This approach argues that societal beliefs deny the complex social and cultural world in which we really live. In the case of the rankings, parents, students, alumni and other stakeholders perceive that if it says it is so it is so. Consumer behavior is a process with many factors used in the decision making process. The decision as to what engineering graduate program a student will select may have something to do with the rankings; however consumer’s makes decisions based on other factors such as cost, location and area of specialization the institution provides.

Perception is defined as “the process by which an individual receives, selects, organizes, and interprets information to create a meaningful picture”. According to Armstrong (1991), consumer behavior is difficult to predict, even for experts in the field. Consumer’s inclination to search for information prior to a decision does allow researchers to predict choices of consumers using brief descriptions of the product the consumer is interested in (Armstrong and Overton, 1971). This process is called the selective perception process and involves selective exposure, selective attention, selective comprehension and selective retention. Selective exposure is when consumers select promotional messages they expose themselves to, such as the rankings report. Selective attention consumers select promotional messages they will pay attention to, such as the U.S. News and World Report publication and website promoting their assessment of institutions and their rankings of “the best” institutions. Selective comprehension consumers interpret messages in line with their beliefs, attitudes, motives and
experiences. This is the area in which economics begin to play a role in how the rankings are put to use when students and parents are selecting an engineering program. Lastly selective retention consumers remember messages they deem more meaningful or important to them. By this stage consumers who have ruled out “the best” due to cost, location or other considerations discard any information they have researched as their purchasing decision intentions have changed (Armstrong and Overton, 1971).

According to Khosla (2010), there are five stages in the consumer buying process: 1) problem recognition stage, which is the identification of something the consumer needs, (graduate degree) 2) search for information, which is the process of searching for information outside of personal knowledge base, (such as publications, college visits, websites and rankings) 3) alternative options, meaning whether there is another better or inexpensive product (degree) available, 4) the choice to select the product, (based on all factors found) and 5) selecting the product (Khosla 2010). These five stages show the entire process that a consumer will follow (whether they recognize it or not) when they are determining purchasing a product (Khosla, 2010). Institutions that fare well in the rankings can use the rankings to play into consumer behavior; however rankings are not the only factor when determining which college student choose. Deans would be well advised to use other measures for promoting the quality of their programs if they do not fare in the top 100 of the rankings system.

According to Solomon, Polegato, and Zaichkowsky, (2009) consumer behavior is influenced by many internal conditions such as demographics, psychographics (lifestyles), personality, motivation, knowledge, attitudes, beliefs and feelings. In the area of psychological factors this includes an individual’s motivation, perception, attitude and
beliefs, whereas personal factors include income level, personality, age, occupation and lifestyle. Lastly, behavior can also be affected by external influences, such as locality, royalty, ethnicity, culture, sub-culture, social class, past experience reference groups, market mix factors and lifestyles. The productive system is considered from the beginning at the level of production, to the end of the cycle, which is the consumer (Kioumarsi, Khorshidi, Yahaya, et al, 2009). Most if not all of the aforementioned elements and processes are in use when students and parents (consumers) evaluate and process the rankings information put forth by the *U.S. News and World Report*.

**Significance of the Study**

This research study provides previously unknown information about the percentages and weights assigned by deans of engineering schools and programs to the nine indicators in the *U.S News and World Report Survey*. This unknown information allows the researcher to compare the percentages and weights assigned to the nine indicators in the *U.S. News and World Report Survey* with the percentages and weights assigned to the nine indicators by the deans of engineering schools and programs who participated in the 2011 survey process. Additionally, this study identify (1) which indicators the deans want moved, (2) which indicators the deans want to add, (3) which of the four areas of the survey (quality assessment, student selectivity, faculty resources, or research activity) the deans prefer to see and the indicators they would add or remove, (4) and report marketing budgets for ranking initiatives and the outcomes of those initiatives, (5) determine whether feedback should be provided to the *U.S. News and World Report Survey* staff and if that feedback would be welcome, and (6) ranked the nine indicators by area of importance.
Potential stakeholders in this research study include but are not limited to deans of engineering programs and colleges, university presidents, members of the Annapolis Group, and deans of other programs and colleges. Additional stakeholders include potential students and parents identifying college preferences; alumni who may be monitoring the reputation of their alma mater and are considering making a donation in the future; politicians, academics, and other individuals who are affiliated with higher education. This research study and the data collected from the survey allow potential stakeholders to determine what the trends are in the feedback provided by the institutions. Additionally, it allows potential stakeholders to determine which areas and indicators participants consider to be relevant and which areas are considered irrelevant in evaluating a quality engineering graduate school or program by the deans of engineering.

**Research Design**

The population for this research study included the deans of engineering graduate schools or programs in the United States who returned the 2011 *U.S. News and World Report Survey* (Appendix A). Deans of schools or programs that did not participate in the 2011 survey were not included in the population.

Secondary data collected by the *U.S. News and World Report* staff in 2011 and purchased from the *U.S. News and World Report* office in 2012 was used to compare the current 2011 *U.S. News and World Report Survey* rankings with data from this doctoral research survey about preferences collected from deans of engineering colleges. The primary data collected from participants was used to determine whether and which indicators predict school rankings and if indicators do indeed predict school rankings. Additionally, the primary data provided information about which indicators the deans
would like removed, which indicators the deans would like added, and whether a relationship exists between funding and marketing efforts to improve their rankings in the *U. S. News and World Report* ranking.

Primary data collected by the researcher through a paper-and-pencil survey, (Appendix B) distributed to each dean who participated in the 2011 *U.S. News and World Report Survey*, along with correspondence explaining the purpose of the study is the survey instrument of the researcher (see Appendix D). Each dean provided general demographic information about their institution and realigned the percentages used by the *U.S. News and World Report Survey* based on what they believe to be an accurate measure of a high-quality engineering program. The data collection consisted of sending an initial request for information with additional follow-up requests. Additionally, following the initial request, those institutions who did not respond received an identical paper version of the survey after 30 days in order to increase the likelihood that as many participants as possible would participate in the study (see Appendix B). Follow-up emails and phone calls were made to institutions who did not respond in order to increase the number of responses. Using descriptive statistics and correlation analysis, comparison of the information collected through the survey to the data formerly collected by the *U.S. News and World Report Survey* for the year 2011.

**Limitations**

Although this research project has been carefully prepared, it is limited by several factors:

1. The survey instrument used for data collection in this research study was distributed to only those engineering deans of schools and programs who participated in the

2. All 198 engineering deans of schools and programs did not participate in the research study survey. Thus, the results do not accurately reflect the perspectives of the entire population regarding weights and percentages of the nine factors.

3. The instructions for completing the survey required participants to enter new percentages and weights that they would prefer in a quality engineering school or program. For each participant, these are to total 100 for weights and 1.00 for percentages. However, some participants misunderstood the instructions for completing the survey or miscalculated the weights and percentages, in which case their survey was returned for clarification or discarded. Every effort was made to provide clear instruction through a cover letter and in the survey instrument itself.

4. A significant portion of deans did not participate in the survey, either by non-response or declined in writing. The data collection process was extended (5 months) until a suitable number of responses were collected.

**Delimitations**

Lunenburg and Irby (2008) have defined delimitations as “self-imposed boundaries set by the researcher on the purpose and scope of the study” (p. 134). The delimitations of this study is based on the researcher’s interest in the degree to which deans of engineering colleges agree with the current method and system used to rank colleges and universities. Based on this topic, the researcher recognizes delimitations according to several criteria. First, this study is delimited only to deans of colleges and universities who participated in the 2011 rankings. This delimitation is set because deans of colleges
and universities who participated in the 2011 rankings are more familiar with the *U.S News and World Report* ranking system.

Secondly, the survey questions in the demographic section is delimited only to geographic location, sex of participant, title, rank, and position; however, no additional required demographic information is required from participants as it has no significance to the research questions in this study and would be acquired strictly for record-keeping purposes.

A third delimitation of this study focuses only on the percentages and weights of the indicators only in the *U.S. News and World Report Survey*. Although other ranking services and ranking systems are provided by a number of organizations and institutions, the *U.S. News and World Report* rankings is perceived as the most credible and influential among prospective college students.

**Assumptions**

This study contains several underlying assumptions about the nature of the population, the method of data collection, and the analysis procedures to analyze and interpret data:

1. The paper-and-pencil version of the survey (primary data) is completed by the same dean (or designated appointee) who completed the 2011 *U.S. News and World Report Survey*.

2. If the dean or dean appointee reassigned the weights and percentages, he or she did so based on what they believe is indicative of a quality engineering graduate program and not on their biased perspective that favors their institution.
3. If the dean or dean appointee assigned new percentages and weights, they verified that the new percentages and weights are correctly distributed to reflect a total of 1.0 for the percentages and 100 for the weights.

Definition of Terms

To avoid confusion, reduce ambiguity, and increase clarification, the following definitions will be used for the purposes of this study:

Accreditation Board of Engineering and Technology (ABET): ABET is an accreditation board that grants accreditation to engineering and technology programs across the United States.

Service Learning: Service learning is a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities. This could be accomplished through professional organizations, cooperative education experiences, internships, and senior design industry-based capstone experiences (Kuntz, 2009).

Survey Indicator: A survey indicator is one of nine measures of quality in the U.S. News and World Report Survey in which weights and percentages are assigned.

Percentages and Weights These factors are specifically assigned percentages and weights assigned to the U.S. News and World Report Survey.

Summary and Organization of the Remainder of the Study

Given the continued debate surrounding the percentages and weight assigned to the nine indicators of the U.S. News and World Report rankings, and the current influence that the rankings have among engineering colleges, it is important to address the concerns of the institutions that believe they continue to be marginalized by the current system
used to determine the rankings. The purpose of this study is to evaluate the *U. S. News and World Report Survey* and determine what percentages and weights the engineering deans would assign to each of the nine indicators currently used in the *U. S. News and World Report* survey.

This research study serves as a catalyst for discussion by stakeholders and aided in determining whether the survey tool currently used by the *U. S. News and World Report* is a fair assessment of quality engineering school rankings or whether the survey tool should be re-engineered to meet the needs of all engineering colleges nationwide.

Chapter 2 of this study addresses the literature currently in publication regarding the weights and percentages of the *U.S. News and World Report Rankings Survey* and deans perceptions of the survey and their rankings. The literature review confirms and clarifies the gap in research address in this research study.
Chapter Two

Review of the Literature

Introduction

This review presents an exhaustive review of the research literature supporting this research study. The literature review researched information currently published regarding rankings, surveys and the perceptions of deans regarding the *U.S. News and World Report Survey*. This study provided an opportunity for participants to provide feedback in regards to various aspects of the *U.S. News and World Report Survey* and its ranking of quality engineering programs. This literature review and the study that followed identified and addressed a gap identified in this body of research and literature.

This literature review presents prior research related to the topic of university and college rankings and the role these rankings have played in the decisions of consumers (i.e., students) to attend engineering graduate colleges and schools. This literature review provides background information related to undergraduate, graduate, and professional engineering education in the United States. Finally, this literature review reviews literature about accreditation and assessment in engineering graduate colleges, rankings and the impact that they have on these colleges, and the effects that rankings have on enrollment and marketing.

According to Clarke (2002), college and university rankings typically are defined as rank-ordered lists of institutions within higher education. These rankings typically are established through a combination of factors or criteria that ostensibly determine the quality or desirability of an institution relative to its constituents. In addition to providing
holistic rankings for higher education institutions (Johnson, 2006), various organizations have provided rankings for specific programs, specific departments, and specific schools. Rankings are conducted by magazines, newspapers, government offices, academic organizations, and other entities. Using surveys as their primary tool, organizations that provide university and college rankings typically have considered a variety of factors when establishing their rankings (Kuh and Pascarella, 2004), including research excellence and/or influence, student choices, indicators of student success, and demographics. Some organizations have provided rankings of institutions within a single country while others have assessed institutions worldwide. Among higher education professionals, the topic of college rankings has produced a substantial amount of debate—particularly concerning their merit as a form of evaluation, their usefulness, their accuracy, their impartiality, and their fairness (Clarke, 2002). The methods used to establish rankings have become increasingly diverse, and this diversity, along with the accompanying criticisms of each new method of evaluation, have indicated a clear lack of consensus among scholars and researchers about the value of rankings and the methods used to establish them (Webster, 1986).

**Background**

According to Morse (2007), rankings are used as a tool for setting policy, influencing student recruits and their parents, marketing schools, (consumer behavior theory) and developing resources (as cited in Ehrenberg, 2003). Research on the impact of rankings has been varied and sometimes controversial because these rankings can determine whether universities and colleges are viewed in a negative or positive light. Morse (2014) has indicated (1) that constituents within the field of higher education
widely believe that rankings enable institutions to build, maintain, or elevate their
top ranking and profile (nationally and internationally); (2) that high-achieving students
use rankings to shortlist institutional choices, especially at the postgraduate level; (3) that
stakeholders use rankings to influence their decisions about funding, sponsorship, and
employee recruitment; and (4) that high rankings bring benefits and advantages. This
clearly connects rankings with the theory of consumer behavior and the decision making
process. According to Hazelkorn, (2011) 63% of leaders within the field of higher
education said they had taken strategic, organizational, managerial, or academic action
regarding rankings, while only 8% said they had taken no action.

The biggest change in the rankings are apparent in the refocusing of resources
toward fields which are likely to be (arguably) more productive, better performers,
indicator-sensitive, and responsive. The arts, humanities, and social sciences are
especially vulnerable, particularly within institutions that have maintained a strong
presence in the bio-medical sciences and other sciences. According to Hazelkorn (2011),
professional disciplines, such as engineering, business, and education, which do not have
a strong tradition of peer-reviewed publications and interdisciplinary work, also are
vulnerable to budget cuts.

Rankings are described as an attempt to measure and compare the quality and
performance of institutions by using a range of indicators with weighted values that are
determined by the values and judgments of organizations participating in the ranking
process. A system that initially began as an informational review process by university
leaders who believed that rankings play an important role in the reputation of their
institution has now become a target for analysis by students, parents, alumni,
administrators, donors, and politicians. According to Hazelkorn (2011), a 2006 survey for the Organization for Economic Co-operation and Development and the International Association of Universities indicated that an overwhelming majority of university presidents have made efforts to improve their institutions positions in the rankings. These efforts have included, but are not limited to, reshaping the goals of their institutions; restructuring their institutions to create larger, more research-intensive colleges; and changing the balance between (a) undergraduate and graduate activities and (b) teaching and research, with the emphasis on research that generates funding. Furthermore, university and college presidents have placed researchers within departments and colleges whose research is more productive, and they have emphasized the role of faculty members who are engaged at the international level and therefore more likely to help move the indicators upward (Hazelton, 2011).

**Undergraduate Education in the United States**

In the United States, undergraduate students typically seek an associate’s or bachelor's degree. An associate’s degree typically requires two years of full-time study, usually at a community college, technical college, or trade school. A bachelor’s degree typically requires four to five years of full-time study and leads to a specific degree designation (Smith, 2004). Although most degrees at the baccalaureate level can be completed in four years, some degrees may take four and a half to five years depending on clinical requirements (such as a nursing practica), mandatory co-ops, internships, and other out-of-classroom activities needed to satisfy specific degree requirements (Unger, 2001).
No matter what academic area in which a degree is awarded, a system (or systems) of rankings sooner or later is likely to be applied to the program, college, or university awarding it. Stuart (1995) has reported that publishers of rankings tend to believe that institutions with strict admission procedures maintain higher quality. However, when ranking undergraduate institutions, Stuart also has reported that institutional profiles typically have not been taken into account, reputation has been used as an indicator of quality, and people who conduct the evaluations may be biased. According to Anions (2007), the primary aim of a university performance evaluation system should be institutional improvement through quality assurance in every process and action.

**Graduate Education in the United States**

The background of graduate education is complex, and its historical development can be traced through a variety of systems based on differing levels of study and the institutions awarding the degrees. According to Verger (1999), the history of graduate education can be traced to European medieval universities in which a bachelor’s degree required six years to complete; an additional 12 years was required to obtain a master’s or doctoral degree. In this system of education, the first six years of a student’s academic pursuits required studying the seven liberal arts: arithmetic, astronomy, geometry, grammar, logic, music theory, and rhetoric. The focal point of these studies centered on logic. Completion of the bachelor’s degree allowed students to choose between three areas of study in pursuit of master’s or doctoral degrees: law, medicine, or theology (Verger, 1999).

When graduate higher education was introduced in the United States in 1876, the role of organized Christianity played a significant role in eight of the nine initial
institutions; naturally, as a result of this traditional focus, theology was emphasized in
graduate higher education (Kelly, 2002). Obtaining a master’s degree or doctorate
enabled the degree holder to profess that he or she was a “master” of the subject and
therefore able to teach as an expert on the subject matter. Graduate education was
formally introduced when Johns Hopkins University was first established in 1876. Johns
Hopkins was modeled after a German research university and did not originally include a
college but instead focused on preparing a few researchers to become leaders in the field
of science and medicine (Good and Teller, 1973). For the next two centuries, private
institutions, primarily supported by private donors and churches, began to emerge in the
United States. At the end of the 1800s, many state colleges and universities were
established across the United States. The passage of the 1862 Morrill Act (Land Grant
College Act) enabled each eligible state to obtain 30,000 acres of federal land per
congressional delegation membership. This led to more than 70 land grant colleges and
universities and required the institutions to focus on practical education of the industrial
classes in the pursuit and professions in life (Thelin, 2006).

Birnbaum (1991) indicated that by the late 1800s, checks and balances had been
instituted to ensure institutions were maintaining an appropriate standard of teaching.
These standards were largely maintained in-house or in-state and represented an informal
evaluation of institutions and their performance and rankings were not yet established.
According to Birnbaum (1991), because faculty became more professionalized in the late
1800s, there was a concerted effort among faculty to obtain greater authority over the
decision-making process. The increase in the number of colleges and universities led to
formal guidelines and a focus on governance at each institution. This also led to a
standardized form of evaluation. Rankings eventually were incorporated in this evaluation in the 19th century, with Carnegie classifications assigned to institutions (Birnbaum, 1983) and continuing with the expansion of the numerous ranking systems used today.

**Professional Education in the United States**

In the late nineteenth century, according to Eby (1952), modern professional education was developed by educators who were talented in their fields, but their teaching methods, presentation of materials and presentation of professional education were not always the most conducive to educating students in their classrooms. However, the decisions and actions they took back then have continued to influence the professional education experience that students and teachers encounter today (Little, 1993). According to Neumann (2011), educational programs in the medical, legal, and architectural professions were some of the first to be developed.

According to Fromm, (2003) the end of World War II, there was an emphasis on engineering science in the field of engineering education. At first, this emphasis enhanced the quality of engineering education; however, after years of increased focus on science engineering, engineering education at the undergraduate level began to suffer from a lack of qualified instruction related to practical engineering applications, and the undergraduate engineering experience became much more fragmented. According to Ferguson (1987), this atomistic approach was one in which “schools break knowledge and experience into subjects, while consistently turning wholes into parts, flowers into petals, history into events, without ever restoring continuity” (p. 379). In the 1980s, many different organizations, including both research institutions and professional associations,
conducted studies in an attempt to resolve the educational problems in the engineering field. Though researchers conducted their research independently, they arrived at several common conclusions.

According to Fromm (2003), researchers agreed that the engineering schools should continue to provide solid basic theory knowledge. However, they also called for added emphasis on synthesis and design understanding as well as increased exposure to societal context and interdisciplinary teamwork. Later reports reiterated the need for more exposure to contexts in which engineering principles were applied as well as the need to make engineering more attractive and relevant to students (ASEE, 1994). According to Hissey (2000), researchers also reported the need for engineering students to develop professional and interpersonal skills. The programs, activities, curriculum, and requirements for engineering programs today reflect an effort to solve the engineering education problems found in these past studies. For the most part, engineering educators viewed service-learning (a term used to describe engineering professional development) as a way to enhance their programs by exposing students to a variety of unique, interesting, and practical engineering contexts while additionally giving them a chance to develop professional and interpersonal skills. These outcomes are published in the online Accreditation Board for Engineering and Technology (ABET) standards for engineering schools.

For engineering programs to obtain and maintain accreditation, ABET requires that the program “demonstrate that their students attain the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context” (Elizandro, Matson and Fraser, 2005).
As much as engineering schools would like to offer all branches of engineering to their constituencies, the community is best served by choosing areas of excellence in which the institution can perform well and in which the institution can gain a solid reputation. According to the Harvard School of Medicine (2012), an area of excellence should represent major areas of achievement and impact, including a consideration of the quality as well as the quantity of contribution. By focusing on the quality as well as the quantity of programs, institutions are more likely to receive excellent evaluations during the ABET process and perform well in the rankings.

Engineering Graduate Education in the United States

Brozino (2006) noted that with the rise of engineering as a profession in the eighteenth century, the field of engineering became specialized, with separate fields designated for (1) civil engineering, (2) chemical engineering, (3) electrical engineering, and (4) mechanical engineering. He further noted that the increase in the number of individuals entering the profession was due to the building up the technological sciences, which were placed in the engineering profession. Each discipline incorporated mathematics and science into each specialized program. Beyond these four major branches of engineering, others include biomedical engineering, computer and computer science engineering, industrial engineering, and environmental engineering. New specialties sometimes merge a standard branch of engineering with a new area to form a new branch of engineering, such as “biomedical” or “biomechanical.” For each of these existing and new fields, an overlap is created, especially when branches of engineering are combined with scientific disciplines, such as physics, chemistry, and mathematics (Bronzino, 2006).
Engineering graduate education in the United States consisted of studying for either a master’s degree or a doctorate (Bowen and Rudenstein, 1992). Historically, entering these engineering graduate programs has typically required an undergraduate or bachelor’s degree in the field of engineering, physics, biology, or chemistry. In the United States, this level of study generally has been referred to as graduate school (Bloom, Karp, and Cohen, 1999).

All graduate programs maintain similar admission requirements; however, the importance of these requirements may differ between departments, colleges, and universities. According to Ingram (1983), admission to graduate-level programs typically requires a bachelor’s degree and high grades in the core curriculum of students’ undergraduate degree. Additionally, Ingram has indicated that the Graduate Record Examination (GRE) is required by all engineering graduate programs. Letters of recommendation from undergraduate teachers are crucial as are strong letters from supervisors, mentors, and individuals students have worked with on undergraduate research projects. This process allows applicants an opportunity to display their capabilities in the area of research. Certainly within the sciences and engineering, previous research experience is valued and illustrates students’ ability to conduct research and handle the pace of a graduate-school experience. Most universities also require students to prepare a statement of purpose in which they share their research interests, the reasons they want to pursue a graduate education, and short- and long-term goals (Bloom, Karp, and Cohen, 1999). Students must meet minimum test scores and minimum grade point averages in their undergraduate degree programs to earn acceptance into
engineering graduate programs. Applicants from non-English-speaking countries often must take the Test of English as a Foreign Language (Sharpe, 2011).

According to the Council for Graduate Schools (2011), admission decisions are normally made by the engineering department. Most universities follow the Council of Graduate Schools’ Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants. According to Branstetter and Handelsman (2000), once the engineering graduate student arrives many perform duties for the department, such as part-time teaching, grading, and tutoring. Students may also be promoted to a lecturer status, which comes with more responsibility.

Doctoral students generally spend their first two to three years completing coursework and begin conducting research by their second, year, if not before (Branstetter and Handelsman, 2000). In the second and third years of study, doctoral programs often require students to pass additional examinations. Programs often require a qualifying examination, designed to ensure students have acquired a broad base of knowledge in their chosen field or profession. Engineering qualifying examinations are normally written examinations prepared by the graduate faculty of the department within each discipline. The successful completion of these qualifying examinations is a substantial milestone toward graduate degree completion. Additionally, when they pass their qualifying examinations, students may begin research and are raised to the status of a doctoral candidate. (Nesler, Aguinis, Quigley, Lee, and Tedeschi, 1996)

After successfully completing the qualifying examination, doctoral candidates often spend the next several years conducting research and documenting their findings. This
can take anywhere from three to five years depending on the thesis topic, the departments in which students are housed, the nature of their research, and many other factors (ASEE, 1994).

In total, most life scientists will invest 12 to 14 years in low-paying training positions, and only 14% will obtain tenure-track jobs (Benderly, 2010). The average age at which life scientists obtain their first R01 grant to conduct independent research is now 42 years old. According to the National Institute of Health, Department of Health and Human Services (2012), the Research Project (R01) grant is an award provided to support a discrete, specified, circumscribed project to be performed by the named investigator(s) in an area representing the investigator's specific interest and competencies, based on the mission of the National Institute of Health.

Doctoral graduates either continue on to conduct postdoctoral work enter the teaching profession in either tenure-track or non-tenure-track positions, or enters the workforce in either industry or government positions in their areas of research. Doctoral graduates, the research they are connected with the assistance they give their faculty advisors are essential to the information reported on surveys ranking institutions.

**Engineering Standards Professional Associations**

Engineering professional organizations play an important role in the careers of practicing engineers. According to the Grainger Engineering Library Information Center (2012) these professional organizations are established for engineers within various disciplines. In these professional organizations, standards of professionalism regarding the field or fields of engineering are determined. Some organizations represent several fields of engineering, such as the Society of Women Engineers (SWE), while others
represent a specific discipline, such as the American Society of Mechanical Engineers (ASME). Many of these professional associations award professional designations, such as European Engineer, Professional Engineer, Chartered Engineer, Incorporated Engineer, or another similar title. There are also many student-run engineering societies, commonly accessible at universities or technical colleges, which lead to participation and membership after candidates successfully complete their degrees and at the onset of their entrance into the workforce.

In the United States, professional designations include (in ascending order) student member, professional member, associate fellow, and fellow. Additionally, the Fundamentals of Engineering Examination (FE) and Professional Engineering Examination and Licensure (PE) are connected to these standards of professionalism. These organizations are connected to engineers’ professional status and are in no way connected to academic achievement or honors. Separate honor societies provide academic recognition prior to engineers’ departure from higher education.

These professional associations, sometimes called professional bodies, professional organizations, or professional societies, are normally not-for-profit organizations whose goals are to promote the profession of engineering among the membership and the community as a whole and to provide professional education opportunities. According to Harvey and Mason (1995), these organizations and associations are defined as groups of people “in a learned occupation who are entrusted with maintaining control or oversight of the legitimate practice of the occupation” (p. 12). These authors have noted that these organizations are also a body acting “to safeguard the public interest organizations, which represent the interest of the professional practitioners” and so act to maintain their own
privileged and powerful position as a controlling body (Harvey and Mason, 1995, p. 15). Although professional organizations and involvement in these organizations are not directly related to rankings, they do provide opportunities for continuing education and opportunities for networking. These opportunities could lead to research and funding opportunities and ultimately improve the quality and increase the funding of engineering educators.

**Accreditation in Engineering and Engineering Technology**

Accreditation is the single most important goal of all engineering programs; even over any type of rankings. Although the rankings are watched and given their due attention, accreditation is where most effort is invested by staff, faculty and the administration of an engineering college or program.

Currently, ABET (2012) accredits more than 3,100 programs at more than 600 colleges and universities worldwide. Each year, more than 2,000 volunteers from 29 member societies contribute to ABET's goals of leadership and quality assurance in applied science, computing, engineering, and technology education. ABET is a federation of 30 professional and technical societies (29 members and one associate member). Most member societies have curricular responsibilities--that is, they recruit, select, mentor, and assist in training qualified program evaluators who, along with team chairs, comprise the accreditation review teams. Additionally, ABET member societies also make nominations to the four ABET Accreditation Commissions (the Applied Science Accreditation Commission, the Computing Accreditation Commission, the Engineering Accreditation Commission, and the Technology Accreditation Commission)
and the ABET Board of Directors. ABET has been recognized by the Council for Higher Education Accreditation (CHEA) since 1997 (2012).

According to Engineering Criteria 2000 (EC2000), in 1997, following nearly a decade of development, ABET adopted EC, considered at the time a revolutionary approach to accreditation criteria. EC2000 focused on what is learned rather than what is taught. At its core was the call for a continuous improvement process informed by the specific mission and goals of individual institutions and programs. Lacking the inflexibility of earlier accreditation criteria, EC2000 meant that ABET could enable program innovation rather than stifling it as well as encourage new assessment processes and subsequent program improvement (Johnson, 1998).

Today, according to Lattuca, Terenzini, and Volkwein (2006), the spirit of EC2000 can be found in the evaluation criteria of all ABET disciplines, and studies like Penn State’s Engineering Change have provided evidence that those criteria are having an impact on accredited programs. ABET encourages the EC2000 perspective with other accreditation boards and degree programs, promoting global education and worker mobility through agreements like the Washington Accord (Lattuca, Terenzini, and Volkwein, 2006).

In the United States, accreditation is a non-governmental, peer-review process that assures the quality of the post-secondary education that students receive. Educational institutions or programs volunteer to undergo this review periodically to determine whether certain criteria are being met. Outside the United States, accreditation is not necessarily voluntary or non-governmental. It is important to understand, however, that accreditation is not a ranking system (ABET, 2011). According to the ABET 2000
criteria document, accreditation is simply assurance that a program or institution meets established quality standards.

ABET (2011) accredits post-secondary degree-granting programs housed within regionally accredited institutions. ABET accredits programs only, not degrees, departments, colleges, or institutions. The quality standards programs must meet to receive ABET accreditation are set by ABET professions themselves. This is made possible by the collaborative efforts of many different professional and technical societies. These societies and their members work together through ABET to develop the standards, and they provide the professionals who evaluate the programs to make sure they meet those standards (ABET, 2011). Accreditation is important because it helps students and their parents choose quality college programs; accreditation enables employers to recruit graduates they know are well-prepared and is used by registration, licensure, and certification boards to screen applicants. Furthermore, accreditation gives colleges and universities a structured mechanism to assess, evaluate, and improve the quality of their programs. Accreditation is a voluntary process on the part of institutions.

To employers, graduate schools, licensure organizations, certification, and registration boards, graduation from an accredited program signifies adequate preparation for entry into the profession. Furthermore, many of these groups require graduation from an accredited program as a minimum qualification.

Seeking accreditation not only adds value to institutions but also provides them with a structured mechanism to assess, evaluate, and improve the quality of their programs. Accreditation helps students and their parents choose quality college programs. Accreditation enables employers to recruit graduates they know are well prepared
because state accreditation assures that a program has met quality standards set by the profession (Pradios, Glazer and Kryer, 2007). Considering what is at stake, accreditation would seem far more significant to programs than rankings as a method of evaluation.

**Assessment**

Educational assessment is the process of documenting, usually in measurable terms, knowledge, skills, attitudes, and beliefs. Assessment can focus on individual learners, the learning community (class, workshop, or other organized group of learners), institutions, or the educational system as a whole. According to Black and Williams (1998), the term “assessment” is generally used to refer to all activities that education professionals use to help students learn as well as to gauge student progress.


Assessment in engineering programs is tied closely to the ABET accreditation process and is clearly defined. ABET accreditation has forced institutions to focus on programs and institutional assessments of student learning. Assessment consists of evaluation in several categories, including institutional mission, educational objectives, learning outcomes, performance criteria, educational practices and strategies.
Assessment also includes collecting and analyzing data, interpreting evidence, and providing feedback for quality assurance.

Assessment planning begins with the institutional mission statement. The institutional mission statement describes the communities that are served, institutional purposes, and other characteristics that define the institution. Educational objectives are statements that describe the expected accomplishments of graduates during the first few years after graduation—usually 3-5 years. These objectives should be consistent with the mission of the program and the institution. Educational objectives need to be assessed and evaluated periodically. This evaluation is generally accomplished through alumni, employer, recruiter, and/or advisory board assessment. The objectives should be evaluated on a systematic basis to determine their continued relevance to the needs of constituents. This evaluation should be completed every 3-5 years. According to Spurlin, Rajala, and Lavelle (2008), learning outcomes are statements that describe what students are expected to know and/or be able to do by the time they graduate.

Because ABET has established criteria to evaluate program assessment, educational objectives, student outcomes, and continuous improvement, engineering colleges and schools have established clear purposes and set goals. According to Knight and Yorke (2003), assessment planning begins with the institutional mission statement, which describes the communities that the institution serves, the purposes of the institution, and other characteristics that define the institution.

Student outcomes are a key component to the assessment process. These outcomes typically consist of succinct statements that describe what students are expected to know and be able to do by the time of graduation. These outcomes relate to skills, knowledge,
and behaviors that students acquire as they progress through the program. According to ABET (2011), student outcomes should be defined in order for faculty to have a common understanding of the expectations for student learning and to achieve consistency across the curriculum, as measured by performance indicators. Performance indicators represent the knowledge, skills, attitudes, or behavior students should be able to demonstrate by the time of graduation. These skills, attitudes, or behaviors are indicators of competence related to the outcomes (ABET, 2011).

According to ABET, (2011) understanding the alignment between educational practices and strategies promotes efficient and effective assessment practices. These practices can be developed by linking educational strategies (which could include co-curricular activities) to learning outcomes. Additionally, strategies for data collection and analysis should be systematic and consistent, and they should focus on assessment related to the performance indicators. Furthermore, evaluation of assessment findings is used to determine the meaning of the assessment results. This evaluation includes the implications of assessment results related to program effectiveness and recommendations for improvement in areas of weaknesses. Once the results are gathered, the information and results can be used to make decisions regarding continual improvement. This feedback process is critical to creating and maintaining a systematic quality assurance system. When successfully implemented, all elements of the quality assurance process interact with one another (ABET, 2012). One advantage to using the ABET 2000, (2011) process and criteria is the support and resources readily available to those participating in the process. Knowledgeable evaluators undergo extensive training before they participate in site visits and evaluate engineering higher education institutions.
Although no system is perfect, the ABET 2000 accreditation system incorporates the majority of assessment practices needed to evaluate programs. Simply put, accreditation is value. It is proof that a collegiate program has met certain standards necessary to produce graduates who are ready to enter their professions. Students who graduate from accredited programs have access to enhanced opportunities in a variety of areas, such as employment and mobility, and they ultimately provide a positive impact on society. ABET is an integral part of each of these areas because they accredit more than 3,100 applied science, computing, engineering, and technology programs at more than 650 colleges and universities in 23 countries worldwide. More than 85,000 students graduate from ABET-accredited programs each year (2011).

ABET impacts students, programs, and institutions as well as the public and professionals who work in the areas of business, industry, and government. Accreditation is an assurance that the engineering professionals who serve communities within the United States have a solid educational foundation and are capable of leading the way in innovation, emerging technologies, and in anticipating the welfare and safety needs of the public. According to ABET (2009), if the ABET process was as widely known and marketed as its rankings are, students, parents, alumni, politicians, and other stakeholders would capture an accurate portrait of an institution’s program quality (ABET, 2009).

**International Rankings**

With the arrival of each new academic year, in much of the world, the rankings season is under way. According to Altbach (2011), the major international rankings, such as Academic Rankings of World Universities (ARWU), which are informally known as the Shanghai Rankings, the QS World University Rankings, and the Times Higher
According to the International Higher Education Journal (2011) the investments that countries such as China, Korea, Singapore, Hong Kong, South Korea and Taiwan have made in their institutions the past several decades have significantly improved their universities, much like the improvement initiated by Japanese universities 10 – 15 years ago. The improvement of these universities is partly reflected in the rankings, however according to Altbach, (2011) it is not easy to remove those institutions that are at the top.

According to Jin and Shen (2012), The Academic Ranking of World Universities, which was published initially by Shanghai Jiao Tong University in China, is well known in the field of international higher education. However the Chinese national university rankings have the greatest influence among students and families. Once a student chooses an institution in China it is very difficult to transfer. Furthermore there are only a few Chinese universities on the world university rankings list so the choices are limited.

According to Bowman and Bastedo (2011), institutional leaders all over the world are quite concerned about their ranking. They believe that many constituents within and outside of higher education look to international and national rankings to reveal which
universities are good and what universities are great. If this is the case and Bastedo and Bowman are correct then rankings may become virtually synonymous with institutional ranking over time (2010).

**National Rankings**

According to McDonough, Antonio, Walpole, and Perez (1998), college rankings are a persistent influence in the field of higher education. In 1995, more than 40% of students entering their freshmen year reported that national college rankings were of some importance or very important when choosing the institution in which they would enroll. According to Bowman and Bastedo (2008), a study conducted in 2010 at the University of Michigan confirmed that rankings in the United States have resulted in a significant change in college applications and admissions each year. Researchers found that moving onto the front page of the *U.S. News and World Report* rankings provides a substantial boost in the following year’s admissions indicators. In addition, the effect of moving up or down within the top tier has a strong impact on institutions ranked in the top 25, especially among national universities. In contrast, the admissions outcomes of liberal arts colleges—particularly those in the lower half of the top tier—were strongly influenced by institutional prices (Bowman, and Bastedo, 2008).

According to the Higher Education Research Institute (2007), in the last 10 to 12 years, college rankings and the weight they carry with students and parents have intensified. Beginning in 1995, the number of students who indicated that rankings were important when choosing their institution of higher learning had increased by more than 50% (Higher Education Research Institute, 2007). Furthermore, according to Marklein (2007), the *U.S. News and World Report* website has reported that the section on
America’s Best Colleges has been accessed millions of times every month. According to Thacker (2005), the increased attention that has been directed towards the use of rankings (coupled with the increasing criticism by many institutions, specifically the Annapolis group) has brought the role, importance, and validity of rankings to the forefront of higher education. Since 1983, America’s best-known college and university rankings are conducted by the *U.S. News and World Report*. Considered the “granddaddy of the college rankings” (Cooper, 2010), these rankings are considered the most influential of all college rankings. The *U.S. News and World Report* rankings are based upon data that the *U.S. News and World Report* collect from each educational institution either from an annual paper-and-pencil survey or from the institution’s website. Additionally, *U.S. News and World Report* also incorporate opinion surveys of university faculty and administrators outside the institution. According to the *U.S. News Rankings Are Out* (2011), the college rankings have been published all but one year since 1983 (not published in 1984).

According to Morris (2010), the influence of the *U.S. News and World Report* rankings has pressured some universities to set specific goals to reach a particular level in the *U.S. News and World Report* rankings. According to Jaschik (2007), Arizona State University has linked the salary of the university president to an increase in standings in the *U.S. News and World Report* rankings. In addition, according to Lederman (2009), Clemson University formally announced it would set an institutional goal to rise to the top 20 in the rankings. The university announced specific detailed plans in order to perform better in the *U.S. News and World Report* statistical analysis, including altering the way teacher salaries were presented and lowering the number of students per class.
section, and in 2010, President Robert Fisher of Belmont University stated, “Rising to the Top 5 in the U. S. News represents a key element of Belmont’s Vision 2012 plan” (Hieb, 2010, para. 8).

The methodology used by the *U. S. News and World Report (2011)* has been modified several times, and the information and data collected from the different institutions and organization are not all available to the general public. The way schools are ranked has been modified since their inception in 1983. For several years, the information was divided into quartiles, with the schools in the highest quartile, or “First Tier,” ranked from 1 to 50. All schools in the lower three quartile were simply identified as “Second Tier,” “Third Tier,” and “Fourth Tier.” However, the system was dramatically changed when the 2011 rankings were calculated; schools in the top three quartiles are now ranked from 1 to 191, and schools in the fourth quartile, which are the bottom 25%, are now designated as "Second Tier" institutions (2011).

The fundamental elements in the *U.S. News and World Report* rankings consist of nine indicators assigned percentages and weights (%) associated with each indicator. For example, peer assessment, which is a survey of the institution’s reputation among presidents, provosts, and admissions deans of other institutions, comprises 15% of the overall rankings. Guidance counselor assessment, which is a survey focusing on the institution’s reputation among approximately 1,800 high school guidance counselors across the U.S., comprises 7.5% of the overall rankings. Retention, which is measured by a six-year graduation rate and first-year student retention rate, comprises 20% of the overall rankings. Next are faculty resources, which focus on average class size, faculty salary, faculty degree level, student-to-faculty ratio, and proportion of full-time faculty,
comprises 20% of the overall rankings. Student selectivity based on standardized test scores of admitted students, proportion of admitted students in upper percentiles of their financial resources based on per-student spending comprises 10% of the overall rankings. Graduation rate performance, which is based on the difference between expected and actual graduation rates, comprises 7.5%, and the alumni giving rate comprises 5% of the overall rankings. *U.S. News and World Report* determined the relative weights of these factors and, over time, have changed them.

According to the National Opinion Research Center (2005), this reviewed the methodology and weights assigned to the nine indicators, “The weights lack any defensible empirical or theoretical basis” (para. 20). According to the methodology used in 2005 by the *U. S. News and World Report*, the first four factors account for the majority (80%) of the *U.S. News and World Report* ranking. The “reputational measure,” which surveys high-level administrators at similar institutions about the perceived quality of each college and university, is particularly important in calculating the final ranking. By itself, this “reputational measure” accounts for 25% of the ranking when using the 2005 methodology.

Given the *U.S. News and World Report* weighting methodology, Thompson (2003) reported in a *New York Times* article that “it’s easy to guess who is going to end up on top: the Big Three, Harvard, Yale and Princeton, round out the first three essentially every year” (p. 24). When questioned about how he knew whether his methodology was accurate, Mel Elfin, who is the founder of the ranking system, answered, “I knew it was [accurate] because those three schools always land on top” (Thompson, 2003, p. 24). However when Amy Graham, the lead statistician, changed the formula to one she
considered more statistically valid, the California Institute of Technology jumped to first place. When Graham left *U.S. News and World Report* the following year, the system was modified, and Princeton was pushed back up to the number-one position the next year (Thompson, 2003). Researchers at the University of Michigan analyzed the effects of the *U.S. News and World Report* rankings, and they concluded that the rankings had a lasting effect on college applications and admissions for students in the top 10% of their class. Additionally, these researchers found that rankings influence survey responses by college presidents regarding the reputation of peer institutions and that rankings and reputation are becoming much more similar over time (Bowman and Bastedo, 2008). Sharp (n. y.) has indicated the importance that reputation plays in higher education. “We operate on the thesis that reputation matters, because the name of the institution that appears on your resume after graduation can open doors and impress people. And, at its worse, a college’s reputation can raise questions about you, like the pro quarterback who was always announced as having gone to “defunct Milton” (para. 5). One southern college put the magazine’s cover on a billboard when a favorable ranking appeared.

An additional method pioneered was the use of choice modeling to rank colleges. This method statistically analyzed the decisions of 3,240 students who applied to college in 1999 (Avery, Glickman, Hoxby, and Metrick). According to Avery, Glickman, Hoxby, and Metrick (2013), MyChances.net adopted a similar approach in 2009. The study analyzed the choices made by students admitted to multiple colleges. The college they attended became “the winner,” and the ones they were accepted to but did not attend became “the losers.” An Elo rating system was used to assign points based on each win or loss, and the colleges were ranked based on their Elo points. A useful consequence of
the use of Elo points is that they can be used to estimate the frequency with which students, upon being admitted to two schools, will choose one over the other.

Rojstaczer (2011) has argued that the *U.S. News and World Report* ranking are fair and relevant while others have argued that the rankings are about money and that more money is what “buys” universities their rankings. The Annapolis Group met in June of 2006 and formally endorsed the idea of moving away from the *U.S. News and World Report* survey and toward providing information to students that is easily accessible, comprehensive, and quantifiable. The Annapolis Group has recommended that this information be obtained through the National Association of Independent Colleges and Universities and the Council of Independent Colleges. The support of this approach has been widely considered by university presidents who would like to remove themselves from the *U.S. News and World Report* process while still providing information to their constituencies (Rojstaczer, 2011). Without an alternative method of providing information to future students and parents, university presidents were hesitant to support the idea of distancing themselves from the *U.S. News and World Report* rankings (Jaschik, 2007) “The presidents agree that prospective students must have accurate information about colleges, and there is no single measure of educational excellence,” said Anthony Marx, president of Amherst College, via e-mail. “We would like to see the rankings improved, and we should provide our own more detailed information. I hope that any rankings or templates of data will drive us to compete on the quality of education, access and citizenship, not just how many students we reject or how much money we spend (as cited in Jaschik, 2007, para. 8).
U.S. News and World Report editor Brian Kelley issued a statement that said the following:

We at U.S. News appreciate the continued support of college and university presidents -- including the Annapolis Group members -- in the rankings process. We applaud any initiative in the higher education community -- whether an academic institution, a government agency or news organization such as ourselves -- to improve and expand accountability measures that help consumers make important decisions. (para. 10)

Kelley further stated that the magazine welcomed ideas about “refining and improving” the rankings so that they could provide “consumers with factual, accurate, easy-to-navigate information that will help them with a hugely important life choice” (as cited in Jaschik, 2007, para. 10).

The U.S. News and World Report rankings have made college administrators angry for years. Because U.S. News and World Report rewards colleges that attract students with high SAT scores and colleges that reject lots of applicants, colleges are accused of “trying to purchase the academically meritorious students” (Jaschik, 2007, para. 18), offering merit scholarships to students who might not need the aid. However, in May of 2007, a movement began with the release of a statement by 12 college presidents. The statement encouraged colleges and universities to suspend all participation in what they considered a reputational survey based on information that was either incomplete or unavailable and to stop using the ranking in their marketing materials. This movement was spearheaded by the founder of the Education Conservancy, Lloyd Thacker, (2005)
whose work is centered around making the admission process less focused on competition and prestige and more focused on education (Jaschik, 2007). Thirty seven college presidents signed the letter against the rankings. Initially the group was mostly liberal arts colleges in the Annapolis Group; however, momentum has picked up among colleges and universities distancing themselves from the U.S. News and World Report rankings. As Thacker (as cited in Jaschik, 2007) has indicated, “The purpose of education is lost to prestige in ranking recruitment wars” (para. 16). According to Thacker, (2008) by providing prospective students with accurate information about colleges, parents and students will rest assure there is no single measure of educational excellence.

According to Hoover (2007), Chris Nelson, president of St. John's College in Annapolis and outgoing chair of the 2007 Annapolis Group, indicated he was pleased with the support and intense interest the university presidents showed in addressing issues related to the U.S. News and World Report rankings. Nelson indicated that the presidents are energized about the issue because they realize “the lack of any evidence that the information collected has anything” to do with educational quality (Hoover, 2007). MaryAnn Baenninger, president of the College of Saint Benedict, said she left the meeting in Annapolis believing her college should not participate with the U.S. News and World Report rankings in the future (Hoover, 2007).

**Impact of Rankings**

According to Hazelkorn (2011), university rankings have gained popularity because they appear to provide they type of information students, parents, policymakers, employers, and other stakeholders are looking for when researching institutions. For better or worse, university rankings play an important role in shaping institutional
reputations. Despite the popularity of rankings, understanding the influence and impact of rankings has become necessary in order to gauge how important the rankings are to institutions (Hazelkorn, 2011).

According to Clarke, (2007) over the past twenty years, rankings of higher education institutions and programs have appeared around the world. These rankings are produced by newspapers, research centers, magazines, and governments, and they have become increasingly important tools of information for prospective students and their parents as well as marketing devices for institutions that are highly ranked. Several trends in the higher education arena have fueled the increased demand for rankings, including increasing participation rates, higher costs and the attitude of student consumers who expect value for money. According Clarke (2007), institutional and program rankings influence students’ ability to access and decisions about U.S. higher education. Rankings also impact students’ opportunities after graduation in terms of placement success and earning potential. Clarke has further noted that the likely effects of the newest addition to the ranking scene--the so called “world rankings”--may influence access, choice, and opportunity outcomes on a global scale. Clarke has indicated that most critiques of rankings focus on the validity of the indicators and weights used to create the rankings; however, Clarke focused on how the rankings impact students. Furthermore, critics also point out that rankings tend to most advantage high-income and high-achieving students and to most disadvantage minority students and those from low-income homes (Clarke, 2004).

According to Woolridge (2005), institutions primarily are concerned about the impact that rankings have on their reputations and programs. Wollridge has suggested
that some institutions believe that rankings influence their admission, enrollment, and reputation; while others believe rankings have little impact due to how institutions and program information reported and the validity of indicators and weights. Information can be manipulated year to year in order to increase enrollment figures. The expanding diversity in rating methods and the accompany criticisms of each method have indicated a clear lack of agreement about the role of rankings and the impact they have on individual institutions and programs (Woolridge, 2005).

According to Wheeler (2010), the importance of rankings may not influence an institution’s national reputation as much as some universities originally thought. According to a 2010 survey of 49 of the 137 top-ranked universities, these institutions reported that they noticed little or no impact on their reputation with their home constituents from either an increase or decrease in institutional rankings (Wheeler, 2010). However, the institutions did report that an increase in their rankings often resulted in an increase in the number of applications coming from international students. The increase in rankings also aided in forming international partnerships between institutions and research-based industries. According to Wheeler (2010), in short, ranking increases seem to have a more pronounced influence on international audiences then they do on domestic audiences (Wheeler, 2010).

According to Boeckenstedt (as cited in The Worden Report, 2012), “The reliance on this [rankings] is out of hand... It’s a nebulous thing, comparing the value of a college education at one institution to another, so parents and students and counselors focus on things that give them the illusion of precision”. According to Messick (1989), the mixed feelings in the academic world were summed up in a report last year by the National
Association for College Admission Counseling. The report stated that most college admissions officers and high school counselors have a low opinion of the *U.S. News and World Report* rankings, yet they use the published material, whether to gather information about other schools or to market their own: “To appraise how well [a measuring instrument] does its job, we must inquire whether the potential and actual social consequences of... interpretation and use are not only supportive of the intended... purposes, but at the same time are *consistent with other social values*” (para. 9).

Messick, (1989) indicates that whether these outcomes are deemed appropriate depends, in large part, on the value system that comes to characterize the global higher education environment.

Clearly the impact of rankings effects the decision making process of the consumer when deciding on which engineering program and institution they will choose, as well as how institutions use the rankings to attract students. At what stage the impact of rankings and consumer behavior remain together or separate depends on individual factors per consumer and their individual needs and capabilities.

**Enrollment Management and Marketing**

“Enrollment management” is a term used frequently in the field of higher education. Maguire (2010) first introduced the concept in the mid-1970s. According to Maquire, since that time, hundreds of colleges and universities have implemented systematic, researched-based enrollment management practices. The term “enrollment management” refers to well-thought-out strategies, plans and tactics that aid in shaping the enrollment of an institution and align with institutional goals. Enrollment management includes marketing, admission policies, retention, and financial aid. It is characterized by
informed collection, analysis, and use of data to predict successful outcomes. Outcomes that are successful are continued, expanded upon, or changed to yield new and different results. According to Maquire (2010), enrollment management is a continuous process focusing on recruiting students on a continual basis.

Attention on enrollment management has increased in recent years as budgets are reduced and competition for the best and brightest students has increased. Institutions have created offices solely dedicated to the mission of recruiting the best and brightest students. Enrollment management offices encompass offices of admissions, registration, financial aid and other student-related services. Marketing and communication offices also increasingly are placed under the auspices of enrollment management. Common goals include improving the number of inquiries, application, and enrollment stages; increasing net revenue by increasing the number of entering students able to pay for most or all of their unsubsidized tuition; and increasing demographic diversity, retention rates, and applicant pools (Seidman, 1995) According to Quirk (2005), “The more advanced enrollment managers tend to focus as much on retaining admitted students as on deciding whom to recruit and accept. Furthermore, they smooth out administrative hassles, guarantee at risk students and the advising and academic help they need, and ensure that the different parts of the university’s 26reacracracy work together to get students out the door with a degree” (Quirk, 2005, para. 26).

Some of the strategies used by enrollment management offices to recruit students include highlighting successful alumni who are well known in their fields of study; providing I pads, laptops, or other technology-based giveaways; and promoting alumni statistics and institutional rankings (Merante, 2009). Rapid advancements in technology
have changed the approach enrollment management offices have taken, and they recently have employed a more interactive and aggressive strategy.

Universities, including highly ranked ones, have taken issue both with the process and data being used by some ranking organizations. Of particular concern has been the methods organizations have used to determine institutional reputation, which many believe is a difficult to measure concept. Some factors used to evaluate institutions have included funding, awards, research, and development. Of all the rankings by news magazines, the *U.S. News and World Report* have garnered the most disapproval for its ranking of universities and colleges. President Gerhard Casper of Stanford University created extensive controversy on this contentious topic when he strongly expressed his concern through a letter to *U.S. News and World Report* magazine editor James Fallows. Casper released a press release from Stanford University entitled “An Alternative to the *U.S. News and World Report College Survey*” (Casper, 1997). Fallows have suggested that this was the catalyst that began the firestorm of articles criticizing the *U.S. News and World Report* rankings and prompted recommendations to enhance the rankings.

Recently, rankings have also started to assess value as measured by earning potential--e.g., “The Best Colleges for Making Money” (Parmar, 2009). Gottlieb (1999) has accused the *U.S. News and World Report* of changing the method year to year in order to shake up the top-ranked schools and keep the public’s interest. Gottlieb shared with online readers that “a successful feature like the *U.S. News* rankings requires surprise, which means volatility. Nobody is going to pay much attention if it is Harvard, Yale and Princeton again and again, year after year (para. 3)”.
From law schools to engineering programs, the *U.S. News and World Report* rankings are and remain under close scrutiny both in terms of their validity and whether they do indeed “matter.” The Association of American Law Schools (AALS) called for an end to the *U.S. News and World Report* law school ranking because it deemed the rankings both misleading and dangerous. According to Klein and Hamilton (1998), the AALS released a study questioning whether the ranking system is valid and offering suggestions about ways to change the current ranking system.

Business schools and engineering program rankings have also come under close examination as well. Researchers, Schatz, and Crummer (1993) have suggested that no one ranking system can possibly determine which the best program is for every given student. These authors have further suggested that there is much more for students and parents to consider when selecting a college than rankings and that the needs of the particular student far outweigh its ranking. According to Morse (2011), the *U.S. News and World Report* have been quick to respond with information about the survey, the rankings, the methods, and detailed explanations about the ranking process. Morse has pointed out that colleges and universities do not have any problems ranking their own students at their institutions, but when it comes to others ranking their institutions, they prefer not to be ranked. However, according to Lemann (1998), many of the same universities that downplay and criticize the rankings are the first to use these rankings for marketing purposes, especially if their ranking is high, and they also are known to adjust their admissions policies, alumni records, and any other ranking factors if they believe that it will help raise their standing in the *U.S. News and World Report* rankings. Most of these strategies are based on fulfilling consumer theory buying. The more attractive the
institution is perceived externally to potential consumers the better chance their
enrollment will increase.

According to Lemann (1998), “Universities ought to assume that students and their
families will use the U. S. News rankings with the same wise restraint that they
themselves employ when contemplating the scores that students are required to submit if
they want to go to college today” (p. 81) Lemann has further noted that “colleges and
universities will certainly devote just as much attention to rankings in the future” (p. 81).
Meredith (2004) has concluded that an institution's ranking in the annual U.S. News and
World Report Best Colleges issue impacts admission outcomes and pricing decisions.
Meredith has suggested that analyzing the effects of the U.S. News and World Report
rankings across a broader range of universities and variables has shown that the
admissions outcomes of many institutions are responsive to movements in the rankings;
however changes in rank are more significant at certain locations in the rankings and
affect public and private schools differently. Meredith also concluded that the
socioeconomic and racial demographics of highly ranked universities may also be
affected by changes in rank.

In May of 2010, the National Association for College Admission Counseling
membership (NACAC) and the U.S. News and World Report Ad Hoc Committee
carried out a survey about the U.S. News Best Colleges rankings. Neither the survey nor
the final report was developed by U.S. News personnel. According to Morse (2011), the
final report was released by the committee in May of 2011 with the following findings:
(1) A majority of college admission counseling professionals in both high school and
college admission offices hold negative opinions of the U.S. News and World Report
rankings; (2) public schools and institutions view the rankings slightly more favorably than do private institutions; (3) college admission personnel, advisers, and counselors use resources in the *U.S. News and World Report* magazine publication aside from the rankings; (4) the rankings are used to market institutions, and the majority of colleges that are ranked in the *U.S. News and World Report* use their ranking as part of their strategic marketing planning; and (5) college admission officers believe that rankings encourage counterproductive behavior among colleges but are likely to believe that this type of behavior does not exist on their own campus. According to Caruso et al. (2011), 90% of colleges indicated they believe that the rankings put pressure on colleges and universities to use resources to maintain or improve their rankings. Forty-six percent of these institutions indicated they make changes to their programs because of the *U.S. News and World Report* rankings.

The NACAC report indicated members of the council had mixed opinions about the ranking indicators that are part of the *U.S. News and World Report* rankings survey method depending on whether they were counselors at a high school, public college, or private college. Additionally, according to Caruso et al. (2011), members were critical of the peer assessment, student selectivity, and alumni giving components of the survey and more laudatory of the measures of financial resources, graduation rate performance, faculty resources, graduation rates, and retention rates.

According to Hossoler, Hoezee, and Rogalski (2007), the ranking systems have resulted in a major problem for institutions. Attention that should be directed by enrollment management offices to improve those areas that are important to the student demographics of each institution are many times being devoted to improving the
rankings. Additionally, resources, which already are stretched to the limit, are earmarked to help boost institutional rankings in areas viewed as weak. Furthermore, it is highly unlikely that the *U.S. News and World Report* will discontinue publishing its rankings or change the methods it uses to gather information. Suggestions have been made, including using an independent auditing firm, gathering more suggestions about the way the survey has been constructed, and changing the method of gathering information.

According to Hossler, Hoezee, and Rogalski (2007), the effort put into gaining prestige, influence, reputation, and revenue instead of educating students may harm and eventually weaken institutions. Universities are playing into consumer behavior theory rather than focusing on educating students. As institutions spend more money on activities that have less to do with students and more to do with increasing rankings, this system is unlikely to change. The priority now needs to be to find a better balance in the goals and strategic plans of enrollment management offices and the tools and strategies for achieving those goals.

According to Capobianco (2009), rankings have provided benchmarks for building preferences in the market. Reputation rankings have aided and sustained the advancement of institutions in higher education with the subtle message that degrees that are awarded by higher-ranked institutions have value added and prestige over institutions that are not ranked. However, Capobianco also found that little, if any, correlation existed between a degree from a higher education institution in the top tier of a reputation ranking and employment opportunities. In fact, work experience, degree field, and employee referrals were factors that played a more prominent role in gaining employment (Capobianco, 2009).
Most of the information above clearly partners the rankings with consumer behavior theory and how constituents (from both sides of the rankings) use the rankings for decision making and outcome based results. Universities need to focus on educating students and constant and continual improvement of their programs and services rather than playing the rankings game.

**Summary**

With the continuation of the *U.S. News and World Report* rankings, as well as other ranking organizations, some way of improving or changing the current system is required, and the primary goal should be to provide a fair, honest, and helpful snapshot of institutions and what they offer to all students who are considering a college degree. A thorough and exhaustive review of the literature revealed no studies that examined the perceptions of engineering deans of graduate programs and their perceptions of the *U.S. News and World Report Survey* instrument and rankings. Furthermore, the literature review was helpful in revealing the methodology of this research study, as well as the theory. From these revelations a survey tool to gather data from the deans of engineering graduate programs was distributed which provided new knowledge regarding the *U.S. News and World Report* rankings and the dean’s perceptions.
Chapter Three

Methods

Introduction

The purpose of this study was to examine the percentages and weights assigned to the nine indicators by the *U.S. News and World Report Survey* for engineering graduate schools and programs and the perception of these percentages and weights by the deans of engineering graduate schools and programs. Additionally, this study investigated whether the deans preferred the removal and/or addition of any indicators as well as the reasons behind these preferences to determine which indicators are of little or no concern.

This research study also examined the Carnegie Classification of each school, the private and public status of each school and the correlation between rankings and classification, ranking between public and private, as well as funding used specifically for ranking initiatives.

This chapter (1) describes the research methodology used for this dissertation research (2) explains the variables gleaned from the research data collected (3) describes the process used in designing the survey instrument and why the particular method was chosen, and (4) describes the data collection and data analysis techniques used to process and determine the results of this research study. This research study was guided by the following research questions.

RQ1: What indicators did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?
RQ2: What percentages and weights did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?

RQ3: To what degree did deans of engineering institutions believe that the *U.S. News and World Report Survey* ranking system is a valid assessment of a quality engineering program?

RQ4: How satisfied were deans of engineering colleges with the *U.S. News and World Report* ranking system?

RQ5: How involved did deans of engineering colleges believe they should be in the *U.S. News and World Report* ranking process?

According to Leedy and Ormond (2005, p.93) “Data and methodology are inextricably interdependent. Therefore, the methodology for this research study must be aligned with the data collected, the research questions to be resolved, or the research questions to be answered (Brown, 1993). This research study methodology is aligned with the data to be collected and the research questions asked.

**Population**

The population for this research study was comprised of the 198 accredited engineering schools and programs based on the Accreditation Board of Engineering and Technology (ABET) who participated in the 2011 *U.S. News and World Report Survey*. The *U.S. News and World Report Survey* publication identified which engineering graduate schools participated in the 2011 survey, and the rankings of these institutions. This information was also available in electronic form for a small fee. The sample of this research study includes those institutions (of the 198) who participated in the 2011 *U.S. News and World Report Survey* for Engineering Graduate Schools. Of the 198 deans of
engineering graduate programs, all but two participated in the 2011 *U.S. News and World Report Survey*.

**Participants**

The participants chosen for this study and the research instrument used were sent to the deans of the 198 engineering graduate programs. The participants of this research study who returned the survey instrument consisted of deans or associate deans of engineering graduate programs who participated in the 2011 *U.S. News and World Report Survey*. One participant responded for each school who returned a survey for this research study. Of the 31 deans or associate deans responding 29 are male and 2 are female. All 31 participants were tenured at their institution and either a full or associate professor in their field of engineering.

The participants (deans) were purposely chosen because of their receipt of the *U.S. News and World Report Survey* and therefore would have full knowledge of the intention of this research study.

**Instrument**

The instrument used for this research study consisted of a ten page survey mailed to all deans that participated in the 2011 *U.S. News and World Report Survey*. The survey instrument was coded with alphabetical coding to identify for removal purposes only the institution returning the survey. Additionally the cover listed the purpose of the document and contact information for the principal investigator and the doctoral research student. The instrument gave a breakdown and explanation of the four areas currently be assessed by the *U.S. News and World Report Survey* as well as the nine indicators. The survey contains seven sections of information with instructions given numerically by...
section. The research survey also gave specific instructions on filling out as well as returning the instrument, and the results of the survey once data collection and dissertation was complete. For the most part survey questions were multiple choices using strongly agree, agree, disagree or strongly disagree. The survey instrument also contained an area for comments which was instrumental in chapter four and five findings.

Section one requested contact information as well as information on gender and title of individuals filling out the survey. Section two requested institutional information such as public or private, Carnegie Classification and what degree programs are offered. Section three addressed the weights and percentages currently assigned to the *U.S. News and World Report Survey* with the request to assign weights and percentages based on their opinion. Section four gave deans the opportunity to remove, add or change any of the nine indicators currently used by the *U.S. News and World Report Survey*. As well as remove, add or change any of the area. Additionally section four also addressed designated funding used toward improving rankings and if it had an impact on rankings. Section five addressed the validity of the *U.S. News and World Report Survey* and whether deans should have input into the information requested by *U.S. News and World Report Survey* office. Section six gave deans an opportunity for additional comments specifically the *U.S. News and World Report Survey* as well as general comments on ranking systems.

**Data Collection Procedures**

As a dissertation proposal, this study called for additional survey research utilizing a survey instrument which addressed questions related to the rankings and feedback from the deans who participated in the 2011 *U.S. News and World Report Survey*. Survey
respondents received an invitation to participate from the principal investigator (doctoral student adviser) and the doctoral candidate by United States mail. The survey instrument included a letter from the principal investigator and doctoral student, directions for filling out the survey, institutional review board information, consent to participate in the study, coding for data collection tracking, and a return address envelope.

In addition to the original survey, reminders were sent out every 10 days through postcards to the invited participants. Information on the postcard reminded the invited participant that the doctoral research study had been sent. Mentioned the due date of the information and encouraged participants to contact the doctoral research student should they need a new survey instrument. Contact information was included on all postcards mail by U.S. mail. These mailings occurred three times on February tenth, twentieth and March second. Follow-up 10 days later occurred wherein emails were sent to the participants. As a last resort, and to increase the percentage of participants in the research study; phone calls were made to each institution encouraging the dean of each engineering program to participate in the research study.

Once an institution responded or requested to be removed from the list of participants the list of participants were updated and continual reminders were sent out. A thank you note was sent to each participant in appreciation of the research study. After discussion with the principal investigator in June 2013 it was determined that all participants who planned on participating had responded. Thirty-one participants responded to the research instrument.
Research Design

This research study employed a quantitative survey design. The term “survey” is commonly applied to a research methodology designed and intended to collect data from a specific population, or a sample from the population, and typically uses a questionnaire or an interview as the survey instrument (Lubowitz, Provencher, and Poehling, 2011). Surveys are used to gather data from individuals about themselves, their households, or about larger social institutions such as schools or programs. Sample surveys are an important tool used for collecting and analyzing information from selected individuals. Sample surveys are accepted and widely used in the field of doctoral dissertation research as a key tool for conducting and applying basic social science research methodology.

Surveys are considered an acceptable and a useful form of practice for gathering information that is representative of a larger population. In the United States the Gallup Poll (2012) on education is an annual survey used to survey the country’s attitudes towards public schools. Surveys are also conducted by market researchers on products preferences. Additionally, the Nielseon Survey is distributed to selected American television viewers to ascertain the size of television audiences to be used for the purpose of establishing advertising rates. These sample surveys contain standardized methodologies which are designated to gather information by examining, analyzing, and systematically identifying population samples. The aforementioned Gallup poll examines issues separated by areas such as ethnicity, region, gender, and education by country (Gallup, 2012) whereas the survey population for this study was already predetermined based on the research study.
According to Leary (1995), there are advantages to using a questionnaire versus an interview methodology in that questionnaires are less expensive and easier to administer than personal interviews. They also lend themselves to group administration, and they help insure confidentiality and anonymity. Additionally surveys distributed by mail or sent electronically are efficient at collecting information in a relatively brief period of time at a fraction of the cost of personal interviews. Because of the advantage afforded by the use of a survey, the researcher chose a quantitative research methodology and designed the survey instrument that assessed what percentages and weights the U.S. deans of graduate engineering colleges and programs would assign to the nine indicators.

Survey Response and Coding

To insure anonymity of institutions and individuals filling out the survey; surveys were coded using an alphabetical code from A to GQ. Each participant was assigned a code between A through AG with a label placed on the upper right corner of the outside cover of the survey instrument. Mailing labels were prepared from the same mail data base and return envelopes containing completed surveys were attached to survey responses as they came in to be added to the research data base. As information came in it was added to the data base along with the date the survey instrument arrived. Once the returned survey instrument was processed it was placed in a binder alphabetically by code for storage in the principal investigators office at The University of Toledo.

Data Collection

Paper-and-pencil surveys were distributed by U.S. mail to those institutions who participated in the 2011 U.S. News and World Report Survey. This quantitative data collection method relied on information and structured data collection that produced
results that were easy to summarize, compare and generalize. According to Leedy and Ormrod (2001) “People tend to be more truthful when responding to surveys about controversial issues because their responses are anonymous.” Such was the case with this survey instrument, however, this method also had drawbacks. The majority of the respondents who received questionnaires may not return them, and those who do might not be representative of the originally selected sample. Web-based surveys represent a fairly new and growing methodology. This would entail sending an e-mail in which the participant would click on a link which would send the participants to a secure web-site to fill in a survey. This type of research is often quicker and less detailed. Some disadvantages of this method include the exclusion of people who do not have a computer or are unable to access a computer. According to Leedy and Ormrod, (2001) the validity of such surveys is in question as people might be in a hurry to complete it and may not give accurate responses, or will simply discard the email.

**Data Analysis**

Once a number of surveys (31) were returned and the principal investigator determined the study should be closed; the data was analyzed and the research questions posed in this study were compiled. Tables were constructed showing similarities and differences among the respondents and comments were compiled to determine what the respondents agreed and disagreed on in regards to the four areas, nine indicators, specific budgets geared toward increasing their rankings and general comments on the *U.S. News and World Report Survey* as well as any other rankings they wanted to comment on in the survey instrument.
The theory of this study is based on consumer buying and what role the rankings play from the buyer’s perspective as well as how the rankings are used for marketing individual institutions to the consumer. There are several steps in the consumer behavior process with different factors determining how long the consumer stays in the process or opts out early on due to factors out of their control. These factors would be, but are not limited to, location, money, programs, health issues, institutional history, social status and other which play into the consumer behavior buying theory (Archer, 2006).

Summary

This study aided engineering professional organizations, academicians, parents, students, and alumni as well as the *U.S. News and World Report* publication by providing additional insight and feedback regarding the current rankings and methodology distributed to the 198 engineering colleges and programs. The information gathered will assist in ascertaining whether there is a consistency of opinion on the rankings in regards to weight, percentages, and methodology and in what areas the consistencies occur among university engineering schools and programs. Additionally, the study will research what role consumer behavior theory plays in the rankings process. The research study supplied important information that adds new information in the higher education community and fills the gap in the research. The results of this research study will assist interested individuals and organizations in ascertaining a different viewpoint of the rankings and the role they play with stakeholders. The information obtained was both predictable in some areas based on the literature review as well as unpredictable in the dean’s responses to what areas they would like considered added.
Chapter Four

Results

Introduction

This Chapter presents the results of a study conducted to obtain data from the deans of engineering graduate programs who participated in 2011 *U.S. News and World Report Rankings Survey* regarding their impressions of the 2012 *U.S. News and World Report Rankings Survey*. The importance of the current study lies in the perceived influence that the *U.S. News and World Report Survey* has on recruiting students and faculty, and the perception that the *U.S. News and World Report Rankings Survey* is biased in favor of larger universities through its choice of areas to be rated and the weighted percentages assigned to them. Accordingly, the present study asked the respondents what in the survey they would change, what they would keep, and whether or not, in their opinion, the *U.S. News and World Report Survey*, in its entirety, has sufficient validity for its continued use. Several research questions were formulated based upon the concerns expressed in the literature in Chapter three of this research document. Analyses pertinent to each of the research questions will be presented following an overview of the results of research survey given to the dean of engineering institutions about the *U.S. News and World Report Survey*.

Data Review

Questionnaire surveys were mailed to the Deans of the 198 doctoral granting engineering schools, of which 148 received published rankings from the *U.S. News and World Report office*. Of the 198 engineering deans that received the questionnaire survey,
31 engineering deans completed and returned the survey they received. Information from each of the 31 surveys was reviewed and prepared so that data analysis could take place and research results could be presented. Table 1 provides an overview of the population that was surveyed and a comparison of the results is shown. The returned surveys closely represented the Public-Private distribution in terms of percentages of the Comprehensive Doctoral programs. Thirty of the 31 responding institutions offered both the Doctorate and Masters level degrees; one offered only the Doctorate. Of the 31 respondents, 29 were males; 19 (65%) held the position of Dean, while 10 (35%) were Associate Deans. Furthermore, the Carnegie Code Classification was represented in all nine areas of the code classification.

Table 1
Characteristics of Sample and Sample Population the Research Study Survey was sent to.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Control Carnegie Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Institutions</td>
<td>141</td>
<td>72.3</td>
</tr>
<tr>
<td>Private Institutions</td>
<td>54</td>
<td>27.7</td>
</tr>
<tr>
<td>Doc: Professional dominant</td>
<td>43</td>
<td>21.8</td>
</tr>
<tr>
<td>Doc: STEM dominant</td>
<td>19</td>
<td>9.6</td>
</tr>
<tr>
<td>CompDoc: No med/vet</td>
<td>51</td>
<td>25.9</td>
</tr>
<tr>
<td>CompDoc: Med/vet</td>
<td>75</td>
<td>38.1</td>
</tr>
<tr>
<td>Doc/other</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Postbac-comp</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td>Special focus</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Not applicable</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Doc/HSS</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>100</td>
</tr>
</tbody>
</table>

Note. Doc -- Doctoral degree; CompDoc -- Comprehensive Doctoral Degree; Med - medical; Vet - Veterinary. Postbac-comp - Post baccalaureate comprehensive; HSS - Health and Human Sciences.
Totals do not add up to 100% due to data not provided by individual filling out the survey.
Table 2 addresses research question one and presents data regarding the Dean's perception of the importance of the items included in the *U. S. News and World Report* Survey. The means represent the mean rank assigned to an area by the respondents. The Average Research Expenditures per Faculty (AREPF) obtained the highest (most important) rating, while the number of faculty in the National Academy of Engineering (FNAE) received the lowest.

The spread between the minimum and maximum rankings as well as the size of the standard deviations indicates that the Deans are not in universal agreement regarding the rankings (importance) that should be assigned to many of the areas.

Table 2
Deans ranking of *U.S. News and World Report Rankings* Indicators that responded to research study.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>$N$</th>
<th>$M$</th>
<th>$Mdn$</th>
<th>$Mode$</th>
<th>$SD$</th>
<th>$Min$</th>
<th>$Max$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAS</td>
<td>27</td>
<td>4.41</td>
<td>4</td>
<td>1</td>
<td>3.10</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>RAS</td>
<td>27</td>
<td>4.78</td>
<td>5</td>
<td>2</td>
<td>2.74</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>GRE</td>
<td>28</td>
<td>4.96</td>
<td>4</td>
<td>3</td>
<td>2.27</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>ARS</td>
<td>27</td>
<td>6.04</td>
<td>6</td>
<td>7</td>
<td>2.03</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>SFR</td>
<td>28</td>
<td>4.20</td>
<td>4.75</td>
<td>5</td>
<td>1.79</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>FNAE</td>
<td>26</td>
<td>7.04</td>
<td>7</td>
<td>9</td>
<td>1.69</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>DDA</td>
<td>28</td>
<td>4.71</td>
<td>4</td>
<td>4</td>
<td>2.36</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>TRE</td>
<td>27</td>
<td>5.00</td>
<td>5</td>
<td>8</td>
<td>2.68</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>AREPF</td>
<td>28</td>
<td>3.54</td>
<td>2</td>
<td>1</td>
<td>2.90</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

Note. PAS - Peer Assessment Score; RAS - Recruiter Assessment Score; GRE - Graduate Record Exam; ARS - Acceptance Rate Score; SFR - Student to faculty ratio; FNAE - Faculty in National Academy of Engineering; DDA - Doctoral Degrees Awarded; TRE - Total research expenditures; AREPF - Average Research Expenditures per Faculty.

A comparison between the weights and percentages assigned by the Deans and those published as part of the *Survey* is presented in Table 3 and addresses research question two. Examination of the table reveals Deans rated the Quality assessment parameters and
membership in the NAE as being less important, while Student Selectivity and Research Activity were seen as being more important. Forty-percent of the Deans would remove one or more of the *U. S. News and World Report Survey* areas (see table 4).

Table 3
Ratings by Deans of *U. S. News and World Report Survey* Areas, Indicators, Weights (w) and Percentages (P) that Responded to Research Study Survey.

<table>
<thead>
<tr>
<th>Area or Indicator</th>
<th>Explanation of Area or Indicator</th>
<th>Current W and P</th>
<th>Deans W and P</th>
<th>Dif. 0-50</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>QUALITY ASSESSMENT (1 and 2 below total 0.40)</td>
<td>40</td>
<td>28.5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Peer Assessment Score (PAS)</td>
<td>25</td>
<td>16.5</td>
<td>0-35</td>
</tr>
<tr>
<td>2</td>
<td>Recruiter Assessment Score (RAS)</td>
<td>15</td>
<td>12.0</td>
<td>0-25</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>STUDENT SELECTIVITY (3 and 4 below total .10)</td>
<td>10</td>
<td>13.1</td>
<td>0-40</td>
</tr>
<tr>
<td>3</td>
<td>Mean GRE Quantitative Score (GRE)</td>
<td>6.75</td>
<td>7.9</td>
<td>0-20</td>
</tr>
<tr>
<td>4</td>
<td>Acceptance Rate Score (ARS)</td>
<td>3.25</td>
<td>7.1</td>
<td>0-75</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>FACULTY RESOURCES (5, 6, and 7 total .25)</td>
<td>25</td>
<td>25.9</td>
<td>0-40</td>
</tr>
<tr>
<td>5</td>
<td>Student to faculty ratio (SFR) Doctoral and Masters. <strong>NOTE:</strong> Two numbers entered for MS/DOC</td>
<td>7.5 (D)</td>
<td>9.9(D)</td>
<td>0-20</td>
</tr>
<tr>
<td></td>
<td>Faculty in National Academy of Engineering (FNAE)</td>
<td>3.75(M)</td>
<td>5.1(M)</td>
<td>0-10.6</td>
</tr>
<tr>
<td>6</td>
<td>Acceptance Rate Score (ARS)</td>
<td>3.75(M)</td>
<td>5.1(M)</td>
<td>0-10.6</td>
</tr>
<tr>
<td>7</td>
<td>Doctoral Degrees Awarded (DDA)</td>
<td>6.25</td>
<td>8.75</td>
<td>0-88</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>RESEARCH ACTIVITY (8 and 9 total .25)</td>
<td>25</td>
<td>29.0</td>
<td>0-55</td>
</tr>
<tr>
<td>8</td>
<td>Total Research Expenditures (TRE)</td>
<td>15</td>
<td>12.0</td>
<td>0-25</td>
</tr>
<tr>
<td>9</td>
<td>Average Research Expenditures per Faculty (AREP)</td>
<td>10</td>
<td>17.0</td>
<td>0-50</td>
</tr>
<tr>
<td>Lines A+B+C+D</td>
<td>Should total 100.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4
Indicators that Deans who responded to the Research Study suggested be removed from the *U. S. News and World Report Survey*

<table>
<thead>
<tr>
<th>Indicator</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAS</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>RAS</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td>GRE</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>ARS</td>
<td>5</td>
<td>18.5</td>
</tr>
<tr>
<td>SFR</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>FNAE</td>
<td>9</td>
<td>32.1</td>
</tr>
<tr>
<td>DDA</td>
<td>6</td>
<td>22.2</td>
</tr>
<tr>
<td>TRE</td>
<td>8</td>
<td>28.6</td>
</tr>
<tr>
<td>AREPF</td>
<td>1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Note. PAS - Peer Assessment Score; RAS - Recruiter Assessment Score; GRE - Graduate Record Exam; ARS - Acceptance Rate Score; SFR - Student to faculty ratio; FNAE - Faculty in National Academy of Engineering; DDA - Doctoral Degrees Awarded; TRE - Total research expenditures; AREPF - Average Research Expenditures per Faculty.

Justifications for the modification and or removal of certain indicators were offered by respondents in all of the nine indicator areas (see table 5). Feedback from eight general comments were qualitative in nature and revealed a common theme of information regarding the *U. S. News and World Report Survey*. These common themes were in regard to the size of an institution, manipulation of data, where data is coming from and reported by whom, size in relation to funding available and national versus world ranking methodologies.
Table 5
Comments from returned surveys regarding specific indicators in the *U. S. News and World Report Survey*

Indicator 1 -- *Quality Assessment*

1. “Has no basis, purely speculation”.
   “Is based solely on reputation usually little thought in ranking”. “Is a bias to reputation and post-graduates who are now deans”?
2. “Is too subjective; could be manipulated”. “Subject to strategic manipulation”.
3. “Participants do not have information to rank all schools”.

Indicator 2 -- *Recruiters*

1. “How do we get recruiters to complete survey”? 
2. “Is anecdotal”.
3. “Recruiters have poor knowledge”.

Indicator 3 -- *Entrance exams*

1. “Not all programs collect GRE”.
2. “Not used and not as meaningful today”

Indicator 4 -- *Acceptance rate*

1. “Can be easily manipulated”. “Data too subjective and manipulated”.

Indicator 5 -- *Student faculty ratio*

1. “Is about quality”

Indicator 6 -- *National Academy of Engineering membership*

1. “This is an old boys club and membership is decided and controlled by a few institutions”.
2. “Is not necessarily an indicator of faculty (academic) performance”?
3. “This faculty has very limited impact on quality evaluation”.
4. “is severely lagging”
5. “NAE Faculty is a reflection of a programs ability to have an NAE member, financial resource vs. development of faculty to become an NAE member”.
6. “No correlation to good graduate programs”.
7. “This is lots of old folks hanging around doesn't indicate present quality”

Indicator 7 -- *Doctoral degrees awarded*

1. “Is a bias towards large schools”.
2. “Is basically about size of faculty”.
3. “What is important is not the numbers. This shows the balance between factory type state schools”.
4. “Not a good indicator”.
5. “Is an absolute metric and does not account for size of unit”.
6. “Indicates size not quality and not efficiency”.

Indicator 8 -- Total research expenditures

1. “Is about size”.
2. “Needs modification. Should be pulled from database”.
3. “Variation in what is counted high due to complex rates (for example does not count subcontracts - others do”.
4. “Indicates size, not quality, not practicing”.

Indicator 9 -- Average research expenditures per faculty

1. Research expenditures is about quality”.

As shown in Table 6, many of the Deans (43. %) would add indictors to the U. S. News and World Report Survey. The most frequently cited indicator to be added would be the number of peer reviewed publications and papers produced in the department by faculty and students. In this regard, peer review of papers and publications constitutes a form of "ranking." Student retention and placement were also considered as important indicators.
Table 6
Additional indicators Deans would add to the *U. S. News and World Report Survey*

1. Publications
2. Publications and presentations
3. Faculty publications
4. Publication rate per faculty member and graduate and PhD students
5. Journal Publications (peer reviewed)
6. Measure scholarly activity and quality of publications and citations
7. Number of archival publications per faculty
8. Number of journal papers per faculty
9. Number of papers published during PhD studies and in the following 2 years.
10. Freshmen retention, first time/full time enrollment. Freshmen-Sophomore retention, first time full time.
11. Placement of grad student A) Academic positions B) Gov’t. or industry
12. Inventions per 1 million in research expenditures.
13. Doctoral Degrees generated per faculty member
14. Assessment of PhD graduates
15. Industry Engagement
16. Distance education capability
17. Research Space

Eight Deans who returned the research instrument added general comments (see table 7) that were reflective and supportive of the changes they would make in the *U. S. News and World Report Survey*. One Dean opined that "We believe the Washington Monthly rankings are a better measure of impact the institution has. The *U. S. News* is only a measure of the status of the institution." This observation, of course, raises the question as to the purpose of the *U. S. News and World Report Survey* -- is it to assess the impact on the field of engineering or status among institutions offering advanced degrees in engineering? The comments offered by the Deans suggest that they are more concerned with "impact" than "status," the latter being more easily manipulated, particularly by larger institutions. That impact has a direct effect on consumer behavior theory from the outlook and perceptions of students, parents, university presidents, and engineering deans, as well as politicians, alumni, donors and other constituents.
Table 7

Additional General Comments made by the Deans who returned the Research Survey

General comments, (with repetitive information), were made by the deans who returned the research survey. A summarization of the comments are listed below, by how often they were mentioned in the general comments, (left to right), are listed in the table below.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Comment</th>
<th>Rank</th>
<th>Comment</th>
<th>Rank</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rankings should be about quality not size of institution. Larger the size of institution the better the ranking.</td>
<td>2</td>
<td>Money should not drive the rankings but money does. More money means more faculty, more research, …</td>
<td>3</td>
<td>Would prefer data that is pulled from other sources rather than self-submitted.</td>
</tr>
<tr>
<td>4</td>
<td>Current data should be used rather than historical data in order to give a true picture of the institution surveyed.</td>
<td>5</td>
<td>Other rankings entities should be used. <em>U. S News</em> measures reputation not quality.</td>
<td>6</td>
<td>Engagement with industry should be included in the quality of a program.</td>
</tr>
<tr>
<td>7</td>
<td>Shanhai Jiao world ranking system attempts to measure unbiased/objective</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Many, if not all, of the summarized comments in table 7 are potential research information that could be used for future research regarding the ranking system.

**Additional Observations**

Four of the Carnegie classifications had sufficient numbers and were selected to be compared on the *U. S. News and World Report Survey* rankings. This comparison indicates that the four groups of schools received different rankings. CompDoc: Med/vet programs received the highest rankings while the Doc-STEM dominant institutions received the lowest rankings.

Post-hoc analyses revealed that the Doc-STEM dominant group of schools were significantly different from the CompDoc: No med/vet and the CompDoc: Med/vet
intuitions at the p<.01 level and from the Doc: Professional dominant at the p<.07 level (RQ8). This result suggests that those institutions with a medical and or veterinary program are seen as higher in status than those institutions that are focused on either pure sciences or professional practice. As several of the Deans noted in their comments, there may well be an institutional size factor involved in these rankings.

Budget allocations targeted toward improving engineering program rankings were indicated by 96.6% of the Deans responding, only two respondents commented on whether or not these expenditures were effective and they both said they were ineffective in advancing their ranking status in the U. S. News and World Report Rankings Survey. Of those indicating that other ranking systems were considered when allocating budgets, the National Research Council, Princeton Review, and Washington Monthly, each received two nominations with "Other" also receiving two nods.

**Summary**

In summary, the present study gleaned both quantitative and qualitative information regarding dean’s perceptions of the U. S. News and World Report Survey. The outcome of the data presented results that indicated that of the Deans who responded, most would keep the U. S. News and World Report Survey in some form, albeit with some misgivings. The deans believe that the indicators that were employed tend to favor larger institutions and believe there is correlation between rankings, large institutions and the funding they have to work with. They were also in agreement that the data could be easily manipulated and needs to come from an unbiased source such as the National Research Council. The deans also felt strongly that having a faculty member in the
National Academy of Engineers had little relevance to a quality engineering program. As a suggested addition to the survey, several Deans suggested that the inclusion of the number of peer reviewed articles and publications might be a better indicator of the impact which any given program has on the field. Collection and analysis of the data provided a gap in the literature and has also provided opportunities for additional discussion and further research outlined in Chapter 5.
Chapter Five

Summary, Discussion, Conclusion

Introduction

In the previous chapter, the presentation and analysis of data are reported. Chapter five consists of a summary of the study, discussion of the findings, study limitations, implications for policy, recommendations for further research, and conclusions. The intentions of the final sections of this chapter are to summarize the research study findings, discuss the findings and determine what recommendations could be implemented into the current *U. S. News and World Report Survey* instrument as well as future research related to this research study.

Recommendations for Further Research

A request to assign new weights and percentages and questions regarding the effectiveness of the *U. S. News and World Report Survey* were distributed to the deans of 198 engineering graduate schools or programs. Questions in the research instrument sent to the 198 engineering deans were based on the review of literature in chapter 2.

The study included 31 participants of the 198 engineering schools and data collected were provided by either a dean or associate dean for the institution. Institutional characteristics and the data collected from the study instrument of the 31 universities included in the population were examined. This study was guided by five research questions:

RQ1: What indicators did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?
RQ2: What percentages and weights did deans of engineering colleges perceive as the most appropriate in ranking engineering colleges?

RQ3: To what degree did deans of engineering institutions believe that the *U.S. News and World Report Survey* ranking system is a valid assessment of a quality engineering program?

RQ4: How satisfied were deans of engineering colleges with the *U.S. News and World Report Survey* ranking system?

RQ5: How involved did deans of engineering colleges believe they should be in the *U.S. News and World Report* ranking process?

Research questions were answered quantitatively from respondent data collected from the survey instrument sent out to the 198 engineering graduate college deans. Respondent answers were compiled and tabulated to reveal areas of concerns as well as areas of less or no concern.

The following recommendations are based on the data analysis and comments gleaned from the returned surveys for this research study. These recommendations are intended for review from both the perspective of the deans as well as the *U. S. News and World Report Survey* publication.

Recommendation 1: The deans could review metrics used for international rankings and compare with current metrics used to evaluate national rankings which have gained momentum in the past 10 years.

Recommendation 2: The deans could address the issue of size which was a common point of concern among institutions. One possible solution would be to divide schools by
comparable sizes and then rank accordingly. This would also, for the most part, address the issue of number of faculty, students and money which is driven by size.

Recommendation 3: The *U. S. News and World Report* could eliminate those areas that lean towards reputation and replace these areas with concrete quality metrics such as research publications, distance learning, patents and industry interaction. These are measurable which add to the quality of a program and not just the reputation of a program.

Recommendation 4: Engineering leaders could invite the *U. S. News and World Report* director to an open forum at the annual engineering dean’s conference held annually on Capitol Hill in Washington, D. C. for an open, organized and honest discussion on the current ranking system.

Recommendation 5: The *U. S. News and World Report* could eliminate self-submitted data and glean data from other entities such as the National Research Council. This would address and eliminate manipulation of data, whether unintentional or intentional.

Recommendation 6: The *U. S. News and World Report* could eliminate indicator 6 which recognizes and awards a percentage of points towards an institution’s final ranking for securing a faculty member in the National Academy of Engineering. Although this award is considered highly prestigious it is not indicative of a quality program. It takes a team of people to build and sustain a quality program and in many instances these individuals have excelled in research but are not involved in the day-to-day operational teaching and service of their institutions program. A majority of deans believe this is a reputational indicator and not a quality indicator.
Discussion of Findings

Discussion in Chapter four indicates the lack of statistical significance noted from the data analysis. However, there are common areas of deans concern that are worth noting that indicate there is agreement among the institutions who participated in the study regarding the *U.S. News and World Report Survey*. Furthermore, had the research survey instrument been organized differently the number of participants returning the survey could have been significant. Further research could specifically address only the areas and indicators and the weights and percentages of these areas only and the reassignment of them.

A thorough and exhaustive review of the literature regarding the *U. S. News and World Report Survey* and the opinions and relevance of the survey by deans, associate deans, educators, industry and the general public was completed. Based on the literature review the survey instrument was design in an exhaustive process with the dissertation committee methodologist and mailed to the sample population for completion. Data was collected with the following findings gleaned from the information.

Data collected to address the nine research questions indicate the average research expenditure by a faculty member was the most important indicator on the *U.S. News and World Report Survey* rankings whereas having a faculty member in the National Academy of Engineering was of no importance. Examination of the data also reveals that the deans believe student selectivity and research activity were the most appropriate in ranking engineering colleges, whereas quality assessment and again membership in the National Academy of Engineering as being less important. Nearly 60% of the deans agree
that the *U.S. News and World Report Rankings* is a valid assessment of engineering graduate programs and are somewhat satisfied with the ranking system even though some areas should be refined or eliminated altogether. A common thread throughout the data collection was the opinion that data could be manipulated and that larger institutions would have an advantage in certain areas just by the size of the institution. Overall the deans would prefer to have some input into what data is collected from the *U.S. News and World Report Rankings Survey* and to also have the ability to remove some of the data that is currently being collected. This supports the assessment of the Gettysburg Group meeting indicating that deans would like a say into the content of the methodology of the *U. S. News and World Report Survey* (Hazelkorn, 2011) Indicators that they would add are in regards to journal publications and presentations (most frequently cited), retention, doctoral degrees awarded and placement, as well as, patents, distance education and research space. Indicators they believed were unimportant were quality assessment, recruiters, the GRE exam, acceptance rates, faculty in the National Academy of Engineering and research expenditures.

Based on comments returned in the research survey; most of the engineering deans who participated in the research questionnaire leave the impression that the indicators were speculative, and for the most part, are based on reputation. These same said deans perceive these indicators as easily manipulated and favorable toward larger institutions. Additionally there is a belief that an institution can be small and still be a quality institution. Furthermore, because the rankings play a role in consumer behavior in relation to marketing and enrollment, the deans perceive these measurable as skewed towards larger institutions and focus on reputation rather than quality. This, in their
opinion, in unfair to the consumer who are using these rankings at face value. A program that places in the top 50 institutions is perceive as a quality institution, whereas those who place after the top 50 are perceived as institutions of less quality. Several of the indicators, predominantly those that are resource based, are driven by the size of the institution. Unfortunately perception is reality to many consumers and this can lead to a skewed perception of an institution (Luca and Smith, 2013).

Over 95% of the deans responding indicated budgets were allocated towards improving their rankings and of the two who commented both indicated the expenditures were not effective and were earmarked for other ranking systems as well. This is an indication that the deans believe the rankings have some impact on their institutions. There was no relationship between tuition per doctoral credit hour and the rankings that were assigned to institutions by the U.S. News and World Report rankings. However, four of the Carnegie classifications had sufficient enough numbers (greater than 6) and based on the data analysis the four groups of school did receive different rankings. The results from the data collection suggest that medical and or veterinary programs are seen as higher in status than those focused purely on sciences or professional practice and private institutions receive higher rankings than public schools in the U.S. News and World Report rankings.

The literature review identified several gaps in the research regarding specific perceptions deans of engineering graduate degree programs had of the U. S. News and World Report Survey and the rankings associated with the survey. Specifically, the literature review gleaned little information in regards to specific perceptions of the deans regarding the U. S. News and World Report Survey indicators or areas and weights and
percentages. Furthermore, no information was available on marketing and budgets.

initiatives deans have used to increase their placement in the rankings. The literature
review was helpful not only in identifying the gap in research, but also general
perceptions that guided the research questions. This research study identified the gap in
research in regards to what changes the deans would like to make to the *U. S. News and
World Report Survey* instrument. The deans believe the current survey favors large
institutions and is not a fair instrument when assessing engineering graduate programs.
Furthermore, deans believe that the survey has more to do with reputation than quality.
This research study addressed the areas and indicators, weights and percentages and
funding directed toward the *U. S. World and News Report Survey*, filling the existing gap
identified within the body of research and literature.

**Consumer Behavior Theory**

The research connected the concern deans and presidents have with how consumers
view the rankings as well as how parents, students, donors and alumni use them
(Solomon, Polegato and Zaichkowsky, 2009). Their opinions bring forth the belief that
the survey ranks reputation rather than quality and that an institution can possess quality
programs without having the “reputation” associated with quality. Furthermore, the study
shows that parents, students, donors and alumni pay attention to rankings depending on
their social class and historical connection with the institution. Additionally, the research
provided insight into the different perspectives all constituents view the rankings and how
they use them during the consumer behavior process. It is understandable why the
Annapolis Group (Hazelkorn, 2007) felt compelled to change the rankings system by
boycotting participation. This research also showed that one step up in the rankings
showed an increase in applications to the institution (Wheeler, 2010) Students, parents, donors and alumni are using the rankings as a tool for decision making; therefore deans and presidents would like a survey based on quality rather than reputation. Consumers also need to be aware of the difference in vocabulary used to promote product and services such as the difference between quality and reputation and that even though an institution has a good reputation that does not automatically mean they have quality programs (Armstrong, 1991).

Additionally, when choosing an institution to attend, support or donate to; constituents should consider want vs. need, quality vs. reputation, impact vs. making a difference. Students and parents may want to be able to say their child is from a particular institution, however is the institution a good fit for the student? Should a student excel academically in a smaller environment rankings take a second seat to environment and student performance. When deciding on a college education reputation does not always guarantee quality programs. This can only be determined by in-depth research into the particular program the student is interested in attending. To base the choice of anything on consumer behavior theory without in-depth research into the reasons a consumer is making a choice can be a mistake (Armstrong and Overton, 1971).

Donors need to be cognizant of the impact their donation will have on an institution. A sizeable donation to a large school will be added to others with much less fanfare than a smaller institution wherein that same donation could turn an entire program around to increase productivity and the learning environment of the program. These decisions play into relationships, connectivity and emotions. Consumer behavior theory, for the most part, drives many decisions parents, students, alumni, donors, and other constituents
make. On the opposite side of the decision making process are institutions affected by the rankings and what information is collected to reflect the quality of their institutions and programs. As Hazelkorn, (2007) indicated during the Annapolis Group Meeting in Gettysburg, Pennsylvania those who are ranked should have a say in the data collected and the way in which it is collected and distributed. With President Obama now showing interest in the rankings; institutions would be wise to begin a conversation now with their local, state and national political representatives. Unless politicians truly understand the rankings and methodology used, what role institutions would like to play in the process, and what information should be used for fair and unbiased rankings there will be no impact to the current ranking system being used and the debate will continue.

Conversations need to take place now before President Obama makes decisions based on limited or biased information. The debate will continue year after year and to some extent consumer behavior theory will be a driving force

**Other Notable Findings**

The last finding that merits discussion was the extremely low response rate, 15.7% percent of the survey instrument. Research shows that the lack of statistical significance in all analyses support literature demonstrating that a low response rate can impact the statistical analyses of research and the researchers ability to generalize findings (Hinkle, Wiersma and Jurs, 2003; Lunenburg and Irby, 2008). Had the response rate been higher the study may have shown a higher significance among the deans responding to the survey instrument.

There are three major sources of outcome results: 1) sampling issues, 2) instrumentation issues, and 3) research design issues (Lunenburg and Irby, 2008). This
research may have research design issues. The first explanation for the low response rate could be attributed to social desirability response bias. Social desirability response bias is an important factor in social and behavioral science research and must be carefully considered when developing survey instruments and providing information to participants (Arnold and Feldman, 1981; Fisher, 1993; Ganster, Hennessey and Luthans, 1983; King and Bruner, 2000; Podsakoff, MacKenzie, Lee and Podsakoff, 2003; Podsakoff and Organ, 1986). “A problem with self-report measures is the potential risk of participatory bias or for participants to manipulate the data to a more desirable outcome.

A second explanation for the low response rate arises from the research design. Had the reassignment of weights and percentages been placed at the end of the survey instead of at the very beginning the survey instrument would have appeared less time consuming and less daunting to individuals already pressed for time. Supporting evidence is the fact that follow-up phone calls were made to 25% of returned surveys due to missing or no information on reassigning weight and percentages to the current U.S. News and World Report Survey.

**Implications for Policy and Practice**

Rankings, their importance, relevance and reputation have been debated for decades. Those who create the instruments that rank institutions believe in the relevance of their data collection process and the areas of data they believe represent a quality institution. For those deans who returned their research packet the areas of concern and those they would like to change were in agreement. Most believe the ranking system of the *U. S. News and World Report Survey* measures status, whereas deans are more interested in
impact. They also believe the rankings should be about quality and not size. Deans also believe that consumers pay attention to rankings and therefore universities should have some say into what is collected, how it is collected and presented to the consumer.

For educational administrators, this study shows that additional resources earmarked specifically to increase rankings is futile. Administrators should save these precious resources to improve the quality of their institutional research programs. Furthermore, if deans of graduate engineering schools want to increase their ranking status they will need to play to the areas that carry the most weight and percentages which has more to do with reputation than impact and quality. The other option for the deans would be to work with the *U.S. News and World Report Survey* staff to implement the desirables noted in the returned research packets such as publications, student retention, doctoral degrees awarded, placement and inventions/patents.

The findings of this study have implications for the engineering community, which include, but are not limited to, industry, alumni, donors, politicians, potential students and parents. The deans of engineering schools should spend less time focusing on rankings, and more time communicating with their communities regarding the quality and impact of their individual programs rather than their reputation. Constituents do pay attention to rankings; however one on one contact with the institution of interest with the dean and school personnel highlighting the strengths and impact of their programs carries far more weight and a longstanding impression. The rankings do play into the consumer behavior theory. According to Luca and Smith, (2013) when colleges are presented by rank in the *U. S. News and World Report*, a one-rank improvement for an institution causes nearly a percentage point in the number of applications it receives. Conversely, rankings have no
effect on application decisions when colleges are listed alphabetically, even though the quality data and methodology to calculate the ranks are provided. This is in the first phase of the decision making process of consumer behavior. As the process unfolds other factors are considered and rankings, for a majority of applicants, are no longer at the forefront of the decision making process. Factors such as cost, scholarship amounts, attainable loans and location begin to factor into the equation. The exception to this is students from households with high income wherein cost is not a factor of students of alumni who have a history with the institution. According to Lytle, (2011) the top 10 schools who benefit from alumni donations give repeatedly as well as often. Interestingly these schools are also listed in the top 100 of their individual school rankings. Rankings seem to be of more importance to donors of high priced institutions whose donors are wealthy. It would serve deans well to define their programs not by rankings if they are not at the top, but by quality, impact and success of their students and alumni.

The findings of this study have implications for deans interested in changing the rankings process. Based on the research packets returned there is a common thread among the deans as to what data collected by the U.S. News and World Report Survey should be changed or eliminated, and what data needs to be considered for inclusion into the U.S. News and World Report Survey. This research study information should lead to a discussion between the staff at the U.S. News and World Report Survey office and the deans of engineering graduate programs.
Conclusion

The deans of engineering graduate schools and programs provided feedback in both quantitative and qualitative form regarding the *U.S. News and World Report Survey* and aided in filling the gap in the literature currently published. This study presented results that indicated, of the deans who responded, most find the *U. S. News and World Report Survey* acceptable with some modifications in the survey. This conveys that the perception that deans are against the survey and do not think it has a place in ranking institutions was false. This study also revealed that the *U.S. News and World Report Survey* are considered a ranking of reputation rather than quality which is in line with the consumer buyer theory presented in this research data. Furthermore, it is perceived that the indicators used in the survey favor larger institutions and that the data the *U.S. News and World Report Survey* collects could be easily manipulated or misrepresented.

Almost 33% of the respondents would remove the PAS, FNAE, and TRE indicators while only one would remove the SFR and AREPF indicators. These findings are supportive of the observation made above regarding the area ratings -- while there is some agreement on the importance of certain areas there are some areas many of the Deans felt should be eliminated or redefined. This shows up in the finding that nearly 60% (58.6%) of the Deans responding agree with the assertion that the current *U. S. News and World Report Survey* ranking system is a valid assessment of a quality engineering program. as compared to 41.4% who disagree. (RQ3). Despite the finding that 77.8% of the Deans disagreed with the assertion that they should have some input into the ranking system, they were nonetheless willing to provide some input regarding the composition
of the survey (RQ5). Specifically, Areas (58.6%), Indicators (61.3%), Weights of Areas (53.3%), and Percentage of Indicators (54.8%).

Several *U. S. News and World Report Survey* indicators were viewed negatively by the Deans. Indicator 1 -- Quality Assessment -- was seen as "purely speculative," "based on reputation," and "capable of being manipulated." Indicator 2 -- Recruiters -- raised the questions as to whether or not recruiters have sufficient knowledge and whether their opinions would be just that. It was noted that the GRE exam (Indicator 3) is not required by all institutions; hence it is not a good indicator just on that basis. Acceptance rate (Indicator 4) was seen as being easily manipulated. Student to faculty ratio (Indicator 5) received only comment, and it concerned quality, presumably, the better the ratio the more likely the program will be a more successful one. Indicator 6 -- membership in the National Academy of Engineering -- was seen as having no correlation with a quality program and is just reflective of "a lot of old folks hanging around." Indicators 7 and 8 referred to research expenditures. Deans noted that because it is an absolute metric, it is biased toward the larger schools and that size does not necessarily correlate with quality.

It would serve graduate engineering program deans well to start a conversation with both local, regional, state and national leaders on their concerns regarding the current rankings system and how best to provide rankings that are produced in a fair and unbiased systematic approach. Should the President’s interest continue to grow regarding the ranking system; it would be to the advantage of institutions to be on the ground floor of the discussions through their governmental representatives.
References


Thelin, J.R., (2006). *Education’s sacred ground: The land-grant heritage and the American campus.* Lecture conducted at a meeting in Somerset, KY.


A - Quality assessment (weighted by .40)

1) Peer assessment score (.25): In the fall of 2011, engineering school deans and deans of graduate studies at engineering schools were asked to rate programs on a scale from marginal (1) to outstanding (5). Those individuals who did not know enough about a school to evaluate it fairly were asked to mark "don't know." A school's score is the average of all the respondents who rated it. Responses of "don't know" counted neither for nor against a school. About 54 percent of those surveyed responded.

2) Recruiter assessment score (0.15): In the fall of 2011, corporate recruiters and company contacts who hire from previously ranked programs were asked to rate programs on a scale from marginal (1) to outstanding (5). Those individuals who did not know enough about a school to evaluate it fairly were asked to mark "don't know." A school's score is the average of all the respondents who rated it. Responses of "don't know" counted neither for nor against a school. About 17 percent of those surveyed responded. For the purpose of calculating this year's rankings, the two most recent years of recruiters' survey results were averaged and were weighted by 0.15.

B - Student selectivity (weighted by 0.10)

3) Mean GRE quantitative scores (0.0675): The mean quantitative score of the Graduate Record Examination for master's and doctoral students entering in the fall of 2011.

4) Acceptance rate (0.0325): The proportion of applicants to the master's and doctoral programs who were offered admission for fall 2011.
C - Faculty resources (weighted by 0.25)

5) Student to faculty ratio: The ratio of full-time doctoral students to full-time tenured or tenure-track faculty (0.075) and full-time master’s students to full-time tenured or tenure-track faculty (0.0375) in the fall of 2011.

6) Percent of faculty in the National Academy of Engineering (0.075): The proportion of full-time tenured or tenure-track faculty who were members of the National Academy of Engineering in the fall of 2011.

7) Doctoral degrees awarded (0.0625): The total number of doctoral degrees granted in the 2011 school year.

D - Research activity (weighted by 0.25)

8) Total Research Expenditures (0.15): The total externally funded engineering research expenditures. These expenditures refer to separately funded research, public and private, conducted by the school and are averaged over the two fiscal years 2010 and 2011. The definition for research expenditures is set by the American Society for Engineering Education.

9) Average research expenditures per faculty member (0.10): The average amount of externally funded engineering research expenditures per full-time faculty member averaged over the two fiscal years 2010 and 2011.

Overall rank: Data were standardized about their means, and standardized scores were weighted, totaled, and rescaled so that the top-scoring school received 100; others received their percentage of the top score
## Engineering Program Rankings, Methodology and Weights

### U.S. NEWS INDICATORS

<table>
<thead>
<tr>
<th>#</th>
<th>Indicator</th>
<th>Weight and Percentages</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>QUALITY ASSESSMENT (1/2 below total weight of .40)</td>
<td>.40 weight</td>
</tr>
<tr>
<td></td>
<td>Peer Assessment Score (PAS)</td>
<td>0.25 percentage</td>
</tr>
<tr>
<td></td>
<td>Recruiter Assessment Score (RAS)</td>
<td>0.15 percentage</td>
</tr>
<tr>
<td>B</td>
<td>STUDENT SELECTIVITY (3/4 below total weight of .10)</td>
<td>.10 weight</td>
</tr>
<tr>
<td></td>
<td>Mean GRE Quantitative Scores (GRE)</td>
<td>0.07 percentage</td>
</tr>
<tr>
<td></td>
<td>Acceptance Rate Score (ARS)</td>
<td>0.03 percentage</td>
</tr>
<tr>
<td>C</td>
<td>FACULTY RESOURCES (5/6/7 below total weight of .25)</td>
<td>.25 weight</td>
</tr>
<tr>
<td></td>
<td>Student to Faculty Ratio (SFR) Doctoral</td>
<td>0.075 percentage</td>
</tr>
<tr>
<td></td>
<td>Student to Faculty Ratio (SFR) Masters</td>
<td>0.0375 percentage</td>
</tr>
<tr>
<td></td>
<td>Faculty in National Academy of Engineering (FNAE)</td>
<td>0.075 percentage</td>
</tr>
<tr>
<td></td>
<td>Doctoral Degrees Awarded (DDA)</td>
<td>0.0625 percentage</td>
</tr>
<tr>
<td>D</td>
<td>RESEARCH ACTIVITY (8/9 below total weight of .25)</td>
<td>.25 weight</td>
</tr>
<tr>
<td></td>
<td>Total Research Expenditures (TRE)</td>
<td>0.15 percentage</td>
</tr>
<tr>
<td></td>
<td>Average Research Expenditures Per Faculty (AREPF)</td>
<td>0.10 percentage</td>
</tr>
</tbody>
</table>

**TOTAL ENTERED MUST EQUAL 1.00 WHEN DATA IS ENTERED IN EACH OF THE NINE INDICATORS or WHEN DATA IS ENTERED IN EACH OF THE FOUR AREAS OF A, B, C, and D.**

1.00

*Overall Rank: Data were standardized about their means, and standardized scores were weighted, totaled and rescaled so that the top-scoring school received 100; other received their percentage of the top score.*
GRADUATE ENGINEERING RANKINGS
SURVEY INSTRUCTIONS AND SURVEY INSTRUMENT

2012

The purpose of this document is to collect data from the deans of engineering graduate schools who provided information in 2011 for the results of the 2012 U.S. News and World Report Rankings Survey of engineering graduate schools and programs. Background and instructional information regarding the survey are listed on the first two pages following this cover sheet. Inquiries regarding this survey questionnaire can be directed to Christine M. Smallman, doctoral candidate at The University of Toledo, Judith Herb College of Education, Health Sciences and Human Services at (419) 290-7031 or christine.smallman@utoledo.edu. Christine is working under the direction of Dr. David Meabon.

BACKGROUND INFORMATION AND INSTRUCTIONS

The U.S. News and World Report Survey for engineering graduate schools use four primary terms in their methodology: (See Section III of this document for visual.)

1. AREAS – There are four areas: Quality Assessment, Student Selectivity, Faculty Resources and Research Activity.

2. INDICATORS – There are nine indicators which are categorized under the four areas listed above in #1. Area A has two indicators, Area B has two indicators, Area C has
three indicators with one of the three broken down into two parts to differentiate doctoral and master’s students, and Area D has two indicators.

3. **WEIGHTS** – Weights are assigned to the four areas. The total weight of the four areas equals 1.0. Area A is .40, Area B is .10, Area C is .25, and Area D is .25.

4. **PERCENTAGES** - Beneath each of the four areas are indicators listed relevant to that particular area. Percentages of the area weights are assigned to each indicator and must equal the area weight. For example, in the current survey Area A is weighted at .40, therefore the percentages (.25 and .10) assigned to the two indicators below Area A equal the .40.

   **This step will be important to keep in mind as you reassign weights and percentages in this instrument.**

**INSTRUCTIONS**

This survey instrument should take approximately 15 – 20 minutes to complete, however section VII is a comment area which will differ for each participant.

1. **Section I** of this instrument involves contact information of individual completing the survey. This entire survey should be completed in **BLUE** or **BLACK** ink.

2. **Section II** of this instrument is completed for your institution; please verify the information indicated for correctness. Any information in Section II that needs to be changed, please cross out incorrect information and indicate new information in **RED** ink.

3. **Section III** of this instrument is requesting feedback from the deans in regards to the *U.S. News and World Report Survey* regarding redistribution of the weights and percentages (#1) and ranking the indicators from most important to least important (#2)

4. **Section IV** of this instrument is questions related to removing and/or adding indicators to the *U.S. News and World Report Survey*.

5. **Section V** of this instrument is questions related to funding used to improve your institutions *U.S. News and World Report Survey* rankings.

6. **Section VI** of this instrument is statement questions related to validity and participation in the *U.S. News and World Report Survey*.

7. **Section VII** of this instrument is an opportunity for you to provide comments regarding the *U.S. News and World Report Survey* or any other ranking system your institution would like to comment on. Additional pages can be attached to the document if so desired.
8. **RETURN OF SURVEY** - Upon completion, please enclose all materials back in the self-addressed, postage paid envelope that is provided in your packet. I would request that you keep a copy of the information you submit in case it is lost in the mail and I contact you after not receiving the materials. Upon receipt of your information I will email the individual listed on the survey and confirm receipt of the information. Please send your information back by January 31, 2013.

9. **RESULTS** - Upon completion of this research study, participants will be given a link to the research results. You will be notified and provided access to a website that presents the results. The results will be compiled and presented in such a way that no individual or institution will be identifiable.

Thank you for participating in this doctoral research study towards completion of my doctorate in Higher Education.

Christine M. Smallman, MLS

The University of Toledo

Doctoral candidate in the Judith Herb College of Education, Health Sciences and Human Services. Under the direction and supervision of Professor David Meabon, Ph.D.

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GRADUATE ENGINEERING RANKINGS

The purpose of this document is to collect data from the deans of engineering graduate schools and programs who participated in the 2012 U.S. News and World Report Survey. The survey should be completed in ink and returned in the self-addressed envelope included in this mailing by January 31, 2013. Instructions for this survey are located at the front of this booklet on pages two and three.

SECTION I - CONTACT INFORMATION
Please enter the name of the individual completing this survey.

(First Name) (MI) (Last Name)

Email

Phone

Gender
Male ☐ Female ☐

Title (check all that currently apply)
☐ Dean ☐ Faculty (Enter Faculty Rank:__________)
☐ Associate Dean ☐ Director (Assistant/Associate/Full Professor)
☐ Assistant Dean ☐ Staff
☐ Other ____________

SECTION II – INSTITUTIONAL INFORMATION (Please verify information)

Please review information below for accuracy and change if incorrect.

☐ Public ☐ Private Carnegie Classification __________

Graduate degrees offered at your institution.
☐ Master’s Degree Only ☐ Doctoral Degrees Only ☐ Both
SECTION III – The U.S. News and World Report Areas and Indicators

#1 - Deans Weights/Percentages Redistribution – If you believe that the weights and percentages are unbalanced in the current U.S. News and World Report Survey, enter your recommended weights and percentages in the chart below in column 4. The number you enter in the gray areas (weights) should total 1.0 and equal the total of the white areas (percentages) directly under each area. **For example:** Should you enter .30 weight in Area A then indicators 1 and 2 underneath Area A should be divided as long as the two percentages equal the total weight of .30. The total score of the four gray areas should total 1.00. Should you believe the current U.S. News and World Report Survey is balanced move to the next table #2 Deans Rankings.

<table>
<thead>
<tr>
<th>AREAS (GRAY CELLS)</th>
<th>DESCRIPTION OF AREAS (GRAY CELLS)</th>
<th>CURRENT AREA WEIGHTS (GRAY CELLS)</th>
<th>DESCRIPTION OF INDICATORS (WHITE CELLS)</th>
<th>WEIGHTS AND PERCENTAGES ASSIGNED BY DEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>QUALITY ASSESSMENT (1 and 2 below total 0.40)</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Peer Assessment Score (PAS)</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Recruiter Assessment Score (RAS)</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>STUDENT SELECTIVITY (3 and 4 below total .10)</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mean GRE Quantitative Score (GRE)</td>
<td>0.0675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Acceptance Rate Score (ARS)</td>
<td>0.0325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>FACULTY RESOURCES (5, 6, and 7 total .25)</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Student to faculty ratio (SFR ) Doctoral and Masters. <strong>NOTE:</strong> Two numbers need to be entered in this section. One for doctoral, one for masters.</td>
<td>0.075 (D) 0.0375(M)</td>
<td></td>
<td>(D) (M)</td>
</tr>
<tr>
<td>6</td>
<td>Faculty in National Academy of Engineering (FNAE)</td>
<td>0.075</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Doctoral Degrees Awarded (DDA)</td>
<td>0.0625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>RESEARCH ACTIVITY (8 and 9 total .25)</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Total Research Expenditures per Faculty (AREPF)</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Average Research Expenditures per Faculty (AREPF)</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GRAY CELLS Should total 1.0

**#2 Deans Ranking** – Based on what you believe is indicative of a quality engineering program, please rank the nine indicators (white cells) starting with 1 as the most important indicator with 9 being the least important indicator. **Please use each number (1 thru 9) only once.**

<table>
<thead>
<tr>
<th>AREAS INDIC</th>
<th>DESCRIPTION OF AREAS AND INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>QUALITY ASSESSMENT (1 and 2 below total 0.40)</td>
</tr>
<tr>
<td>1</td>
<td>Peer Assessment Score (PAS)</td>
</tr>
<tr>
<td>2</td>
<td>Recruiter Assessment Score (RAS)</td>
</tr>
<tr>
<td>B</td>
<td>STUDENT SELECTIVITY (3 and 4 below total .10)</td>
</tr>
<tr>
<td>3</td>
<td>Mean GRE Quantitative Score (GRE)</td>
</tr>
<tr>
<td>4</td>
<td>Acceptance Rate Score (ARS)</td>
</tr>
<tr>
<td>C</td>
<td>FACULTY RESOURCES (5, 6, and 7 total .25)</td>
</tr>
<tr>
<td>5</td>
<td>Student to faculty ratio (SFR) Doctoral and Masters. <strong>NOTE:</strong> Two numbers need to be entered in this section. One for doctoral, one for masters.</td>
</tr>
<tr>
<td>6</td>
<td>Faculty in National Academy of Engineering (FNAE)</td>
</tr>
<tr>
<td>7</td>
<td>Doctoral Degrees Awarded (DDA)</td>
</tr>
<tr>
<td>D</td>
<td>RESEARCH ACTIVITY (8 and 9 total .25)</td>
</tr>
<tr>
<td>8</td>
<td>Total Research Expenditures (TRE)</td>
</tr>
<tr>
<td>9</td>
<td>Average Research Expenditures per Faculty (AREPF)</td>
</tr>
</tbody>
</table>

Gray Cells Total
SECTION IV – INDICATOR ITEMS (1 – 4)

Item 1
If given the opportunity to remove any of the nine indicators listed above would you remove any? (If yes move to item 2, if no move to item 3.)

☐ Yes            ☐ No

Item 2
Which of the nine indicators would you remove and why?
(Check all that apply.)
☐ Indicator 1: Peer Assessment Score I(PAS)
  Reason:_________________________________________________

☐ Indicator 2: Recruitment Assessment Score (RAS)
  Reason:_________________________________________________

☐ Indicator 3: Mean GRE Quantitative Score (GRE)
  Reason:_________________________________________________

☐ Indicator 4: Acceptance Rate Score (ARS)
  Reason:_________________________________________________

☐ Indicator 5: Student to Faculty Ratio (SFR)
  Reason:_________________________________________________

☐ Indicator 6: Faculty in the National Academy of Engineering (FNAE)
  Reason:_________________________________________________

☐ Indicator 7: Doctoral Degrees Awarded
  Reason:_________________________________________________

☐ Indicator 8: Total Research Expenditures (TRE)
  Reason:_________________________________________________

☐ Indicator 9: Average Research Expenditures per Faculty (AREF)
  Reason:_________________________________________________

Item 3
If the opportunity was given to add any indicators, would you?
(If yes move to item 4, if no move to item 5).
Yes ☐       No ☐
Item 4

If yes, list the indicator(s) you would add to the survey and under which of the four areas you would place the indicator under (A, B, C, or D)?

LIST NEW INDICATOR(S) BELOW AND IN WHAT AREA
Area
THE NEW INDICATOR WOULD FALL UNDER (A, B, C, D)

1) ______________________________________________________

2) ______________________________________________________

3) ______________________________________________________

4) ______________________________________________________

SECTION IV – BUDGET ITEMS (5 - 7)

Item 5

Did your engineering college designate funding (2011 rankings) specifically targeted for improving your engineering program rankings? (If yes move to Item 6, if no move to item 8.)

Yes ☐ No ☐

Item 6

To what extent to you agree these expenditures were affective in improving your engineering ranking status?

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

Item 7

In addition to the *U.S. News and World* Report rankings, what other ranking systems do you consider when designating funding? (Check all that apply.)

☐ American Council of Trustees and Alumni
☐ College Trend Topper
☐ Forbes Magazine
☐ MediaBuzz College Guide
☐ National Research Council (U.S.)
☐ Princeton Review
☐ Washington Monthly
☐ Other
SECTION V – STATEMENT ITEMS (8-10)

Please indicate the extent to which you agree with the following statements.

**Item 8**
The current U.S. News and World Report ranking system is a valid assessment of a quality engineering program.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Disagree
- [ ] Strongly Disagree

**Item 9**
The U.S. News and World Report ranking system should, in part, include and incorporate input from the deans of institutions participating in the survey? (Should you strongly agree or agree move to Item 10, if you disagree or strongly disagree move to Item 11.)

- [ ] Strongly Agree
- [ ] Agree
- [ ] Disagree
- [ ] Strongly Disagree

**Item 10**
The U.S. News and World Report ranking system should, in part, include and incorporate input from the deans of institutions regarding: (Check all that apply.)

- [ ] Areas (A, B, C & D)
- [ ] Indicators
- [ ] Weights of areas (A, B, C, D)
- [ ] Percentage of Indicators

SECTION VI – COMMENTS (11-12)

**Item 11**
Please include any additional comments regarding the U.S. News and World Report ranking system.

_________________________  ____________________________
_________________________  ____________________________
_________________________  ____________________________

**Item 12**
Please include any additional comments on other ranking systems important to your institution

_________________________  ____________________________
_________________________  ____________________________

Thank you for participating in this doctoral research project. Once the research information has been compiled, you will be notified and provided access to a website that presents the results. The results will be compiled and presented in such a way that no individual or institution will be identifiable. Please place this survey information in the self-addressed postage paid envelope and return by January 31, 2013. Thank you for your participation in this doctoral research study.