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THE CHARACTERISTICS THAT CAUSE AN
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A HIRABILITY STUDY: THE CHARACTERISTICS THAT CAUSE AN ENGINEERING STUDENT TO RECEIVE A JOB OFFER

By

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ABSTRACT

A HIRABILITY STUDY:
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AN ENGINEERING STUDENT TO RECEIVE A JOB OFFER

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In this qualitative case study, the researcher examined and described the recruitment process of three organizations and their efforts in hiring engineering graduates. The perspectives of organizational recruiters, engineer new hires and engineer new hire supervisors were evaluated to determine interconnections and relationships in order to answer the question: What characteristics cause an engineering student to receive a job offer?

There have been numerous research studies on the relationship of different key dimensions of recruitment. But research that addresses hirability with practical application is nonexistent. This study presents the practical side of the research.

The story of the recruiter provided a foundation for the basis of the research. Categorical headings of recruiting practices, hirable characteristics, organizational characteristics and statistical information gave definition to the system an engineer new hire would enter upon being hired. Findings indicated that data collected from engineer new hire subjects could be placed under three categorical headings: current job, successful characteristics and organizational focus. These headings produced data regarding what the engineer new hire's job is like once he or she is on the inside of the

organization; what characteristics caused him or her to get there; how these characteristics impact his or her work experience today; and last, a look at the engineer new hire's relationship with the organization: before and after being hired. Conclusions could not be formulated until the perspective of the supervisor of the engineer new hire was revealed. What engineering functions have to be performed to get the job done? What characteristics cause success on the job? What is the profile of the successful engineer new hire?

Each perspective helps to clarify "hirability" from an organization's perspective for engineering students. The data collected promoted the creation of Watson's 3-C Selection Theory, which postulates that, the right mix of character factors, competency factors and credential factors cause one to be selected, and then hired by an organization. Engineering graduates who are able to present themselves as a total package having: 1) previous co-op experience; 2) relevant coursework; 3) teamwork skills; 4) communication skills; 5) project management skills; 6) high organizational skills; 7) the ability to be a self-starter; and 8) computer skills are able to land the job.

To my family (father & mother); sisters & brothers (I include in-laws here; nieces & nephews, great-nieces & great-nephews)and many special people in my life

your prayers, encouraging words, love & support

propel me even more to be all that God has called me to be.

Thank you for being a part of my life—with your uniqueness, you have blessed me SO!

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John Watson, Sr.(father)/Gladys Watson(mother)
John Jr.(brother)/Peggy(sister-in-law)/Quincy, Roshawn & Leondrae(nephews)
Odessa(deceased-sister)
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Evelyn Ellis(sister)/Stanford(brother-in-law)/Sharnae, Chera & Leah(nieces)
Shari Boggan(sister)/Daniel(brother-in-law)

Jy-Jy—all pages are done now!

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CHAPTER I

INTRODUCTION

Statement of the Problem

When prospective employers are considering new college graduates at their organizations, what are the most important characteristics they consider? This is a question many students ask themselves when contemplating whether they have what an organization is looking for in their recruits.

According to Michigan State University's Placement Manual, 1998-1999, a national study of businesses, industries, governmental agencies and educational institutions employing new college graduates, the characteristics listed in Table 1.1 were ranked as the most important by prospective employers:

Important Characteristics for New College Graduates
Table 1.1

Dependability	Mental Stability	Perseverance
Ability to get things done	Self-Confidence/Poise	Flexibility
Honesty and Integrity	Interpersonal communication abilities	Decision-making abilities
Competitive abilities	Diplomacy/Tactfulness	Motivational abilities
Team management skills	An appropriate major	Intelligence
Ability to accept Responsibility	Physical ability to do the job	Self-Pride/Appearance
Staying power and stability	Common Sense	Ambition
Writing skills	Maturity	Neatness
Time management skills	Computer skills	Innovative ideas
Mathematical skills	Ability to delegate	Ability to move within organization
Ability to be an example to others	Excellent speaking skills	
	Campus leadership experiences	

The list in Table 1.1 is quite extensive. Of those characteristics listed, which ones are critical for engineering graduates? Do employers who recruit engineering graduates desire some characteristics over others or should they master them all?

In considering what characteristics employers deem necessary for an engineering graduate to be hired by their organization, it is vital to recognize the relevance of the Accreditation Board for Engineering & Technology, Inc. (ABET). The ABET Board of Directors sets policy and approves accreditation criteria, while the Commission implements accreditation procedures and decisions. Practicing professionals from the industry, both public and private sector, actively participate on this Board to better reflect standards set by the profession itself. This participative approach is an effort to produce better-prepared graduates ("What is ABET and why it is Important," http://www.abet.org).

Upon evaluating engineering programs during the 1999-2000 accreditation cycle, ABET's *Engineering Criteria 2000,* says that graduates from these programs must be able to demonstrate that they have the following:

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component or process to meet desired needs
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

ABET requires engineering programs evaluated under the accreditation criteria of *Engineering 2000*, to undergo an assessment process with documented results. Evidence must be given that the results are applied to the further development and improvement of the program. The assessment process must

> demonstrate that the outcomes important to the mission of the institution and the objectives of the program, including those listed above, are being measured. Evidence that may be used includes, but is not limited to the following: student portfolios, including design projects; nationally-normed subject content examinations; alumni surveys that document professional accomplishments and career development activities; employer surveys; and placement data of graduates ("Criteria for Accrediting Engineering Programs," http://www.abet.org).

Information from the Internet tells engineering students that grade point average has mixed importance in a college engineering program. Because many engineering courses are generally curved, even students with mediocre grades manage to find employment, according to the article. If a student has a grade point average of anywhere between 2.7 and 3.5, this corresponds to what some employers are looking for. Employers are said to have a greater concern with whether students can demonstrate that they understand engineering from the perspective of their individual discipline.

Employers also seek good communication skills. Engineers often work in groups or teams and have to convey their ideas clearly to each other, both in written and oral form. As a profession, engineering does allow people who lack good communication skills to lean on their technical skills and compensate with good engineering work. However, good communication skills can open doors of opportunity that otherwise might go unnoticed.

Extracurricular activities or participation in an engineering society is looked upon favorably by corporate recruiters. The activities allow both academic and social exposure, in that engineering societies allow students to network with people in industry and learn about engineering outside the classroom ("The Engineering Experience," http://table.jps.net/~godfrey1/ch.2htm).

This study will explore what characteristics make an engineering graduate from a public university hirable. What characteristics cause a match to be made between the student and the employing organization? Through the use of comprehensive case studies of three organizations, the researcher will be able to identify what recruiting employers are looking for as a large group, by examining this subset, or smaller group of three organizations, that are particularly interested in engineering graduates.

Purpose Statement

This study was intended to develop a better understanding of what employers desire in engineering graduates they hire. The primary question for this study is: (1) What characteristics cause an engineering graduate from a public university to receive a job offer? The secondary question is: (2) How have these characteristics impacted the new hire's work experience today? In-depth case studies were used to examine and evaluate the comprehensive recruiting efforts of employers who recruit at public universities. Follow-up interviews were held with recent new hires to depict a profile of the successful graduate who is currently working with a designated organization; with engineering supervisors to get more insight into the characteristics necessary to be hired as an "engineer" with the organization; and with college engineering placement personnel to explore the recruiting process more closely from the university perspective and partnership with business.

This research is not just for inquiry purposes, the following objectives of this study have practical application:

1) It will help build a framework of how an engineering student should prepare in order to increase his/her chances of gaining employment after graduation.

2) It will further contribute to the research available in providing an understanding of "hirability" from the eyes of the employing organization.

3) It will make a deposit into the research literature bank on recruitment.

4) It will assist practitioners, students and career placement professionals in having a better understanding of how multiple recruitment activities interact.

5) It will help engineering students be better prepared for future job searches by informing them of what it takes to be hired by major employers, which should have a direct impact on the number of engineering graduates who receive job offers.

6) It will offer career placement professionals insight in developing innovative approaches that will help increase the number of engineering students who land job offers.

7) It will allow organizations to be able to better distinguish their needs from others in regards to what characteristics an engineering graduate needs to gain employment with their organization.

Significance of the Study

Within the past few decades, a change has occurred in the importance placed on effective human resource management. In recent years, we have noticed greater documentation focusing on human resources in scholarly research as well as in commercial enterprise symposia. However, the questions that have prompted many research studies have become more sophisticated and multifarious over time. Many years ago business management theorists postulated schools of thought promising more productive employees or effective grids that measured a manager's concern for the work to be done as well as for the employees who did the work. Times have changed. Focus has changed. Needs have changed. Businesses and educational institutions alike are concerned with how to prepare students for the world of work so that they can be hired and become productive members of the labor force. Recruitment remains an important

part of effective human resource management. Recruitment performs an essential function of drawing human capital into the organization. Other efforts, such as selection, training and development and compensation, depend partly on the quality and quantity of new employees identified and attracted through the recruitment process (Barber, 1998).

In investigating the breadth and depth of recruitment research, discussion and evaluation of a variety of angles were evident in the literature. To date, there have been many studies done related to the effects of different recruitment sources, reactions to specific types of recruiters and the nature of the recruitment message. Barber (1998) identifies specific recruitment activities that are included in an organization's recruitment process, which are 1) definition of target population; 2) choice of medium/source; 3) message delivery; 4) making the offer; and 5) general administrative issues. Though there has been a great deal of research that addressed a single recruitment activity, there is little research that incorporates how multiple recruiting activities interact (e.g., how an organization's administrative procedures impact the way an offer is made by the organization). This is one reason why there is such a great need for this research study. Employing organizations need to analyze what they need from the engineering students they seek to attract to their organization. Conversely, engineering students need to know what characteristics they should possess if they want to be hired by these organizations. With this understanding, they will be able to develop those characteristics and increase their chances of gaining employment after graduation. Gaining information on either side can only produce positive outcomes.

The results of this study will not only make a contribution to the research literature bank on recruitment, it will also assist practitioners, students and career

placement professionals in having a better understanding of how multiple recruitment activities interact. Career Placement professionals will gain insight from this research in learning what services will be effective in increasing the number of engineering students who land job offers. Businesses will be able to better distinguish their needs from other organizations and identify what activities help or hinder their recruitment process.

Research Design

Due to the nature of this study, utilization of a qualitative research design is most appropriate. This study explored nonnumeric data in the form of words and utilized non-statistical means of analyzing and interpreting data. "Qualitative" denotes of or relating to quality, and a quality, in turn is an inherent or phenomenal property or essential characteristic of something (object or experience) according to Neumann (1985). This qualitative study was concerned with gaining an understanding of what characteristics cause an engineering student to be hired. Case studies were employed to allow for insight, analysis and interpretation, rather than hypothesis testing.

The researcher conducted formal and informal interviews with organization recruiters and/or human resource personnel, engineering recruits to the organization, supervisors of engineering recruits and public university engineering placement personnel. All data received aided in defining "hirability" from an individual employer's perspective. The researcher used the insights gained from particular organizations to develop a better understanding of the recruiting process relative to an engineering graduate's hirability. The researcher personally visited one of the sites to observe the natural setting of the organization as well as to interact face-to-face with subjects.

Research Assumptions and Questions

The following assumption and questions will guide the depth of this study:

Assumption

1. There are specific characteristics that cause an engineering graduate to be hired by an employer. It is feasible to believe that though the organization may differ in product/service, there will yet be similarities in the characteristics necessary to perform as an engineer across organizations. Only the individual organization can confirm this assumption through in-depth exploration of their recruitment process.

Questions

1. What characteristics cause an engineering graduate from a public university to receive a job offer from an on-campus employer?

2. How have these characteristics impacted the new hire's work experience today?

In reviewing the aforementioned research assumptions and questions, Barber's (1998) key dimensions provide a detailed understanding of recruitment and its elements (see Table 1.2). The subsequent explanations of each dimension reveal which key dimensions will be examined more closely in this study. These five dimensions sufficiently model the complexities of recruitment. Each dimension: the actors (players), activities, outcomes, context and phases have consistently appeared in the literature, though potentially labeled differently, but with the same meaning as Barber (1998) describes.

Key Dimensions of Recruitment
Table 1.2

ACTORS:
- Individual/Applicant
- Organization
- Organizational Agents

ACTIVITIES:
- Defining target population
- Choice of medium/source
- Message delivery
- Closing the deal
- Administrative processes

OUTCOMES:
- Attraction
- Post-hire
  - Organizational performance
  - Other

CONTEXT:
- Internal
- External

PHASES:
- Generating applicants
- Maintaining applicant status
- Job Choice

These five dimensions sufficiently model the complexities of recruitment. Each dimension: the actors or players, activities, outcomes, context and phases have consistently appeared in the literature, though potentially labeled differently, but with the same meaning.

Players

"Players" refer to the individuals or organizations involved in the recruitment process. These players can either influence, or be influenced, by recruitment processes. The primary players, in most cases, are the organization engaged in the process of recruiting and the applicant (or potential applicant) being recruited. In this dimension, the organization has interdependence to the applicant, and vice versa. This interdependence reemphasizes the organizational function of recruitment and its dependence on influencing (or attracting) potential applicants. Because of this interdependence, it is important to view recruitment from the organizational perspective, in regards to what brings success to a particular organization relative to its unique identity, as well as from the potential applicant's perspective relative to the necessity to become selected (or hired). It is important that research in this area is representative of the population of organizations involved in recruitment to better interpret recruitment as viewed by the organization.

Activities

Recruitment activities (or recruitment efforts) are those specific tasks, procedures and actions undertaken for purposes of recruitment. These are those things actually done by the actors on behalf of the organization. Included in this classification could be activities that fall under headings of 1) defining the target population (this research study will focus on organizations that recruit engineering graduates from public universities); 2) choice of medium/source (this study will focus on organizations that use on-campus recruiting as one of their primary sources by which potential applicants are reached);

3) message delivery (this study will learn more about an organization's expectations of potential applicants from those recruiters who serve as organizational spokespersons); 4) making the offer (this study will identify what characteristics cause an offer to be extended); and 5) general administration issues (refers to the policies and practices that manage the overall recruitment function of the organization).

Rynes and Barber (1990) and Rynes, Heneman & Schwab (1980) plead that research should incorporate a greater variety of recruitment activities in order to have a better understanding of how different activities interact.

Outcomes

Since the primary objective of recruitment is to identify and attract potential employees, outcomes are vital. Each organization involved in the recruitment process has specific outcomes it wants to gain unique to its organization. Numbers might be important, as far as the quantity attracted. Specific attributes that match the vision of the organization are normally sought from those desired to be attracted. Both quantitative and qualitative dimensions are associated with attraction (Rhynes & Barber, 1990). Each organization has specific characteristics that they are seeking. A successful match between the applicant's abilities and the organization's desires and/or needs determines the success of an organization's recruiting efforts.

Context

This dimension refers to the real world context recruitment occurs in. Context factors can be classified as external or internal. External context factors include aspects

of the environment outside the recruiting organization, such as the state of the labor market or legislation that addresses discrimination. Internal context factors primarily focus on organizational characteristics, such as its business strategy—namely, the type of employees needed or the relative importance of human capital.

Phases

Recruitment is a process that takes place in multiple phases (or stages). This dimension focuses on a potential employee's movement through the job search process (Boudreau and Rynes, 1985). These phases can extend over a period of time and are helpful in identifying the transitions or cycle of changes a potential applicant experiences from one point in the recruitment process to the next.

In expounding on the aforementioned key dimensions, a number of variables relevant to recruitment research emerge. Examination of the recruitment literature reveals that the experts have called for future research that incorporates more of each of these dimensions (Barber, 1998). In understanding that all dimensions cannot adequately be addressed in one single study, this study will focus, primarily on the actors (players) and provide some insight on the activities and the outcomes.

This study will take on the characteristics of qualitative methodology in order to explore the dynamics of the relationship of recruitment to the hiring of engineering graduates. The investigator will explore what characteristics cause an engineering graduate from a public university to receive a job offer from an on-campus employer, i.e., what makes an engineering graduate "hirable" in the eyes of the recruiting organization.

To study how decisions are made about an applicant's hirability in the field of engineering, it is necessary to view a classification scheme that has organized jobs into different categories. A useful model for this qualitative research study is Holland's (1973) Theory of Vocational Choice. Holland's Theory postulates that members of an occupational group share similar personalities. The individual's success in this particular occupation is contingent on the degree of congruence between his or her personality and the job environment (EAD 864-Josephs, Lecture Notes, 1993). Vocational choice is an expression of one's personality and performance is best when there is congruence between the personality-based preferences and values of the individual and the requirements of the job. However, little empirical research has tested this proposition. Costa, McCrae & Holland (1984) investigated the relationship between Holland's typology and the neuroticism-extroversion-openness (NEO) model of personality. The results indicated that openness to experience was strongly associated with Investigative and Artistic interests and that extroversion was associated with interests of Social and Enterprising types. As an extension of this research, Dunn, Mount, Barrick & Ones (1995) addressed the relative importance of personality and general mental ability in managers' judgments of applicant qualifications.

Definition of Terms

Engineering student: one who is enrolled in an undergraduate accredited program offered in the School of Engineering.

Engineering graduate: one who has completed the necessary degree requirements for a bachelor's degree in engineering, according to the standards required by the educational institution.

Public university: a school or institution controlled and operated by publicly elected or appointed officials and deriving its primary support from public funds (Digest of Education Statistics 1998, U.S. Department of Education, p. 528, http:\\www.acenet.edu).

Job offer: an offer to an individual to accept employment with a particular organization for the purpose of performing a certain job, including the compensation and benefits presented in order to receive acceptance of the offer.

Recruit: [re-, again + crescere, grow]; 1) to enlist (new members) for an organization (Webster's New World Dictionary and Thesaurus, pg. 517).

New hire: an engineering graduate who gained employment with an organization in the past three years.

Character: at a given time, each person has a specific attitude **(At)** towards a specific issue and has distinctive individual qualities **(P)** that cause him or her to act **(B)** in a certain manner; a person's character consists of one's attitudes, personality and behaviors.

Selection: choosing the most qualified or picking out the one who makes the best match with the organization from a group of applicants.

Hirability: possessing the right mix of character factors, competency factors and credential factors to be extended a job offer, accepting that offer and being inducted by the organization to perform certain functions for a certain wage.

Delimitations

This study was delimited to three organizations that have recruited engineering students (or graduates) from public universities in the past three years. It is important to consider that these organizations are only a sample of a greater population of multi-dimensional organizations, each with its own distinct product or service, unique organizational climate, and specific human resource needs. This study did not in any way attempt to state that these three organizations represent what actually occurs in all organizations, but instead suggests that these three organizations serve as a representative sample of other similarly situated organizations.

This study was delimited to engineering graduates and what makes them "hirable" to employers. Through exploration and inquiry, this study identified specific characteristics that are consistently sought among a representative sample of employers who hire engineering graduates. This information was delimited in that it is only applicable to engineering graduates who have received job offers and should not be generalized to other career majors. Additionally, insight gained from this study regarding engineering students was delimited to those who are of undergraduate status and attend public universities.

These delimitations do not exist because certain factors are considered to be more important than others. Moreover, in recognizing the importance of all educational

majors, all types of organizations, the hirability of all students, students in all class standings, and both public and private universities, and the need to shed as much light as possible into the subject realm, a decision was made to extract a sub-group. This sub-group allowed the scope of the study to be narrowed to provide thorough and well-examined data that educates those who need to know and challenges those who want to know more, to proceed to the next level of inquiry.

Overview of the Study

The first chapter of this work introduces the study and its approach to the problem being explored. Chapter II is a review of related literature. Chapter III presents research methods, the subject selection process and subject traits. Chapter IV is divided into three sections. Each section provides a story told by the recruiter, engineer new hire and engineer new hire supervisor. Descriptive information regarding the on-site visitation to one organization is also included. Chapter V is a presentation of conclusions and discussions of the research findings, new theory, conclusions and recommendations for future research.

CHAPTER II

LITERATURE REVIEW

Current and previous research has been extensively examined via literature review to determine the extent of prior research on recruitment of applicants. Recruitment is a complex process involving key dimensions and multiple phases. In reviewing the literature, it was ascertained that the breadth of research extends into many areas. These multiple phases, which include 1) generating applicants; 2) maintaining applicant status; and 3) job choice, encompass most to all elements of the key dimensions (Barber, 1998).

Phase of Generating Applicants

Literature relating to the initial phase of recruitment, the generation of applicants, was quite extensive. However, topics such as geographic targeting, recruitment sources, image, reactions to recruitment materials and the like, were not adequately covered in the research. This stage is one of extensive search where applicants and employers are engaged in producing large numbers of candidates for future consideration. This larger pool will be reduced, as many interrelated activities and processes occur, to a pool of selected candidates.

Key outcomes for this phase are the identification and attraction of potential applicants. Identification of individuals who meet the organization's needs is complex in terms of qualifications, demographic characteristics, or other characteristics relevant to

organizational objectives. After these individuals are identified, they must be persuaded to pursue employment with the organization. This phase begins from the organization's perspective, examining organizational decisions regarding what population to target and what recruitment sources to use. This process, then shifts to the applicant's perspective, focusing on how initial impressions are formed, reactions to recruitment materials and other related issues, that impact an applicant's decision to pursue employment with a particular organization or not.

The literature revealed many issues relative to applicant targeting. Though geographical boundaries define the recruitment parameters of many organizations, there has been virtually no systematic study of the rationale for recruitment boundaries, or consequences thereof. A number of studies have suggested that applicants "rule out" jobs located outside their preferred geographical area (Barber & Roehling, 1993; Osborn, 1990; Rynes & Lawler, 1983). Other research indicates that individuals hold preferences for communities with specific characteristics. Candidates are easily attracted to a particular community when those characteristics are satisfied (Carruthers & Pinder, 1983; Noe & Barber, 1993). In addition, researchers found that relocating to new communities that are similar to the applicant's former home helps decrease stress and anxiety and adjustments are more easily made (Brett, Strop & Really, 1992; Pinder & Schroeder, 1987).

Conversely, where geographic similarities are important to applicants, specific applicant characteristics are important to the organization, likewise. To make the recruitment process more effective, it behooves organizations to target individuals with specific characteristics (i.e. skills and abilities required to perform the job, likeliness of

accepting a job offer should one be extended, etc.). The literature revealed an extensive discussion of applicant targeting in Rynes and Barber (1990) suggesting that organizations focus on nontraditional applicants when applicant shortages are large, when jobs are unattractive, when high wages are not available, etc., to gain a competitive edge in recruitment. Literature in this area with empirical evidence was essentially nonexistent.

Other areas of research exploration included discussion of the effectiveness of different recruitment sources and their relationship to specific outcome variables. This area has been more intensely researched than other areas, but revealed limited information on the identification and attraction of applicants, except in explaining outcomes relative to performance, absenteeism, satisfaction and post-hire longevity (Gannon, 1971; Blau 1990; Breaugh & Mann, 1984; Werbel & Landau, 1996; Vecchio, 1995; Wanous, 1978).

The Social Identity Theory

After target populations and recruitment sources have been identified, organizations have to determine how they will persuade individuals to apply to their organization. The image of the organization as well as the recruitment materials that depict who they are as an organization have a remarkable impact on the applicant's decision to accept employment (or seek) employment with an organization or not. Limited information was found relative to these areas. However, some interesting phenomena surfaced relative to organizational image. First, a comprehensive definition was provided by Tom (1971) which described image as the way people perceive an organization—a loose structure of

knowledge, beliefs and feelings about an organization (Barber, 1998). This image, may be vague or clear, weak or strong; may vary from person to person and can change over time. Tajfel & Turner (1985) discussed how the Social Identity Theory comes into play in explaining how self concepts are shaped partly by the organizations to which we belong. A favorable view of an employer (by oneself or others) results in positive social outcomes, such as approval of that employer (Barber, 1998). Conversely, negative views of an employer held by an employee or others they associate with, can lead to negative outcomes like stress and depression (Dutton, Dukerich & Harquail, 1994). In considering this, potential applicants may prefer organizations with positive images. Another issue related to image in the literature dealt with whether image is malleable or not (Fombrun & Shanley, 1990; Turban & Greening, 1997; Katayama, 1990; Martin, 1987).

Job seekers begin with some impression of employing organizations they will consider as a potential employer. These organizational images can be "a loose structure of knowledge, beliefs and feelings about an organization" (Tom 1971). This image can be either complemented or modified by recruitment materials the organization produces. There are studies in the literature ranging from how an organization's image can attract attention to reactions to the content of recruitment materials (Koch, 1990; Barber & Roehling, 1993; Gatewood, et. al., 1993; Mason & Belt, 1986; Dawis, Lofquist & Weiss, 1968; Laabs, 1991; Redman & Matthews, 1992).

The Expectancy Theory

The aforementioned issues emphasize that many factors impact an applicant's decision-making ability in the recruitment process—how individuals decide whether to apply for jobs. In addressing this issue of applicant decision making, the literature introduced the applicability of the Expectancy Theory (Vroom 1964). The Expectancy Theory portrays motivation to exert effort toward some particular end as a multiplicative function of two factors: the individual's perception that he or she can obtain a particular outcome (referred to as [*expectancy, or E*] and the individual's assessment of the attractiveness of that outcome, a combination of the likelihood that the outcome has certain characteristics (called its [*instrumentality, or I*] and the attractiveness of these characteristics (their [*valence, or V*], depicted by the mathematical model: Exertion of Effort = $f[Ex\Sigma(V*I)]$ (Barber, 1998). In relating this theory to application decisions, expectancy refers to the potential applicant's beliefs that he or she would be successful in obtaining employment with the organization. The attractiveness of that employment would be a function of the attributes the job was expected to possess as well as the attractiveness of those attributes to the potential applicant. This theory tends to focus on individual elements rather than the model in totality. Therefore, its ability to predict job application decisions is limited according to the literature (Herriott & Rothwell, 1981; Barber & Roehling, 1993).

Due to the limited empirical evidence produced from research studies in the aforementioned areas, opportunities to contribute substantially to the literature are eminent.

Phase of Maintaining Applicant Status

The second phase of recruitment is called "maintaining status as an applicant." The organization's goal during this phase is to maintain the applicant's interest so that he or she will continue to pursue employment. This stage is characterized by significant interpersonal contact, which could range from initial face-to-face contacts with applicants to "site visits." Other topics covered to some extent in the literature are recruiter-centered research (Rynes & Boudreau, 1986); the influence of recruiter trainer (Taylor & Bergmann, 1987); and applicant reactions to site visitations (Taylor & Bergmann, 1987; Turban, Campion & Eyring, 1995; Rosse, Miller & Stecher, 1994).

Signaling Theory

Face-to-face recruitment, or the initial interview, was extensively covered in the literature. This significant body of research addressed a wide range of topics relative to applicant reactions to recruiter traits to focus on the initial interview an applicant has with a recruiter. Signaling Theory (Spence, 1973, 1974) suggested that decision makers who are faced with uncertainty and incomplete information should use what information they have as the basis for inferences about missing information. Often times applicants have limited information about jobs and/or organizations, so they use recruiter traits and behaviors as signals of important aspects of the employment opportunity (Barber, 1998). Relative to signaling and inferences, Rynes (1991) addressed inferences regarding the applicant's probability of receiving a job offer and inferences regarding job organizational characteristics. Other studies addressed applicant reactions to recruiters as far as attraction to particular jobs or organizations (Powell, 1984; Taylor & Bergmann,

1987; Harris & Fink, 1987; Turban & Dougherty, 1992; Mauer, Howe & Lee, 1992). Interview focus is a topic widely covered in the literature in regards to the purposes of interviews, applicant responses, different settings and structure of interview, to mention a few (Rynes, 1989; Taylor & Bergmann, 1987; Macan & Dipboye, 1990; Turban & Dougherty, 1992; Taylor & Sniezek, 1984).

Phase of Influencing Job Choice

The final recruitment phase is "influencing job choice" and addresses issues related to whether applicants decide to accept job offers they have received or not. Most research identified through my literature review in this area focused on the applicant, as it should. Job attributes definitely influence whether a job offer would be accepted or not (Schwab, et al., 1987, Jurgensen, 1978; Lacy, Bokemair & Shepart, 1983; Barber, Daly, Giannantonio & Phillips, 1994).

The topic of "job fit," which is the congruence between individual and organizational characteristics, enters the picture when questions arise on whether a job offer will be accepted or not (Behling et al., 1968; Tom, 1971; Schneider, 1987; Wanous, 1980, 1992). These studies each introduced various models relating to subjective factors, image, attraction and matching.

Research relating to the various phases of recruitment has been explored at many angles. Though extensive research has been done, there is still room for more exploration on subjects that have not been explored or those that need further investigation of new dimensions.

CHAPTER III

METHODS AND PROCEDURES

Research Methods

This qualitative case study examined the recruiting experience of three recruiters from their organization's definition of what recruitment means for engineers, how that experience is transferred into an on-the-job setting through the eyes of five engineer new hire and lastly, from the perspective of three engineer new hire supervisors who are focusing on getting the work done successfully. A qualitative case study approach was selected to collect and analyze the data in a manner that allows the data to be reduced to themes or categories and evaluated subjectively. A qualitative case study approach allows emphasis on description and discovery. Polkinghorne (1991) deems that qualitative methods are especially useful in the "generation of categories for understanding human phenomena and the investigation of the interpretation and meaning that people give to events they experience." The investigator was able to personally experience what Polkinghorne referred to through a thorough investigation of hirability from the eyes of the recruiting organization. This research procedure escalated the learning process of the intricacies of what causes an engineering graduate to gain employment with an organization.

Qualitative methodologies can have a depth of heterogeneity, but there are three fundamental assumptions that all such methods share (Patton, 1980): 1) a holistic view:

which stresses that the whole is greater than the sum of its parts and the focus on seeking to understand phenomena in its entirety in order to develop a complete understanding of a person, program, or situation; 2) an inductive approach, where the research begins with specific observations and moves toward the development of general patterns that emerge from the cases under study; and 3) naturalistic inquiry, with the intention of the research being to understand phenomena in its naturally occurring state—a discovery-oriented approach in the natural environment.

This qualitative study was able to employ these methodologies through the data gathering techniques of formal and informal interviews, review of documents and observation. Each organization constituted a case that was broken down into the experiences of the organization's recruiter, engineer new hire and engineer new hire supervisor. The sum of the parts should produce the holistic view of recruitment and hirability from the eyes of a specific organization. As additional organizations were analyzed, specifics transformed into generalizations that were shared among the organizations, which lead to even more clarity and understanding of the type of organizations that employ engineers while observing the natural environment of one such organization. The experiences of each role within the organization were examined individually initially and then in relationship to the other organizations participating in the study. The organization was the primary focus of each group of interviews: what does the organization desire from engineer graduates they recruit, how do these desired characteristics come into play once the engineer new hire is inside the organization and what characteristics cause a successful on-the-job work experience from the perspective of the supervisor who is responsible for getting the job done.

Design

"Research design is similar to an architectural blueprint. It is a plan for assembling, organizing, and integrating information (data), and it results in a specific end product (research findings). The selection of a particular design is determined by how the problem is shaped, by the questions it raises, and by the type of end product desired." (Merriam, 1988).

A case study approach was selected for this research study to allow the researcher to move from specific information to apply to general populations, or exercise inductive reasoning. Case studies allow the attainment of descriptive information and explanation from examinable events that allows the researcher to conclude the nature of why certain events took place in order to offer direction and advice to future student populations. The question of why some engineering students are hired and others are not is a practical question that arises from everyday employment situations. A case study approach allows a particularistic focus on this situation and the events that surround it, and provides a descriptive end product giving a thorough, literal description of the incident being investigated. The information gained from the case studies is heuristic because it brings about illumination and understanding of the phenomena as well as a discovery of unknown relationships or variables that produce meaning to a situation.

Qualitative case studies adhere to the objective of discovering meanings and experiences and understanding how all parts work together to form a whole. Patton (1985) wrote:

> It is an effort to understand situations in their uniqueness as part of a particular context and the interactions there. This understanding is an end in itself, so that it is not attempting to predict what may happen in the future necessarily, but to understand the nature of that setting—what it means for participants to be in that

> setting, what their lives are like, what's going on for them, what their meanings are, what the world looks like in that particular setting—and in the analysis to be able to communicate that faithfully to others who are interested in that setting...The analysis strives for depth of understanding (p.1)

Organizations who hire engineers are looking for students who have certain characteristics, who fit into the specific organizational setting. There are a variety of different methods they go about to identify those persons. The engineers who are hired learn how those characteristics assist them in doing the job they were hired to do. After working on the job, the engineer might have a different interpretation of the recruiter as far as what applicability those characteristics have to the type of work they are actually doing. Realities might offer different perspectives. Furthermore, the supervisor who is responsible for the output of a product or service has an even different perspective of what characteristics are needed to be successful on the job. Because of so many different experiences, variables and perspectives, no predetermined hypotheses were evident. There was no manipulation of subjects; the researcher took things as they were (McMillan and Schumacher, 1984, p. 26). The researcher got as close as possible to the subjects to be able to have access to subjective factors—their thoughts, feelings and experiences and in some cases, to their natural setting to directly observe what their world was like (Bromley, 1986, p.23).

Olson (in Hoaglin and others, 1982, pp. 138-139) summed it up best in identifying the features of case study design into 16 simple statements, those which apply directly to the goals of this research study are listed below regarding the particularistic nature, the descriptive nature and the heuristic nature:

- It suggests to the reader what to do or what not to do in a similar situation.
- It examines specific instances, but illuminates a general problem.
- It illustrates the complexities of a situation and educates that not one, but many factors contributed to it.
- It has the advantage of hindsight yet can be relevant in the present (or future).
- It includes vivid material—quotations, interviews, etc.
- It presents information in a variety of ways and from the viewpoints of different groups.
- It explains reasons for a problem, the background of a situation, what happened and why.
- It evaluates, summarizes and concludes, thus increasing its potential applicability.

Because of the special features available in a case study design, the researcher was able to allow the recruiters, engineer new hires and engineer new hire supervisors an opportunity to use their own vocabulary to articulate their version of the story, to provide their perspective of the situation from the role they play in order to shed light on the concept of "hirability."

This research study was exploratory in nature, yet guided by the single assumption that:

1. There are specific characteristics that cause an engineering graduate to be hired by an employer. It is feasible to believe that though the organization may differ in product/service, there will yet be similarities in the characteristics necessary to perform as an engineer across organizations. Only the individual organization can confirm this assumption through in-depth exploration of their recruitment process.

This assumption is based on the researcher's own experiences in working in three different organizations whose focus was on engineering work as well as personally being responsible for recruiting engineers to the organizations for over a decade. Being able to examine the characteristics necessary to perform as an engineer in different organizations, meaning what is necessary for an engineer to be hired by these types of organizations, can produce many benefits, of which the most desired is to help engineering students be better prepared for future job searches by being informed about what it takes to be hired by major employers, potentially causing an increase in the number of engineering graduates who receive job offers. As this study progressed, the assumption and number of research study objectives, combined with evolving data, led to the conclusions found in Chapters IV and V.

Population and Selection Process

Based on the definition of this research study, it was necessary to ascertain what type of organizations recruit engineering majors. A top ten Michigan public university was contacted to supply a list of all organizations that indicated a desire to recruit engineering majors at their institution. This list contained organizational names, addresses, phone numbers, email addresses and recruiter contact name(s) for 127 organizations. Of this number, conversations were held with a university placement staff person on the recruiting practices of these organizations based on the university's experience. This staff person was asked to exercise comparable-case selection to identify those organizations that had similar recruiting tiers involved in their recruitment process (Merriam, 1988). This process of selection is often used with purposeful sampling, which is based on the

assumption of a need to select a sample from which the most can be learned (Schwandt, 1997). Some organizations require a number of different steps to be taken before a decision is made on whether an applicant is extended an offer or not. The investigator desired to look at organizations that had similar recruiting practices, so as not to compare apples with oranges, but to be able to give a realistic view of a representative sample. Of the 127, 30 organizations were identified as likely have similar recruiting practices. A designated recruiter from each of these organizations was contacted via email and/or phone, informed of the study and asked to complete a preliminary survey. The preliminary survey contained seven questions relating to the organization's recruiting practices. Seven organizations responded and completed the preliminary survey. The recruiting practices were examined to ensure that they were in fact similar to others in regards to the methods they utilized in recruiting engineering graduates and the number of tiers involved in their recruitment process and what each tier included. It was determined that all seven organizations were similar, therefore, all organizations were mailed an explanatory letter, consent form and interview protocol, asking for their organization's participation in the study. Recruiters (two males and two females, all white) from four organizations agreed to participate initially. One organization withdrew from the study when Human Resources was requested to supply information to a few questions which involved statistical information about the workforce, number of engineer new hires/offers for specific years, and other related questions. Though some other information had been released, a decision was made not to reveal this type of information and at that point, to withdraw from the study, leaving three participating organizations.

Organization X is a 3 billion dollar manufacturing company, with over 24 sites throughout five countries. It has been in existence for almost 100 years, though it has undergone many structural changes as well as a recent name change. With over 8,000 employees worldwide and approximately 400 employees at the local Michigan site who agreed to participate in the study. Organization X is recognized worldwide as an industry leader and has over 40 chemical product markets.

With a 112-year excellence history, Organization Y focuses on professional, scientific and technical services. In more than 100 countries around the world, Organization Y helps institutions, airlines, communication providers, commercial market leaders and government agencies apply information technology to streamline operations, minimally. There are over 30,000 employees worldwide. The Recruiter who agreed to participate in this study gave information pertaining to two Northcentral plants, with 1400 employees total.

As a relatively new organization in advanced technology, systems and components, Organization Z is a $14.5 billion corporation, with a 15-year history, nearly 70,000 employees worldwide and 2,500 employees at the Michigan site participating in the study. Organization Z is constantly growing in size, reputation and profits. In 26 countries globally, Organization Z has 16 North American companies, currently manufactures 340 product lines and is yet diversifying. See Table 3.1 for organizational profiles.

Table 3.1: Profile of the participating organizations.

Organization	# Empls Nation-Wide	Yrs of Service	Product / Service Focus	# Global Countries	Annual Rev	# Product / Service Markets
X	8,000	100	Mftg	5	3 Billion	40
Y	30,000	112	Profes, Scientific & Technical Services	100	Not Given	9
Z	70,000	15	Mftg	26	14.5 Billion	340

Key: Empls = Employees / Yrs = Years / Rev = Revenue / Mftg = Manufacturing / Profes = Professional

Selection of Subjects

The structure of this study dictated that initial interviews be done with organizational *recruiters* to learn more about how organizations recruit engineers. These recruiters were asked to identify up to 30 names of *engineer new hires* recruited to their organization within the past three years. However, if 30 or more new hires were recruited within a particular calendar year, names of the most recent new hires should be provided. They were also asked to identify *engineer new hire supervisors* within their organization who had supervised engineer new hires within the past three years. After these names were supplied, an explanatory letter and consent form was either mailed or emailed to 28 engineer new hires and 13 engineer new hire supervisors allowing each person an opportunity to participate in this study. All persons were provided the investigator's email address and phone number to inquire about the specifics of the study prior to accepting the invitation to participate. Seven engineer new hires (2 females and 5 males; one black, four white and one Asian) and three engineer new hire supervisors (3 white males) participated in the study. A total of 14 interviews were done with either recruiters, engineer new hires and engineer new hire supervisors. Only one organization was aware of the names of the engineer new hires and engineer new hire supervisor who participated in the study due to their desire not to release names to the investigator, but to personally forward the information to appropriate personnel. The identity of other recruiters, engineer new hires and engineer new hire supervisors was protected and not released to any other personnel within or outside of the organization.

Phone interviews or face-to-face interviews were done with a designated recruiter from each organization, at least two engineer new hires and an engineer new hire supervisor to provide different perspectives of the recruitment process and how it relates to being hired with that specific organization. Of the organizations that participated, one on-site visitation was done and interviews with the recruiter, engineer new hires and engineer new hire supervisor were conducted on-site. At the on-site visit, the investigator was able to speak with the subjects in their natural environment, tour the plant and observe general interactions among employees as well as the organizational focus or message being exhibited. Interviews with the recruiter lasted approximately 45 minutes to one hour. Interviews with engineer new hires and engineer new hire supervisors lasted 30 minutes. Three informal interviews were done with public university placement personnel to attain additional information on the recruitment of engineer graduates from the university career services perspective, making a grand total of 17 interviews being done for this study.

Data Collection

Due to the nature of this study, data collection and analysis were ongoing throughout each aspect of the study. The primary methods of data collection were interviews, document analysis and observations. Emerging patterns and consistent themes were depicted between subjects, across organizations. Theme headings were identified for each subject group and data was examined and analyzed and was color-coded according to consistency between subjects.

Interviews

Each subject in the study participated in one formal interview, either phone or in-person between September and November, 1999. Questions for the recruiters were formulated to focus on topic areas of: the organizational recruiting practices, hirable characteristics, organizational characteristics, statistics and general observations/notations. An interview protocol was developed, which consisted of 25 questions to frame the interview for consistency with the recruiters. An interview protocol of 13 questions was formulated for the engineer new hires, based on topics of: their current job, hirable characteristics, organizational focus and general observations/notations. For engineer new hire supervisors, an interview protocol of 14 questions were formulated based on the topic areas of: engineering job functions, successful on-the-job characteristics, profile of the engineer new hire, statistics and general observations/notations. However, depending on the information shared by the subject, other questions might have arisen that were necessary to bring clarification to the responses received from the subject. Subjects were asked if they could be taped. Those who agreed, were tape recorded to ensure that the investigator captured responses as they were given. Tapes were transcribed at the conclusion of all interviews being completed. All subjects agreed to be tape recorded, except one who expressed verbal disagreement. One other subject expressed a great deal of concern with the anonymity of his responses and the confidentiality of information he shared, while small talk was occurring prior to going through the interview protocol, so the investigator decided not to ask the subject if he would agree to being tape recorded. Throughout the interviews, regardless of which subjects were being interviewed, subjects were asked if they had any questions, needed

additional clarification or had any discomfort in answering any question to let the investigator know. Interviews went well and appeared to be representative of the subject's candor regarding the perspective being shared.

Informal interviews that were held with university placement personnel lasted from 30 minutes to one hour, depending on the specialization and/or expertise of the subject. These interviews took place in the office of the person being providing information. The information gained from these informal interviews was used to fill in the gaps in the research from the educational perspective and provide explanations to help better interpret the information gained from the recruiters, engineer new hires and engineer new hire supervisors. An interview protocol was developed of all possible questions that might be asked to any university placement personnel depending on their program specialty area.

Written notes were taken at all interviews, which were later used to supplement the transcripts. Most interviews were tape recorded. Electronic messages were sent or phone calls were made to subjects for necessary clarification of information provided or information that was missing from the interviews, after notes were transcribed.

Documents

A limited number of documents were reviewed in this study. Some organizations would not release certain documents, such as copies of performance evaluation rating forms, internal training program materials, pay rate schedules, etc. However, the site visitation produced documents such as an informational packet, commonly forwarded to persons scheduled for interviews with the organization. This packet contained

information on the organization as a whole in brochure format, benefit and employee perks; an application form; a business card from a designated recruiter; a drug policy information form; a voluntary self-disclosure form; organizational information regarding the organization's history, awards received, customers, product facts, mission, directional map, global profile, global operations, and global sales; global newsletter and site newsletter. This organization was the most liberal in their willingness to release documentation that provided a panoramic view of the organization in its entirety. This same organization also provided a brochure for its recently implemented career development program and information relative to engineers from its career development guide. This information was helpful in generating additional questions that contributed to understanding the organization's focus relative to the structure of its recruitment program and its endeavors to bring a certain type of individual into its doors. These documents were reviewed privately by the researcher. The information extracted from these documents was useful in triangulating information learned from participants and being able to relate that information to the environment in which employees work and the type of work being done that necessitates the structure the organization is based on (Cohen, 1980).

Observations

A site visitation was carried out at one of the organizations. The recruiter served as a tour guide and explained the organization in detail. This visit allowed direct observation of employees at work, the cultural environment the organization operates by, the tools employees work with, managerial structure, physical design and layout of the

building, employee dynamics and interactions and many other observable characteristics that only a site visitation can offer. Having the opportunity to spend a full morning at this organization, including becoming acquainted with some of the employees, other than those who agreed to participate in the study, helped to paint a clear picture of what the organization was all about—the mission statement of the organization became visible by the human eye.

Field notes were not taken during the tour as the researcher did not want any interference with observable characteristics as well as no influence to alter the natural dynamics of human interactions, which sometimes occurs when people suspect that they are being observed and studied. The recruiter somewhat reinforced this view by stating, "before the tour, let's stop at my desk, you can leave your things at my desk." The researcher's desire to be discreet and "fit in" was accomplished, as some employees asked if the researcher was a new employee. However, field notes pertaining to the tour were recorded when the researcher returned home and an electronic message was forwarded to the recruiter who provided the tour to give clarification on issues or questions that formulated in the researcher's mind. The recruiter's responses and mailing of additional documents helped the generalizations gain specificity and focus (Spradley, 1980). Basically, the observations during the tour focused on: (a) environmental conditions; (b) interactions between employees; (c) organizational culture; and (d) organizational structure. The tour lasted approximately one hour and one half. Since the plant was so large (over 3 million? square foot), it was impossible to cover it in its entirety, but the tour allowed me an opportunity to directly observe different aspects of the organization to get a glimpse of what the organization had to offer to potential

engineer new hires. The researcher learned that touring this organization was not uncommon, but the norm. This revealed to me that this organization is very comfortable in its economic standing and not intimidated by others having inside-information.

Data Analysis

This qualitative study produced large quantities of data about the subjects' experiences and feelings. In determining what information to present and how and what technique of inductive analysis would be used to process the data, the most important consideration was to make sense of the data. Lincoln and Guba said it best as, "What is at issue is the best means to 'make sense' of the data in ways that will facilitate the continuing unfolding of the inquiry, and second, lead to a maximal understanding of the phenomena being studied" (Lincoln and Guba, 1985, p. 224).

Procedures described by Merriam (1988), McCracken (1994) and Glaser and Strauss (1967) were utilized in analyzing the data. Data analysis occurred simultaneously with data collection in order to examine the data consistently and continuously as it was collected in order to make sense of the stories told individually as well as collectively.

Data gathered from interviews, documents and observations were coded and used to develop patterns for analysis. Recorded interviews were analyzed by methods developed by McCracken and broken down into identifiable categories, second, each statement received was analyzed first on its own and then in relation to the entire transcript, third, determining what each statement meant in relationship to the assumption and literature on recruitment, fourth, discovering what relativity the observations and documents presented and finally, taking the patterns and themes from all the interviews

and analyzing them intra-subject group (engineer new hires with engineer new hires, supervisors with supervisors and recruiters with recruiters) and then the researcher examined the relationships inter-subject groups. These results were presented for further analysis. Graphical displays were presented as deemed necessary to clarify data.

CHAPTER IV

FINDINGS

This chapter is divided into four parts and contains findings from the data collected in this study. Part One includes narratives of each of the recruiters, including their selection background data and selected theme categories relative to the subject group. Part Two includes narratives of each of the engineer new hires and Part Three, narratives of each of the engineer new hire supervisors. Part Four includes summaries of data collected from university engineering placement personnel.

Part One: Story of the Recruiter

Recruiter X

Selection Background Data

Recruiter X was a white male who had a long employment history with Organization X of 25 years. A mild-mannered man with a pleasant demeanor, Recruiter X had 12 years of recruiting experience, but by educational background, he held Bachelor and Master degrees in Chemical Engineering. The researcher was able to personally meet Recruiter X and interview him prior to his recruiting engineering students at a university Engineering Career Fair. Recruiter X was a member of the American Institute of Chemical Engineers and seemed very knowledgeable about the whole process of selecting and attracting engineering students to Organization X. Definitely, having a

background in engineering made Recruiter X a prime resource to recruit the right type of engineering students to the organization.

Recruiter X was well prepared for the interview and had actually reviewed the protocol questions, which had been previously sent via electronic mail, and typed responses to each of the questions, with only two questions he agreed to supply information to at a later date. The one-hour interview with Recruiter X began with small talk. Recruiter X was very easy to talk to and appeared comfortable in talking about "recruitment." Dressed in casual slacks and a polo shirt with the company logo embroidered on it, Recruiter X seemed ready for a day of sharing information with students on careers as engineers at Organization X.

Recruiting Practices

Of the 25 questions on the interview protocol, 10 related to the recruiting practices of the organization. Recruiter X presented information on the recruiting practices of Organization X, with specific references to the Michigan site he worked at. Though, it is expected that these practices would be evident at any site of Organization X throughout the world.

With four persons on the recruitment team of Organization X, this organization has found it also beneficial to have a mix of recruiters, including alumni of particular universities to attend career fairs to talk directly with currently enrolled engineering students on their experiences with the organization as a graduate of the same university. As recent new hires to Organization X and alumni of particular universities, these persons have realistic testimonies that make a big difference with currently enrolled students who

want to know what it is like to work at this organization from someone who is similar to themselves. What better representative could an organization have other than one who has recently graduated from that university and is now working at the organization that is recruiting for students? The day Recruiter X was interviewed, the researcher had the opportunity to become acquainted with one of Michigan State University's engineering alumni who had worked with Organization X for the past two years. Since recruiters at Organization X do not have to fulfill special educational requirements to recruit for the organization, it is easy to include alumni representatives in their recruiting efforts with specific universities. However, all persons participating in Organization X's recruiting efforts must attend a two-hour training program on general interviewing techniques based on job competencies. All persons receive an interview guide for their personal use. Recruiter X indicated that the organization has diverted from requiring more formal training to be involved in recruitment for the organization, due to many reasons which include, but are not limited to: availability and interest. Yet Organization X tries to maintain a good mix of recruiters with participation of persons in different disciplines, levels and functions; such as manufacturing engineers and technical engineers, higher level managers, along with alumni, visiting universities to recruit.

Recruiter X worked in a Michigan plant of Organization X, so it was no surprise to learn that most of their recruiting efforts were concentrated in Northcentral region (see diagram 4.1for regional map). Recruiting costs were relatively low with Organization X, since most sites required minimal travel expense. Recruiter X indicated he was not sure how to calculate this amount, but believed the average cost of recruiting an engineering graduate with a bachelor degree to Organization X to be approximately $500 per student,

when taking into account the cost of the recruitment fair and the fact that most sites were "close-by" universities.

Being a leader in the chemical industry, 60% of Organization X's engineering recruiting efforts are focused on chemical engineers, 20% electrical, 20% mechanical and 10% for computer engineers/computer science majors. Recruiter X indicated that Organization X uses a variety of methods in recruiting engineers to its organization, which include: on-campus interviewing, career/job fairs, campus web sites, co-op programs and site interviewing. Co-ops are the organization's main hiring pool as Organization X uses a student's time in the co-op program to groom the student for permanent employment. When Recruiter X was asked what factors contributed to the success of Organization X's recruiting efforts, he commented on the opportunities that Organization X offered to engineers "to apply what was learned in school," competitive benefits, referrals from the organization co-op program and the organization's reputation. Recruiter X indicated that Organization X does experience difficulty in locating qualified electrical engineer candidates because most universities combine electrical and computer engineering principles with more emphasis on integrated circuits and computer design rather than veritable electrical engineering. To compensate for this deficiency, Organization X grooms their co-op students who have an interest in electrical engineering and helps them to tailor their classes to that focus.

In evaluating the successful recruiting efforts of Organization X in terms of where the graduate new hires are coming from and why, Wayne State University (WSU), Michigan State University (MSU) and University of Michigan (UoM)-Dearborn are leaders for yielding the most engineering graduate new hires due to their active

participation in the organization's co-op program, university academic reputation and proximity to plant—attracting the interest of more local students.

Hirable Characteristics

What characteristics cause an engineering graduate to receive a job offer? Each organization gave their view of what makes an engineering graduate "hirable" at their organization. Organization X does pre-screening of resumes to identify students with grade point averages of 3.0 or higher and relevant co-op/intern experience. This co-op/intern experience is an indication of functional and technical skills in an industry work experience and grants the student further consideration for hirability by Organization X. In addition, students should have: 1) good teamwork skills (can be shown by discussing school team projects or employment opportunities to work in a team environment); 2) communication skills (including listening, verbal and written); and 3) results orientation or commitment to task—being able to manage the process from start to finish of a project. Recruiter X mentioned that the appearance of a student's resume gives the recruiter a presentation of his or her writing skills. Also included in communication skills is relevance to the presentation of ideas in selling projects to managers and demonstrating effective presentation strategies. These characteristics are based on the organization's operational needs for plants and those key competencies successful engineers have demonstrated over the years. These characteristics are specific to Organization X in that they are common across the organization due to consistency in the selection process, regardless of location. Organization X expects "hirable" candidates to meet a minimum of 80% of these characteristics. When Recruiter X was asked to rank

these characteristics from most to least important, the order changed to: 1) relative co-op/intern experience; 2) communication skills; 3) results orientation; 4) good teamwork skills; and 5) 3.0+ grade point average.

Many organizations have specific characteristics that are necessary for an engineering graduate to gain employment with their organization. These organizations have characteristics that cause a graduate to be eliminated from consideration as well. Those who are negligent in showing up for scheduled interviews, tardy, not showing interest in the interview questions being asked, lack of experience that is relevant to what is desired in candidates, have poor communication skills and the inability to relate their experiences to organizational competencies, will find themselves eliminated from consideration by Organization X.

Organizational Characteristics

Organization X is in the manufacturing industry and has nearly 8,000 employees worldwide, with 400 employees at the Michigan site that participated in this study. It is not typical for Organization X to offer signing bonuses for entry-level engineer positions that require a bachelor's degree. This is mostly done for experienced engineers who are recruited from outside the organization. However, Organization X does offer the standard benefits to engineering graduates, that include relocation expenses, portable pension, 401K and dental and medical plans, to mention a few.

Statistical Information

Organization X extended seven offers of employment to engineering graduates since 1997. For 97-98, three offers were extended and in 98-99 four offers were extended. One graduate accepted the offer in 97-98 and three accepted in 98-99 of which one was a previous participant in the Organization X's co-op program, but one later declined. See Table 4.1 for race/sex breakdown of offers extended and offers accepted. Of Organization X's recruiting effort, 97-98 yielded the hiring of one white male and 98-99 yielded two hires; one white male and one white female. If a rating was given to these recruits, Organization X would rate all of them as above average. The average starting salary bachelor-degree chemical engineers receive is $45K. Twenty-nine percent of Organization X's workforce is practicing engineers at the Michigan site. All of those engineers have a bachelor's degree, and some have received their master's degree since working with Organization X. There are 20 chemical engineers (16 white males and 4 white females); 10 mechanical engineers (7 white males, 1 black male and 1 American Indian (gender unknown) and 7 electrical engineers (6 white males and 1 white female).

Recruiter Y

Selection Background Data

Recruiter Y was a white female who had worked with Organization Y for 20 years, eight of those years serving as a recruiter. The researcher never met Recruiter Y personally, but had multiple phone and electronic mail conversations with her. Recruiter Y had a Master's degree in Labor and Industrial Relations and had attended various recruitment seminars as well as other human resource training. She was also involved

with the Michigan Council of Cooperative Education and the Society of Human Resources Management. Though Recruiter Y worked at a plant in Ohio, she reported information for Michigan and Ohio in regards to Organization Y's recruiting efforts.

Recruiter Y was well prepared for the phone interview that would last for one hour. She had reviewed questions prior to conversation with the researcher, so she was able to follow along and address each question fluently. There were, however, a statistical question regarding the total number and race/sex breakdown of engineer hires and two questions on contact information for engineer new hires and engineer new hire supervisors of Organization Y within the last three years, that Recruiter Y indicated she would supply by the end of the week and she did so as she had promised. With special attention to presenting correct information and after examining organizational records, Recruiter Y had to make some corrections in the statistical data she had given earlier.

Recruiting Practices

Ten people are a part of Organization Y's recruitment team. Since the organization is very selective in who goes to campus recruitment events, only representatives from human resources, engineer managers, analysts and programming analysts are permitted to attend. Organization Y also tries to have alumni of the university visited to attend to represent the organization. There are no special educational requirements for the organizational representatives to serve as recruiters, but there is an 8-hour training session that covers the dos and don'ts of college recruiting.

Organization Y focuses its hiring efforts in Northcentral region (see Figure 4.1). The average cost of recruiting an engineering graduate with a bachelor degree is about

$500 per hire. Recruiter Y emphasized that this amount was not associated in any way with the salary of the person recruited.

With a very high offer acceptance rate of 85% for engineers, Recruiter Y indicated that computer science/engineering majors constitute 60% of its engineer recruiting; 15% electrical; 10% industrial; 10% engineering arts and 5% mechanical. The researcher learned that of the 11 responses received from the 98-99 offers, 26 new hires who were sent electronic messages regarding this study, six responded that they were non-engineering majors. After interviewing three volunteers from Organization Y who agreed to participate in the study and share information on their new hire experience, it was learned that two of the participants were not engineering majors, but were industrial technology majors. In addition, the researcher learned that many respondents had working titles that included the word "engineer," but were not engineering majors and had instead majored in business administration or operations management. This meant that 65% of the respondents were not engineering majors. The researcher interviewed three new hires of which only one was a true engineering major, so it was decided to only include data collected from the one person who did major in engineering so as not to skew the results of the study.

Organization Y uses various methods to recruit engineers, which include: on-campus interviewing, resume referrals, campus web postings, co-op, special student group visits and career/job fairs. When asked what factors contributed to the success of Organization Y's recruiting efforts, Recruiter Y commented on the type of work done at the Michigan plant, relative to new technology and new programs; 100% tuition reimbursement; on-the-job training programs; and the fact that Organization Y is on the

leading edge of professional, scientific & technical services. Organization Y experiences no difficulty in recruiting for any type of engineer vacancies.

Michigan State University was the name that popped up when Recruiter Y was asked what universities yield the most engineering graduate new hires and why. Recruiter Y stated that many MSU engineering graduates were hired by Organization Y because of the programs the university offers, specifically the co-op program. Uof M-Dearborn also yields many graduates for Organization Y due to its worker/industry focus at this campus branch (as opposed to the Ann Arbor branch that produces more managerial employees). Organization Y draws many new hires from their co-op students.

Hirable Characteristics

Engineering graduates who are interested in being hired by Organization Y should be 1) innovative; 2) able to work on a team and 3) a "computer hacker," in that order of importance. These characteristics are based on the nature of the organization and the type of work done by the organization. "Hirable" graduates must demonstrate computer skills/expertise at 100%, team player ability at 80-85% and innovation at 80%. Presenting school design projects indicating the graduate's ability to design, like web pages, for example can show demonstration of innovativeness.

On the other hand, if an engineering graduate did not have appropriate programming languages, courses or skills listed on his or her resume and had a grade point average of 2.6 or lower, he or she would be eliminated from consideration for hire.

Recruiter Y emphasized that co-op experience is a plus in deciding whom to consider and whom to eliminate from consideration.

Organizational Characteristics

Organization Y is a mega-organization with 30,000 employees worldwide and an over 112-year history. Yet, this organization does not give many signing bonuses to entry-level engineers. Of the 26 hires for 98-99, only one white male received a signing bonus. On average, these bonuses are about $2500. Newly hired graduates relocating over 50 miles to the site also receive a $5000 relocation stipend.

Statistical Information

Seven graduates were hired for engineer positions at Organization Y in 97-98 and 26 for 98-99. Information was not available on the number of offers that were extended, but Recruiter Y indicated that there is a 85% acceptance rate in Michigan of all offers extended by Organization Y. Table 4.1 provides a race/sex breakdown of 98-99 hires. Recruiter Y felt that most recruits were above average, in assigning a rating to the recruit hired by Organization Y, on a scale of 1 to 5 (1=poor, 2=fair, 3=average, 4=above average, 5=exceptional). About 60% of Organization Y's engineering recruiting efforts are for computer engineering and computer science majors. On an average, computer engineering majors with a bachelor's degree can expect a starting salary of $45K and $50K with a master's degree. Those majoring in computer science with a bachelor's degree can expect $45.6K and master's degree holders $52K. Recruiter Y indicated that it is not common for all engineers to possess a bachelor's degree in engineering (38% of

Table 4.1: Race/sex breakdown of organizational hires.

Org	97-98 Hires	Male	Female	Min	98-99 Hires	Male	Female	Min
X	1	1	0	0	2	1	1	0
Y	7	4	3	2	26	16	10	6
Z	3	3	0	1	3	1	2	0

Key: Org = Organization / Min = Minority

engineers have a bachelor's degree in engineering), though all have bachelor's degrees in some field. No statistical data of the race/sex breakdown of the workforce was provided.

Recruiter Z

Selection Background Data

Recruiter Z was a white female, probably in her mid- to upper-twenties, who had only been with the organization for two and one-half years. She has functioned as a recruiter (as well as performing functions of corrective action, orientation, suggestion program coordination and other related human resources functions) for only one and one-half years. The researcher was able to personally meet Recruiter Z and to be hosted on a tour by her, spending a whole morning at Organization Z. Recruiter Z was very energetic, thorough and organized, even down to providing specific driving directions to the site visitation of Organization Z. All interviews were done on-site and afterwards, Recruiter Z hosted a tour of the facilities for the researcher.

Recruiter Z possessed a Bachelor's in Business Administration from Western Michigan University, with an emphasis in human resources. She has undergone various in-house related training on management techniques, equal employment opportunity and selection strategies. During the time she was a student, she was one of the founders of the Society for Human Resource Management (SHRM) student chapter. Recruiter Z informed the researcher that Organization Z is a member of SHRM, but does not regularly send representatives to meetings.

The steps that lead up to the interview experience with subjects from Organization Z was like no other. With the other two organizations, the researcher sent the

explanatory letter and consent forms to engineer new hires who had begun working with their organization within the past three years and engineer new hire supervisors who had supervised new engineers within the past three years and coordinated schedules to find a time suitable for the researcher and the subject to talk further about their experience. This was not the case with Organization Z, Recruiter Z insisted she would coordinate the whole process. She contacted engineer new hires and engineer new hire supervisors, forwarded the explanatory study information and consent forms, identified volunteers who would talk to the researcher further and scheduled time slots and meeting room.

Dressed in navy twill pants and a white long-sleeved shirt with a red embossed company logo, Recruiter Z came to meet the researcher in the main lobby and escort her to the meeting room to meet with the engineer new hire supervisor and then two engineer new hires. The researcher would meet with Recruiter Z last of all.

Recruiter Z had reviewed all interview questions and was prepared to answer most questions, excluding three questions relating mainly to statistical data, which she promptly supplied the responses to by the end of the week. Because Recruiter Z was very prepared and things seemed to flow even quicker, the interview lasted about 50 minutes.

Recruiting Practices

Recruiter Z presented information specific to the Michigan site she worked at in discussing what is common at Organization Z. Three people are a part of Organization Z's professional recruiting team. Recruiters at Organization Z must possess a minimum of a bachelor's degree, which is necessary for the specialist classification, of

which these human resource representatives are a part. There is also a requirement to attend an 8-hour, self-paced training on selection strategies. This training addresses legal questions, how to write interview questions that are behavior-focused; information on the requisition process; developing rapport with the interviewee, etc. Recruiter Z did not mention whether non-human resource personnel serve as recruiters for Organization Z. However, it was determined that non-human resource personnel do represent the organization as recruiters, as in the interview with the supervisor subject, he indicated that he has served as a campus recruiter in the past. Currently, his involvement is limited to non-existent due to time coordination problems. Recruiter Z informed the researcher that most of their recruiting efforts were primarily in the Northcentral region, but also some efforts were focused on Northeast region. See Figure 4.1 for regional map. The average cost of recruiting a engineering graduate with a bachelor degree was estimated at $1500, depending on location. Recruiter Z gave an example that Organization Z might spend $1600 for a plane ticket to Michigan Technological University, but might have minimal costs traveling to an university close by, like Western Michigan University.

Organization Z focuses 40% of its engineering recruiting efforts on mechanical majors; 30% manufacturing; 20% electrical and 10% industrial. Organization Z utilizes all categories of methods to recruit engineering graduates that were listed on the preliminary survey, including: on-campus interviewing, resume referrals, campus web postings, co-op program, special student group visitations, career/job fairs and Organization Z website. Recruiter Z attributes public relations, with reference to Organization Z's internet links, as a major factor contributing to Organization Z's recruiting success. She further expounded and commented on Organization Z partnering

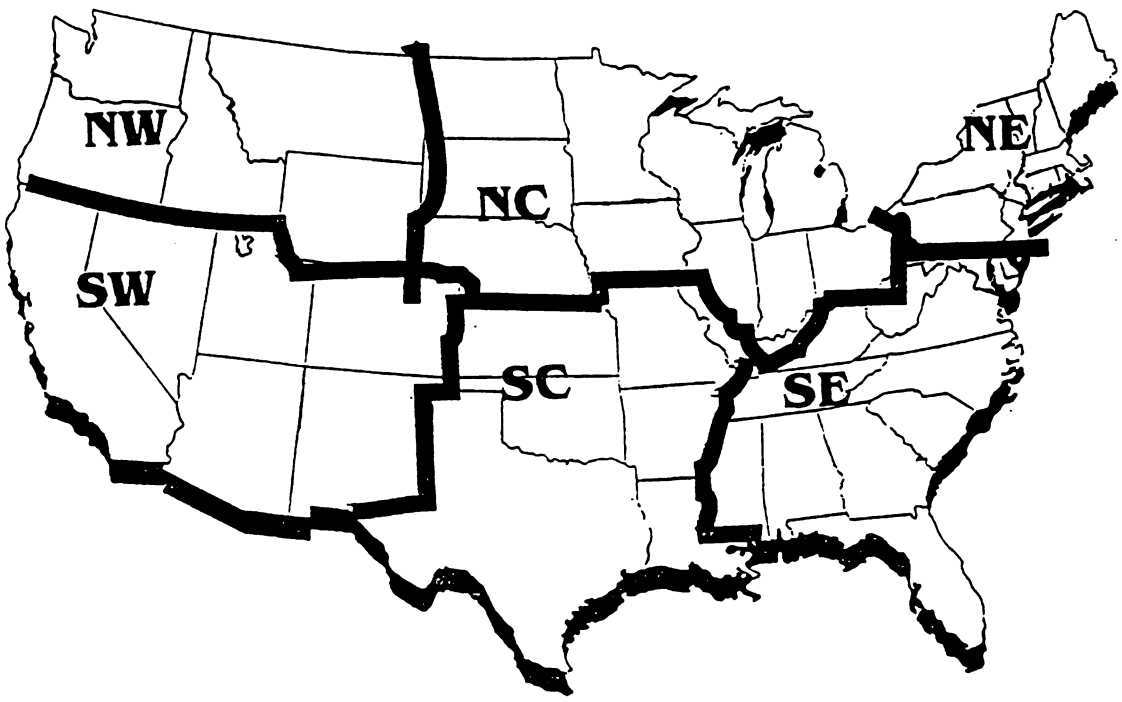

Figure 4.1: Geographic region-focused hiring.

with professors and administrators at Michigan universities, bringing university personnel in to discuss general education issues and provide a tour of the facility. Recruiter Z spoke of Organization Z's non-structured co-op program that allows co-ops the opportunity to work part-time during the school year and full-time during summers. Though Organization Z's recruiting efforts were generally successful, Recruiter Z said that there was some difficulty experienced in locating technical candidates due to Organization Z not being very well known. Organization Z has only been at this Michigan location for 14 years and was basically a small organization with 1400 employees, up to recently when the organization expanded due to business gained by heightening economic conditions in the automotive industry, now having nearly 2500 employees.

Recruiter Z could not provide any information on what universities yield the most engineering graduate new hires and why due to her newness to the recruiting position and the lack of information tracking done by Organization Z.

Hirable Characteristics

Organization Z determines "hirable" candidates by: 1) communication skills; 2) time management; 3) prioritization; 4) previous co-op experience; and 5) computer skills. These characteristics are ranked from most to least important. Recruiter Z commented that graduates must have co-op experience first and then computer skills listed on their resume. The other characteristics become more apparent in the interview. The time management and prioritization characteristics relate directly to the job. As an

international organization, communication is very important to Organization Z to be able to communicate to customers in a clear manner that is understandable.

To prevent being eliminated from consideration for hire, engineering graduates cannot have a grade point average of 2.7 or lower, depending on the school. Recruiter explained that a 2.7 from WMU would give the candidate a slim chance of gaining an interview, but a 2.7 from MTU is considered good because it is considered a challenging school. In addition, poor communication skills and not accurately answering questions could cause an engineering graduate to be eliminated. The researcher and Recruiter Z discussed the fact that some recruiters feel that candidates who are constantly in touch with the organization are showing their sincere interest.

Organizational Characteristics

As an emerging global leader in advanced technology, systems and components, Organization Z has 70,000 employees worldwide and 2,500 at the Michigan site that participated in this study. Though Organization Z is on the cutting edge of many employee benefits, signing bonuses are not offered. However, Organization Z offers many other special benefits in addition to the standard benefit package, like up to $3,000 per calendar year to employees who are seeking a degree; an in-house recreation center; vacation sell-back option; discretionary bonuses; a monthly-birthday lunch, which includes a free buffet meal and birthday cake, plus many others.

Statistical Information

Organization Z hired six engineering graduates since 1997 to the current time. Recruiter Z apologized for not having thorough statistical data regarding its workforce and indicated that an effective tracking system was in the plans for Organization Z. In '97, three males were hired, of which one was a minority (specific race was unknown). In '98, one white female was hired. In '99, two people were hired, one white male and one white female. See Table 4.1 for race/sex breakdown of organizational hires. If a rating was given to these recruits, Recruiter Z indicated that they would receive a 3.5 out of 5.0, or anywhere between average to above average due to the broad mix of graduates that were hired. Recruiter Z indicated that over the years graduates who would receive an "exceptional" rating are also hired. Organization Z has some struggle with filling technical vacancies as a lot of engineering graduates choose major companies if they are interested in automotive supply and do not consider smaller organizations. An engineering graduate who has a bachelor degree along with co-op experience can expect an average starting salary of $42K with Organization Z. Those who do not have co-op experience can expect $40.5K. About 6% of Organization Z's workforce are engineers with bachelor degrees at the Michigan site. Recruiter Z was not able to supply statistical information regarding the workforce.

Site Visitation of Organization Z

Due to a personal visit to the worksite of Organization Z, the researcher had rich field notes about the experience. Upon driving into the visitor parking lot, an elaborate architectural structure stood with various flags flying in the wind. The main lobby of

Organization Z was quite spacious and had a nice reception area. There were many comfortable contemporary tables and chairs. A receptionist was stationed near the back of the lobby in a spacious office area. The meeting room the researcher had interviews in was comfortable with tables and chairs arranged in a conversational setting. One interesting thing was that this meeting room had motion lights. If the occupants did not move after a certain amount of time, the lights would shut off. At the conclusion of the scheduled interviews, Recruiter Z took the researcher on a tour of the facility. Initially, the main office area was observed. This was a large open office environment with desks lined up in classroom style. The managers were positioned strategically on the perimeter of the large room, looking in on the workers and being able to observe everyone in full view. Even the president of Organization Z did not have an office with a door, but had a desk in the open environment on the perimeter of the room. In the hub of the lined desks, were tables and chairs positioned together in "round table" style—though all tables were actually square. These tables were used for employee team meetings. The office environment seemed pleasant. As employees passed one another, they would say, "hello" and short conversational friendly statements. The tone of chatter was minimal. Some people were working independently at their desks, while others were in clusters working on projects. A few employees appeared to be visiting other employees at their desk area. However, there was not a lot of loud or excessive talking, employees appeared to be pretty task-focused. There were signs above the sections that denoted the type of work being done, such as "Human Resources" or "Financial Development." Organization Z consisted of over 2- million square footage in this Michigan site location. The majority of the employees wore uniforms in accordance with the rule that uniforms

were required for employees whose job required them to be in the plant more than 25% of the time, otherwise business casual was acceptable attire. In order to not have the uniform requirement be a burden, Organization Z provides seven uniform sets to each employee (the employee must purchase any additional uniform sets) and offers free cleaning of uniforms.

The researcher observed that the employee entrance into the plant had controlled security access and a guard in a booth. Only employees with an access card were allowed entrance, others would have to check in with the guard or proceed to the visitor entrance. Employees who entered through the employee entrance, looking straight ahead would observe posters with the words, "Safety & Health," which is Organization Z's first concern. In accordance with Organization Z's focus on safety, certain employees are provided free protective gear, such as safety shoes. The second concern is "Quality," which was also depicted with large letters. There were several bulletin boards depicting quality team awards and pictures of employees who received them along with the winning ideas. To the left, at the employee entrance, important information was displayed on easels, such as, harvest food drive drop-off information or alternative day care information.

While touring the facility the researcher got a feel for the type of environment Organization Z employees work in. Based on the information presented, the researcher learned that Organization Z focuses on family life combined with work life—integrating the two and making both positive because of the effect that one has on the other. Many special services were offered for employees, such as an in-house credit union; a career development center, a nurse's station and a recreational facility (family members are also

allowed to use) with lockers. Organization Z housed a large cafeteria with hot dishes, salads and cold sandwiches as well as featured dishes. "Cobblers" were the featured item on the day the researcher visited. Microwaves and refrigerators were provided in the back of the cafeteria for employees who desired to bring their own food. There were televisions tuned in to CNN (Cable News Network) for employees' viewing pleasure. There were also closed-circuit televisions which depicted information specific to what was going on within Organization Z, like "open enrollment for benefits." In the cafeteria, there was a beautiful mural portraying multi-cultural people. Bulletin boards were evident in various locations around the facility where employees could learn about job vacancies within Organization Z or about items other employees had for sale. These bulletin boards were maintained by a full-time employee and were very neat and organized.

The researcher did not enter the facility's plants, but walked pass them and noticed the signs that read, "HIGH SAFETY AREA—Protective Equipment Must Be Worn to Enter!"

Part Two: Story of the Engineer New Hire

New Hire X1

Selection Background Data

According to the confines of the study, new hires were persons who were recently inducted into an organization within the last three years, who possessed a degree in engineering and were working for the organization as an engineer. New Hire X1 was a white male who had two and one-half years at Organization X as a professional engineer.

He had also worked with the organization as a co-op for one and one-half years, prior to gaining permanent employment. Because of New Hire X1's successful co-op experience, he was immediately hired for a professional engineer position upon receiving his bachelor's degree in Chemical Engineering in June of 1997. New Hire X1 is not currently involved in any professional affiliations. The researcher was not able to meet New Hire X1 personally, but communicated via telephone and electronic mail. New Hire X1 demonstrated that he is a man of his word. He responded affirmatively to the explanatory letter requesting participants for the study, but because of such a full workload and the type of work done by New Hire X1, many unexpected situations arose which delayed the interview. Many would have given up and simply stated that they would not be able to participate due to a heavy workload, but not New Hire X1. He continued to email and call with updates on his schedule, until he and the researcher were able to make a connection to do the interview.

New Hire X1 was well-prepared for the 30-minute interview as he had familiarized himself with the study by reading the information the researcher forwarded to him weeks earlier as well as reviewing the questions beforehand. Because New Hire X1 and the researcher had had so many previous phone or email conversations, it almost seemed as if they had actually met each other before. Small talk seemed easy. New Hire X1 was pleasant.

Current Job

New Hire X1 currently works as a manufacturing engineer for Organization X. He performs functions of daily troubleshooting of processes, does production numbers for efficiency, and is responsible for increasing the capacity of the plant. New Hire X1 further explained "increasing the plant's capacity" to relate to process schedule sizes and their relation to different products to ensure the fastest running rates possible.

When New Hire X1 was asked how has his job changed since he was first hired, he indicated that now he has much more responsibility. New Hire X1 started out with Organization X as a process engineer working on long-term projects of improving processes over a long term, but now he is doing tasks that affect the operations on a day-to-day basis. He also indicated that he is doing more jobs simultaneously, such as changing things, fixing parameters and fixing quality issues.

Successful Characteristics

In examining what characteristics would cause an engineering graduate to receive a job offer, the researcher asked New Hire X1 if he was informed of what characteristics the organization was looking for in their new recruits? The researcher learned that New Hire X1's situation was a unique one, as he did not have an interview in order to receive his permanent position with Organization X as a professional engineer. He simply was placed in a position after he received his bachelor's degree. However, he believed the desired characteristics to be self-motivation, ambition to learn, professionalism and teamwork abilities. New Hire X1 did not provide a direct response of how well he

believed he met the desired characteristics, only gave examples of developing self-motivation and opportunities to learn.

In looking at what characteristics are vital in New Hire X1's job today, he revealed that work ethics, responsibility and being able to get things done (self-motivation) are important.

Organizational Focus

Though New Hire X1 did not have a formal interview to receive his permanent position with Organization Z, it was still necessary to extend an offer of employment for a permanent position as a professional engineer. Not all co-ops are asked to stay on with the organization as permanent employees. A technical team leader extended the offer of a professional engineer position to New Hire X1. There was no special bonus included in this offer. Nor did New Hire X1 have a need to relocate since the plant was only 40 miles away and was drivable. However, New Hire X1 revealed that he did relocate closer to the work site for personal reasons. New Hire X1 still has contact with the person who extended the hire offer to him, as one of the technical team leaders is currently his direct supervisor. New Hire X1 commented that he has a very good working relationship with his supervisor.

To understand the new hire's relationship with the organization prior to being hired, the researcher asked New Hire X1 how he learned of Organization X. He commented, "Through the co-op program at Wayne State University." The extent of New Hire X1's relationship with Organization X prior to being hired as a professional engineer was through his 5-term co-op work experience. He simply signed up for WSU's

co-op program and Organization X called him for an interview. He believed the process was one where organizations would request resume referrals from WSU and several resumes would be forwarded. The organization would review them and contact desired candidates for interviews.

New Hire X2

Selection Background Data

New Hire X2 was a white female who had only worked with Organization X since June of this year. She graduated from MSU in May with a bachelor's degree in chemical engineering and is a member of the American Institute of Chemical Engineers (AICE). Though the researcher was not able to personally meet New Hire X2, they were able to communicate on many occasions by telephone mostly, but also via electronic mail. New Hire X2 was an engineer on the move, as her position had changed quite extensively during the six months she had been with Organization X. Even though, New Hire X2 was in the midst of many job responsibilities, she was consistent in calling when she had a break to try to connect to do the interview. After several voice mail messages (and email messages) regarding both the researcher and the subject's availability, a connection was finally made and the interview was done.

New Hire X2 had received the interview protocol prior to the scheduled interview that contributed to her preparedness to respond to the questions. The 30-minute interview provided rich information about New Hire X2's experience with Organization X.

Current Job

As a process engineer for Organization X, New Hire X2 handles inventory (keeps track of how much material is produced, packed and shipped out); troubleshoots problems with the product; fills in for department supervisors during vacations providing instructions to hourly operators on daily assignments; payroll; special projects that improve processes to allow Organization X to run more safely and more efficiently; and does periodic safety checks to recognize potential safety hazards and ensure that recommendations are followed.

When New Hire X2 was asked how her job has changed since she was first hired, she elaborated on the many changes her job has undergone in a short 6-month period. She indicated that upon hire she worked in two departments, now she works in three departments, of which one is two departments combined into one. When New Hire X2 was first hired the other engineer in her area left within a month, so she had to take on additional engineering responsibilities as the engineer was not replaced. Three months later, New Hire X2's supervisor left, so she had to take on additional responsibilities that her previous supervisor performed. Basically, the changes New Hire X2 experienced were an increase in engineering responsibilities and an increase in supervisory or leadworker responsibilities.

Successful Characteristics

As New Hire X2 reflected on her experience interviewing with an on-campus recruiter, she did not recall any information being shared with her directly about what characteristics Organization X was looking for in its new recruits. She did remember recruiters giving affirmation to statements she made about her qualifications, and stating "that's what we're looking for." New Hire X2 remembered her on-campus interview as one where the recruiter was trying to find out as much as possible about the applicant—how well the applicant matched the organization. There was not much information shared about Organization X at this time. However, she recalled her second interview at the worksite being one where the recruiters were trying to sell the organization. New Hire X2 was able to share information about her specific interests and learned about existent vacancies at the second interview and the recruiter focused on how well the organization matched New Hire X2.

Though the characteristics Organization X sought were not directly revealed to New Hire X2, she believed they wanted someone who would not want to sit at their desk looking at the computer all day, but instead wanted someone who would work extra if needed and be on-call, which was a requirement of the job. New Hire X2 believed Organization X wanted someone who had previous co-op/internship experience and good people skills. She received an explanation of how each department was structured and run. She was asked questions about group activities she had worked in. New Hire X2 believed she met these characteristics very well. Although she was flexible and willing to work extra hours when needed, she did not want to work 10-hour days.

When New Hire X2 was asked if she believed the characteristics necessary to be hired were still vital in her job today and in what ways? She responded that, "many companies won't look at a resume without co-op experience." New Hire X2 feels that previous intern/co-op experience gives a graduate the confidence that since they have done a job before, they can do it again as well as helping the graduate learn independence and enabling them to check for their own mistakes without someone having "to look over your shoulder."

Organizational Focus

New Hire X2 learned of Organization X at a Society of Women Engineers (SWE) banquet. One of the people sitting at her table was from Organization X. She was able to get familiar with the company name, so she began looking out for them on the web and on the campus interview schedule. She afterward applied to Organization X for a summer employment by visiting the site for an interview. Two years later, after receiving her bachelor's degree, New Hire X2 landed a permanent position as a professional engineer with Organization X, after her second interview. There was no signing bonus included in her offer that was extended by a technical team leader, who subsequently became her direct supervisor until he left the organization four months later. Because New Hire X2 lived in a city close to the plant, she did not need to relocate and was able to drive to work.

New Hire Y1

Selection Background Data

Of the three engineer new hire respondents who agreed to participate in the study, it was later learned that only one actually had taken courses in an engineering program. The other two engineer new hires were only called "engineers" in their working title, but in fact received their degrees in industrial technology. Though these two engineer new hires were interviewed, their data will not be included in this study, so as not to skew the results of it.

New Hire Y1 was a black female who will receive her bachelor's degree in mechanical engineering this December. However, she has worked with Organization Y for the past nine months. With a unique situation, the researcher learned that New Hire Y1 was hired with Organization Y in May of this year under the expectation that she would be receiving her degree this same month. Apparently, WSU made a mistake and identified one additional course New Hire Y1 needed to finalize degree requirements. Since Organization Y had already hired her, they did not rescind her offer. New Hire Y1 is finishing this course requirement this semester and will receive her degree in December.

New Hire Y1 also had some previous on-the-job experience in manufacturing, design & assembly, which she believe aided in her landing a permanent position as a professional engineer with Organization Y.

The researcher did not meet New Hire Y1 personally, but communicated with her via electronic mail until the day of the scheduled phone interview. She seemed reserved and cordial during the conversation. She had reviewed the interview protocol and the

scope of the study, as this information was emailed to her days prior to receiving a response that she was willing to participate in the study.

The interview with New Hire Y1 lasted about 30 minutes. She was to the point in her responses to the questions, but would expound and add clarification when the researcher requested it.

Current Job

New Hire Y1 currently works as a manufacturing engineer for Organization Y. She performs functions of supporting a work cell (an independent work group); supports production issues; resolves quality issues that might hold up the line with the appropriate person; corrects processes; incorporates changes to written instructions for products and refers them to work cell; assists with day-to-day operations (problem solving) with quality-related issues; and maintains current designs.

When New Hire Y1 first came to Organization Y, she worked on a special project with one other person relating to launching a product into mass production market. She and a co-worker would report back to their immediate supervisor and that was the extent of her contact with other employees. However, there was a problem bringing this product to the forefront so those responsibilities ceased. Today, New Hire Y1 notices a difference in her responsibilities: she now has more exposure to how Organization Y works and how she is contributing to the overall picture. New Hire Y1 is now responsible for overseeing other manufacturing engineers. New Hire Y1 feels that now she has an opportunity to have a hands-on look at her product and has a better understanding of how processes go together, therefore her understanding has increased.

Successful Characteristics

New Hire Y1 had an opportunity to interview with Organization Y due to a friend's referral. She emphasized that it was not an absolute that she would be hired because of the referral, but she would have to go through the normal channels of being hired. At her initial interview that took place at the site of Organization Y, New Hire Y1 does not recall the interviewer sharing what characteristics they were looking for in their new recruits. But due to her understanding of the nature of the position, she believed Organization Y was looking for characteristics of concurrent engineering (teamwork), satisfying the customer and public relation skills. When asked what extent New Hire Y1 felt she met those characteristics, she responded, "very little." She further explained that initially she felt lost basically due to it being a new environment. She felt she did meet the requirement of concurrent engineering since she had knowledge of this concept from her engineering program. New Hire Y1 further defined concurrent engineering as a project that is worked on by several different people who are bringing a new product to the floor.

The interviewers reviewed her credentials and asked New Hire Y1 if she would like to pursue employment in manufacturing, due to a matching of her experience in this area. Her interview focused on asking questions which would help determine if the applicant matched what the organization desired in "hirable" applicants.

New Hire Y1 feels that the characteristics she believed Organization Y were looking for when she first interviewed with the organization, are yet still very important today in her daily operations, as her job functions are predicated on satisfying the customer (internal and external) and concurrent engineering.

Organizational Focus

New Hire Y1 was extended an offer to work with Organization Y by a supervisor and a human resources representative. Her relationship with these persons today is to be directly supervised by the supervisor and no contact with the human resources representative who no longer works with the organization. Because New Hire Y1 lived within a 40-mile radius, she did not relocate, but drives to work. New Hire Y1's offer did not include a signing bonus, but she was given vacation upfront.

New Hire Y1 recalls how she learned about Organization Y, as an incident where she noticed a teleprompter in the main lobby where she was waiting to be interviewed. She was able to reference the teleprompter to learn more about the operations of Organization Y. Prior to being hired, New Hire Y1's relationship to Organization Y, was a simple one of watching their commercials on television.

New Hire Z1

Selection Background Data

New Hire Z1 was an Asian male who had only worked with Organization Z since May of this year. He received his bachelor's degree in mechanical engineering from Western Michigan University in late-April and is currently pursuing a master's degree in engineering management. New Hire Z1 is a member of the American Society of Mechanical Engineers (ASME), the Golden Key National Honor Society and a student Industrial Engineer chapter.

The researcher was able to personally meet New Hire Z1 at his worksite. He had communicated to Recruiter Z that he would be willing to participate in the study, so he

was scheduled for a 30-minute interview. Upon meeting New Hire Z1, the researcher found him very cordial and fun going. Dressed in navy twill pants and a white cotton shirt with the company logo embroidered in red, New Hire Z1 was well prepared for the interview. He had already written responses to each of the interview questions, had the consent form completed and had a business card available to present the researcher. The researcher read each question and communicated with New Hire Z1 in a conversational manner. He responded candidly, not referring to his notes, as the information was vivid in his mind.

Current Job

New Hire Z1 currently works as a staff engineer. His job responsibilities include doing durability, reliability and performance tests; technical support; report writing; writing computer programs; and project scheduling. He further explained that he does very little project scheduling to make sure that testing is on track and prepared according to priority.

Although New Hire Z1 was only hired six months ago, he still notices some changes in his job. He believes he has more responsibility, more opportunities to be personally responsible in the lab as opposed to having someone at his side to oversee and guide him closely; and higher expectations. Since he is doing more work it requires him to "drive harder" and do process management.

Successful Characteristics

New Hire Z1 recalls his initial recruiting experience with Organization Z as one where two human resource recruiters came to WMU to recruit engineers. He did not recall the recruiters providing direct information about what characteristics they were looking for in their new recruits, but he did know what vacancies were available and was also able to view his university's on-line employment website which identified what qualifications were necessary for all vacancies. Complete information was given about the education and experience requirements. Students were also able to post their resumes on this website to allow employers an opportunity to review those matching their needs and then they could contact selected students directly. New Hire Z1 had his resume posted on this on-line system.

Though the position New Hire Z1 currently occupies was not available at the time he inquired on-line, he believed they were looking for a strong background in mechanical engineering, relative course knowledge of heat transfer and thermodynamics. At the time, New Hire Z1 was working on-campus as a computer lab specialist, but he felt he met all of those characteristics. New Hire Z1 feels that today, these characteristics are vital on-the-job in daily team projects.

Organizational Focus

New Hire Z1 recalls a human resources recruiter extending his offer of employment. A signing bonus was not included in his offer. Because he lived in the vicinity of Organization Z, he did not need to relocate.

New Hire Z1 first learned of Organization Z through his university's employment website, the on-campus recruiting schedule, and by word of mouth, as he had several friends working with Organization Z, of whom three of five are still employed with Organization Z. Prior to being hired by Organization Z, the extent of New Hire Z1's relationship with the organization included the organization's campus visits and the organization's participation in the student senior design projects. New Hire Z1 talked about WMU's requirement for seniors to identify an organization to work with on a senior project. Organization Z participated in this program and allowed students to work with Organization Z engineers on special projects. However, New Hire Z1 did not work on his senior project with Organization Z.

Today, New Hire Z1 still has contact with the recruiters who were involved in his being hired for the organization. When he needs references, Human Resources writes them for him as well as working with him to secure a H1 VISA (one that allows a person without U.S. citizenship eligibility for practical training, meaning eligibility to work at an organization in a position related to their educational training for up to three years, with the allowance of one extension for three additional years).

New Hire Z2

Selection Background Data

New Hire Z2 was a white male who has worked with Organization Z for a short time period of about 6 months. He gained employment with the organization shortly after receiving his bachelor's degree in mechanical engineering from University of

Michigan-Ann Arbor. Due to spending a morning at Organization Z for a site visitation, the researcher was able to meet New Hire Z2 personally.

The researcher recalls New Hire Z2 being a little early for his scheduled interview and entering the meeting room prior to the conclusion of a previous meeting. He politely excused himself and apologized for the interruption and waited patiently in the hall. Recruiter Z had assured the interview participants that no more than 30 minutes of their time would be taken for the interview and that meetings would be timely. The researcher believed that it was because of these instructions that New Hire Z2 made sure he was a little early, not wanting to be the hold up in things staying according to schedule. The researcher momentarily concluded her interview with another respondent and invited New Hire Z2 into the meeting room, still adhering to schedule.

New Hire Z2 was dressed as most others were in Organization Z, in navy twill pants and a white cotton shirt with a red company logo above the right pocket. He was polite and direct. The researcher could perceive that he was a no nonsense type of person. New Hire Z2 was well-prepared for the interview that would last 30 minutes maximum. He had written responses to all interview questions, had completed the consent form and had a business card available to present to the researcher. The researcher received these documents and as planned, proceeded to go through each interview question in a conversational manner.

Current Job

New Hire Z2 currently works as a design engineer for Organization Z. He performs functions of designing small jigs, fixtures and machines; machine procurement; buyoffs; and project management. New Hire Z2 further explained that "buyoffs" refer to purchasing machinery from another company and being responsible for going to look at the machinery, determine its value, determine what parts should be purchased and coordinate the movement of the machine to Organization Z.

When New Hire Z2 was asked how his job has changed since he was first recruited to Organization Z, he replied, "not much." He went on to explain that he is more comfortable because he is settled in as well as being more knowledgeable about the tools that are needed and how to work with those tools.

Successful Characteristics

New Hire Z2 was asked if he was informed of what characteristics Organization Z was looking for in its new recruits at his first interview? He indicated that he was not told directly. The recruiter told him that there was one job opening at the time New Hire Z2 interviewed. After being selected for an interview, New Hire Z2 was told that the organization was looking for an experienced, highly organized person, with good communication skills, willing to work overtime and with computer-aided design experience. New Hire Z2 believed they were looking for someone who was easy to get along with others, when they told him about their open office environment. New Hire Z2 rated himself on a scale of 1 to 10, with 10 being the best. He rated himself as an 8. He felt he needed more design work experience in an industry setting to get a "10" rating.

When New Hire Z2 was asked if he believed these characteristics were vital in his job today and in what way? He answered affirmatively and commented on getting along with others being more important at Organization Z, that it was stressed due to the management a person works under. In New Hire Z2's work area, there are many deadlines and a lot of money at stake, he felt that someone who is not a natural at working with others could have problems. He believed that time management was also very important and stated, "you must be organized due to the many projects you're responsible for."

Organizational Focus

New Hire Z2 had an on-campus interview and was extended a job offer by human resource representatives, but based on a team leader's decision. There was no signing bonus included in his offer. He relocated to a city closer to the plant. New Hire Z2 learned of Organization Z by word of mouth. He shared that when he worked for a past employer, many of his co-workers quit and went to Organization Z to gain employment. His relationship with Organization Z prior to being hired, was attributed to information he gained from employees he knew that worked with Organization Z.

When New Hire Z2 was asked what is the extent of his contact with the recruiters who inducted him into the organization now that he is working with Organization Z, he responded, "I can go see them any time needed." He further shared that human resources had made two follow-up visits to him, since he had been on board with Organization Z, to make sure he had everything he needed. New Hire Z2 termed these visits, "friendly stop-bys."

Part Three: Story of the Engineer New Hire Supervisor

Supervisor X

Selection Background Data

This study allowed supervisors who had supervised engineer new hires within the past three years to share their views. The supervisor, being one who is responsible for work getting done, has direct knowledge of what is required to do just that. The information a supervisor has to share is valuable in understanding the characteristics associated with the tasks a successful engineer performs while working within the organization.

Supervisor X was a white male who had worked with Organization X for 18 years and 12 of those years as a supervisor. He also informed the researcher that in his past employment history, he had also supervised hourly employees. Supervisor X had a bachelor degree in chemical engineering. He indicated that he was not involved in any professional affiliations and thought that would be indicative of most supervisors within non-research classifications.

The researcher did not meet Supervisor X personally, but communicated with him via telephone and electronic mail. Supervisor X was the first supervisor who responded to the package sent to organization supervisors explaining the study, enclosing a consent form and requesting their participation. Upon talking with him in the initial interview, the researcher found him pleasant and seemed to have a great interest in the research study. The researcher learned that the supervisor was very knowledgeable about what was required for success in engineering as well as having direct involvement in campus recruiting and mentoring of engineer new hires within Organization X.

Supervisor X was well prepared and the researcher recognized that he had familiarized himself with the interview questions prior to the phone conversation. The interview lasted 35 minutes, as the supervisor had lots of helpful information to share.

Engineering Functions

Supervisor X was classified as a manufacturing support team leader within Organization X. He was responsible for overseeing major capital project installations for the facility; directing engineers who are responsible for design and installation of those projects; coordinating co-op activities for the plant and coordinating engineer new hire campus recruiting. Based on the definition of an engineer new hire for this study, Supervisor X currently supervised one engineer new hire, who was hired a little over two years ago. The researcher did not receive information on the total number of engineers Supervisor X currently supervises.

When asked what functions an engineer new hire might perform at Organization X under Supervisor X's supervision, he replied, "Designing and installing equipment based on the needs of the manufacturing organization; support of quality problems—cost efficiency and safety recommendations (helping to prevent injuries); repair problems, etc."

Successful Characteristics

Supervisor X had a lot to say when the researcher asked him what characteristics were necessary for an engineer new hire to be successful on the job and if they have any specificity to Organization X. Supervisor X said an engineer new hire must be a self-starter—exert a willingness to go out and take the lead on an assignment. The supervisor will give direction and mentoring when needed, but the engineer new hire has to take the initiative. To be successful, an engineer new hire has to have good communication/people skills—have technical knowledge and able to exert common viewpoints—meaning being able to talk technically and practically when communicating with non-technical people; general problem solving capability; co-op experience; general engineering course work; and be able to work in a team environment. Supervisor X expounded further on the characteristic of problem solving capability being defined as displaying "procedural thought process to solve problems." He referred to co-op experience as being "real-world experience" and general engineering course work as being those basic courses on mechanics, structural and electrical design. Being able to work in a team environment was defined as "working with others from various disciplines" by Supervisor X. When the researcher asked were these characteristics gained after being on the job or should an engineer new hire walk in the door possessing these characteristics, he commented that a core of each characteristic should be evident when the engineer new hire walks through the door and then they will be able to develop those characteristics more on the job. Supervisor X explained that certain characteristics are hard to teach, such as being a self-starter. Engineer new hires should possess this trait from their schooling. Organization X provides training to engineer new hires on project

management and sends them to classes for 3-4 days to learn about different computer systems and theory, receive mentoring, do hands-on exercises and receive various manuals. Supervisor X indicated that this information is confidential and exclusive for Organization X employees only. Organization X also provides personal development training for its new engineers.

In looking at the job functions an engineer new hire performs, these characteristics are considered "critical core competencies" and are the basis of most of their career at Organization X. To be hired by Organization X, the average engineer new hire must satisfy most of these characteristics. Supervisor commented further that Organization X normally hires the students who participate in their co-op program when they receive their bachelor's degree, but have recently experienced problems with many co-ops not having the level of communication skills desired as well as other characteristics, like being a self-starter and exerting the "drive to go out and ask questions on their own." Organization X is not extending offers to those co-ops. Supervisor X added that an exceptional engineer new hire would satisfy all of the characteristics, as opposed to most by the average engineer new hire.

Profile of the Engineer New Hire (ENH)

Supervisor X was asked how he would describe an "average" engineer new hire. He stated that most new hires are average in that they have two terms of co-op experience, are a self-starter, have good communication skills and some problem solving ability. He further commented that if these characteristics are not sensed in an interview, then Organization X will not hire. An exceptional engineer new hire is described as one

who has 2-3 terms of co-op experience, along with being a self-starter, good communication skills and good problem-solving ability. He further clarified that the difference between an average engineer new hire and an exceptional engineer new hire is that the exceptional one would satisfy all characteristics as opposed to most characteristics.

Engineer new hires at Organization X are required to have an annual written evaluation. Organization X has a goals program to develop goals for the engineer new hire for the year. At the end of the year, the results are reviewed and a development plan is identified which outlines courses and assignments necessary to assist the engineer new hire in gaining the skills and/or experience needed. However, Supervisor X also gives a mid-year less formal review for engineers under his supervision. This review is more verbal. Supervisor X commented that preparing the GOALS document at the beginning of the engineer new hire's employment with Organization X allows the engineer to know what is expected and how he or she has met those expectations. He felt that this alone contributed to the engineer new hire he currently supervises receiving a superior rating for his last performance evaluation.

Supervisor Y

Selection Background Data

Supervisor Y was a white male who had worked with Organization Y for over 25 years, with over 20 years in supervision. He has a bachelor's degree in mechanical engineering and computer science and a master's degree in Business. He was not involved in manufacturing engineering.

Of all supervisor subjects interviewed, the phone conversation with Supervisor Y was the longest of all, being about 45 minutes. He had so much rich information to share and did not mind taking more than 30 minutes to do so. He told the researcher to let him know if he was giving too much information. But, the researcher appreciated his candid responses and thoroughness. Supervisor Y was well prepared for the interview as he had previously reviewed the information. He literally read each question, gave a thorough response and moved to the next question. The researcher was able to interject with questions when needed.

Engineering Functions

Classified as a manufacturing engineer, Supervisor Y had responsibilities of working with development engineers on concurrent engineering teams representing the viewpoint of manufacturing and supporting manufacturing production (integrated work cells) lines to ensure that quality and efficiency increase. He currently supervises two new hires and also mentioned that he has several interns/co-ops.

Engineer new hires under Supervisor Y's leadership might perform functions in five categories: 1) quality handling corrective action; 2) process engineering changes and updating manufacturing process instructions; 3) new production work on concurrent engineering team (brand new product introduction); 4) daily work cell group (problem solving with the line); and 5) special projects.

Successful Characteristics

To be successful on the job at Organization Y, engineer new hires must have 1) interpersonal skills and teamwork; 2) creativity and innovativeness; 3) tenacity and can-do attitude; 4) customer service; and 5) technical excellence. Supervisor Y added that not only are these five major categories required for engineer new hires, but all employees at Organization Y, regardless of their classification, are judged on all five categories. In addition, new hires should possess the following: 1) learning agility (be a quick learner); 2) adaptability (maintaining effectiveness with various tasks and people); 3) organizational awareness; 4) initiative; 5) client dedication; 6) an international standard of quality; 7) knowledge of the concepts of total quality management; and 8) domain knowledge. Supervisor Y explained that organizational awareness relates to understanding the culture, which determines what and how decisions affect others. Client dedication means working with the client as a partner and being able to understand and anticipate their business needs. In regards to whether an engineer new hire would gain these characteristics while on the job or if they should walk in the door possessing them, Supervisor Y commented that Organization Y expects learning agility, adaptability, initiative, knowledge of total quality management, domain knowledge (doing research and showing an interest in what the company does) from engineer new hires walking in the door. They should also walk through the door with client dedication, meaning that they have an understanding of why they are coming to work, to satisfy someone on the end of the line. They will have the opportunity to learn organizational awareness on the job as well as the ISO (International Standard of Quality).

Organization Y has many characteristics they expect from their engineer new hires. These characteristics have a direct relation to the job functions engineer new hires perform at Organization Y. Supervisor Y explained that since engineer new hires are not supervised in every step, they must have adaptability on a daily basis and must be prepared to work with others. Organizational awareness and client dedication is basically the nature of the work that is done at Organization Y. It is expected that engineer new hires bring a certain level of technical excellence and they will be able to develop it further on the job.

On a 1 to 5 rating scale, with 5 being the highest rating, Supervisor Y stated that an average engineer new hire should rate at least a 3 in all categories after being on the job for six months and a 5 in sub-categories. Exceptional engineer new hires would fulfill all five categories to the highest degree.

Profile of the Engineer New Hire (ENH)

When Supervisor Y was asked how he would describe an "average" engineer new hire at Organization Y, he commented, "like a Ferrari waiting to find a road to race on." He further explained that statement to mean having a strong desire to work or being "gung-ho." He added that an exceptional engineer new hire would be requested by many to be on their team.

Engineers at Organization Y are evaluated annually. The rating they receive becomes a part of their personnel file. However, Supervisor Y also does an unofficial review once every six months as well as giving his subordinates constant feedback. Supervisor Y commented that of the engineer new hires he currently supervises, one

received a 4 and the other a 3. He further stated that at Organization Y, soft skills determine success and are very important. A high level of creativity and technical skills are not as important as the soft skills. Other soft skills might be interpersonal skills, teamwork, problem solving, can-do attitude, etc.

Supervisor Z

Selection Background Data

Supervisor Z was a white male who had ten and one-half years with Organization Z and four years as a supervisor. He had bachelor's and master's degrees in mechanical engineering and was licensed as a Professional Engineer in the State of Michigan. Supervisor Z was also a member of the National Society of Professional Engineers and the American Society of Mechanical Engineers. He also shared that he has done some on-campus recruiting of engineer new hires, but has not done many lately due to time coordination issues.

The researcher was able to personally meet Supervisor Z at his worksite. He seemed to be an easy-going type of person, yet very knowledgeable about machine design. When the researcher met him, he was dressed in navy twill pants and a white cotton shirt with the company logo over the right pocket in red lettering. He was well prepared for his 30-minute interview and had reviewed all questions previous to the scheduled interview, had completed the consent form and had a business card available to present to the researcher.

Engineering Functions

As the Assistant Manager for Machine Design, Supervisor Z was responsible for assisting in the leadership of the department in accomplishing goals for Vision 2005. He does direct supervision of eight engineers, improves productivity (ensuring that machines are performing at a high level); does conceptual development (design); does budget planning; and assists in the scheduling of projects. Four of the eight engineers reporting to Supervisor Z are engineer new hires according to the definition of this study.

Under Supervisor Z's leadership, engineer new hires perform functions of designing tooling fixtures (or jigs) for quality checking of products; locating products for proper assembly; modifying machinery for new products; modifying tooling for products; and procuring materials for outside vendors.

Successful Characteristics

An engineer new hire at Organization Z can be successful on the job if he or she possesses the following characteristics: 1) computer-based design knowledge (some drafting skills); 2) good project management skills, which include: a) scheduling, planning and tracking; b) ability to estimate time and cost; and c) good communication skills. Supervisor Z stated that engineer new hires could work on up to 250 projects a year with projects lasting anywhere from two days to six months. Most of his engineer new hires are responsible for four to five projects at once. In referring to good project management skills, Supervisor Z mentioned that good communication skills are necessary to be able to extract the information needed from internal sources by asking the right questions. An engineer new hire should have these basic characteristics when they

walk in the door and should improve after on-the-job training. These characteristics relate to the job functions an engineer new hire performs in day-to-day operations. Supervisor Z commented that engineer new hires need these characteristics to be able to juggle many projects. Average engineer new hires should satisfy most of these characteristics as opposed to exceptional engineer new hires satisfying all characteristics to some extent.

Profile of the Engineer New Hire (ENH)

Supervisor Z was asked how he would describe an "average" engineer new hire. He indicated that an average engineer new hire would have two or three of the four main characteristics. He provided an example, saying that an average person might have teamwork, scheduling and planning, but their communication skills might be lacking. In describing what "average" means further, Supervisor Z said the "average" engineer new hires do not seem to possess great confidence in themselves, but mostly rely on their supervisors for direction. Exceptional engineer new hires would exhibit more initiative and satisfy all characteristics to some extent. They would have great confidence.

Engineer new hires at Organization Z receive a required annual evaluation. However, Supervisor Z does evaluations twice a year. He commented that he gives some evaluation at the completion of each project so that expectations are clear. Of the engineer new hires that Supervisor Z supervises, two are still waiting to be rated as they just began employment this summer, one received "good" and the other received "very good" on their last evaluations.

Part Four: University Involvement with Employers

Universities and employers are similar in that they are both developers. Universities develop human potential that can be translated into ingenious ideas. Employers purchase these ideas through the mechanism of job offers, inviting graduates to join their organization to further develop their products and services causing an increase in their economic gain. The relationship between universities and employers is one that can be effective when there is partnering. Universities are concerned with producing graduates who are hirable by employing organizations. Employers are concerned with having sufficient qualified workers to produce their products. If a connection can be made with what knowledge, skills and abilities graduates need to have to gain employment with certain organizations, then universities can offer necessary courses, relevant instruction and technologically advanced resources to aid in the development of knowledge, skills and abilities. It can be a win-win situation for both. But, partnering is necessary to accomplish win-win.

To gain a better understanding of the partnership that Michigan State University has with employers who recruit its graduates, the researcher had informal interviews with three placement personnel. The Co-Operative Education Office offers an annual Engineering Exchange where over 125 employers attend to talk to engineering students about career opportunities at their organization. The Career Services & Placement Office keeps files with written information on employers who recruit on campus. This information consists of annual reports, company brochures, and other related information to acquaint the student with the organization and what it has to offer to qualified applicants.

When talking with an assistant director of the Co-Operative Education Office about the relationship MSU has with recruiting organizations, it was learned that some organizations serve on college advisory boards and volunteer their time and/or money. Most organizational representatives are alumni of MSU. Each department has an advisory board. Organizations can request to serve on the board or MSU can ask specific organizations to be involved. Less than 10% of the 125 organizations serve in this capacity.

Statistical Information

In considering the engineering graduates who receive job offers by recruiting employers, the issue of starting salary consistently surfaces. Since society commonly measures the worth of a person or value of the work performed, by how much one is paid, it is no surprise that salary is an issue. The literature revealed that computer science graduates are the most sought-after group of graduates. According to the "NACE 1999 Salary Survey," this student group had a 6.4% increase for an average starting salary offer of $44,649. Across engineering fields, increases clustered around 4-5%. Chemical engineers had a 4% increase to $46,929, while electrical engineers, averaged $45,180 with a 4.4% increase. Mechanical engineers experienced the greatest increase to nearly 5% to $43,275. Of the 29,777 salary offers reported in the NACE Survey, 10,894 offers were to engineering graduates (including computer science majors), which is 37% of the total offers to all majors. Mechanical engineer produced the most offers (2,076), electrical next with (1,863) and then computer science with 1,528 offers.

CHAPTER V

CONCLUSIONS, FINDINGS, RESEARCH SURVEY, DISCUSSION AND RECOMMENDATIONS

Conclusions

Engineer New Hires

The ultimate goal of a college graduate is to gain worthwhile employment that allows him or her an opportunity to apply a theoretical knowledge base to real-world experiences. Yet, some students are hired, while others are not. Those who receive job offers, do so because of demonstrating characteristics that match those desired by a particular organization. After the engineer new hire is inside the organization, those characteristics may or may not affect the engineer new hire's work experience as a whole.

To better understand what characteristics caused certain engineering students to receive job offers, conversations were held with seven engineer new hires from three different organizations, of which data from five of the interviews will be disclosed. Data collected from two subjects will not be disclosed due to their not meeting all requirements of the study. To be included in the study, engineer new hires had to: 1) have received a bachelor's degree from the College of Engineering at their educational institution (or fulfilled all educational degree requirements); 2) be a graduate of a public

university; and 3) began employment with a particular organization performing engineering functions within the past three years.

The engineer new hires that were included in this study had working titles of manufacturing engineer (2); design engineer (1); process engineer (1) and staff engineer (1). In examining the duties they are currently performing with those classifications, it was recognized that there were many similarities. All of the engineers are doing project management (responsible for handling several projects at once)—depending on the organization, this function is called project management or concurrent engineering, which takes in the aspect of teamwork as well, because an engineer would be working on several projects with several other engineers. Four of the five engineers are doing problem solving functions and troubleshooting process or products. Two of the five engineers are providing technical support to work groups, inventory and serving in supervisory or leadworker roles. Some duties that were unique to certain engineer new hires were computer programming, report writing and doing safety checks of the plant.

All engineer new hires had experienced some change in their job responsibilities since they were first hired. Two engineers had only been employed with their organization for six months, two employed for nine months and one employed over two years. Four of the five engineers experienced an increase in responsibility—meaning more work and different responsibilities. Two engineers mentioned changes which were related more to culture and personal development than to the nature of the work, being that since they began employment with their organization, they are now more comfortable with the work environment and have a better understanding of how things go together (e.g. appropriate tools to use, resources available, processes to undertake, etc.).

On-campus interviewing is considered the most effective strategy for hiring students (MSU Recruiter Packet, Career Services & Placement, 1999). Three engineer new hires had on-campus interviews with either human resources staff or technical team leaders (engineering supervisors). One engineer went to the organizational site to be interviewed and one did not have an interview due to his previous five terms of co-op experience with the organization and having received good performance ratings. Most supervisors played some part in extending the job offer to the engineer new hire to join their organization. These four engineer new hires are all working for those supervisors, except one whose supervisor left the organization within months after her acceptance of the job offer. No signing bonuses were offered to any of the engineers. All of the engineers attended Michigan universities and were all Michigan residents, living within 40 miles of their work location, so it was not necessary for them to relocate. However, two engineers did relocate closer to the plant due for personal reasons.

The main focus of this study was to look at what characteristics cause an engineering graduate to be hired. In attempting to determine whether organizational representatives are sharing information with the applicants on what characteristics they are looking for in hirable candidates, one interview question addressed whether the desirable characteristics were revealed to the engineer new hire during the interview or not and if so, in what manner were they revealed. None of the engineers could recall being told directly what those desirable characteristics were. Most recalled their first interview being one where they were asked several questions about their qualifications, as the recruiter made efforts to determine if the applicant matched the needs of the organization.

Though the five engineers had different working titles or classifications, there were similarities in the job functions they were performing. There were also similarities in the characteristics that determined that hirability as well as the importance of those characteristics on the job today. Based on the type of questions the interviewers asked or the nature of the job vacancy, the researcher developed a list of several characteristics the engineer new hires believed were hirable characteristics, which were: 1) computer knowledge; 2) previous co-op experience; 3) motivation; 4) relevant course knowledge and/or degree; 5) highly organized; 6) good communication skills (customer relations); 7) willingness to work overtime (flexibility with working hours); 8) can-do attitude; 9) good work ethics; 10) teamwork skills. Consistent responses were repeated by at least two engineer new hires for each of the following characteristics: 1) communication skills, 2) previous co-op experience; 3) can-do attitude; and 4) flexibility with work schedule. All engineers, except one, believed they met the desirable characteristics 80-100%. All engineers felt that these characteristics are vital in their job today. The engineers gave consistent responses in identifying the importance of these characteristics in daily operations, interactions and team projects.

Supervisors

Supervisors have direct experience and knowledge of how hirability characteristics can be applied on the job. Three supervisors from three different organizations provided insight on the on-the-job application of those characteristics that are necessary to master to be successful in performing a specific set of duties and responsibilities.

All supervisors possessed at least a bachelor's degree in engineering. Two of the three also possessed master's degrees, one in engineering and one in business. One of the supervisors was a licensed Professional Engineer for the State of Michigan. All supervisor subjects were white males. Each supervisor was responsible for supervising six to eight total engineers, which includes one to four engineer new hires (those who began with the organization within the past three years, as defined by this study).

The research assumption guiding this study declared that:

> "There are specific characteristics that cause an engineering graduate to be hired by an employer. It is feasible to believe that though the organization may differ in product/service, there will yet be similarities in the characteristics necessary to perform as an engineer across organizations. Only the individual organization can confirm this assumption through in-depth exploration of their recruitment process."

Of several responses received from supervisors regarding the functions that engineer new hires would perform on the job, there was consistency in the following functions, with at least two supervisors stating the function: 1) design; 2) support quality problems/problem solving; 3) project management; and 4) teamwork. In examining the functions that engineer new hires would perform, it is not logical to neglect the characteristics an engineer new hire must possess in order to perform those functions. Supervisors were consistent in giving the following responses as characteristics that are necessary for on-the-job success: 1) project management (multi-tasking); 2) teamwork; 3) communication skills; 4) technical excellence; 5) relevant coursework; and 6) self-starter/can-do attitude. All supervisors emphasized that it is necessary for graduates to walk through the door possessing some degree of these characteristics and then they will have opportunities to develop those characteristics further on-the-job. According to these

supervisors, these characteristics are related to the job in the day-to-day operations engineer new hires perform.

One supervisor defined an average engineer new hire metaphorically as "like a Ferrari waiting to find a road to race on." He further commented on the implied meaning as being "enthusiastic" or "gung-ho." Organizations expect engineer new hires not only to possess certain competencies, but a certain character as well.

In terms of estimating how engineer new hires measure up against these characteristics, supervisors shared that an "average" engineer new hire would possess most of these characteristics. An "exceptional" engineer new hire would possess all of the characteristics, to some extent. To assess how well an engineer new hire is performing, all supervisors stated that annual written performance evaluations are required at their organizations. However, all supervisors gave informal ratings twice a year, usually verbal, as well as two of the supervisors commenting that they give constant feedback at the conclusion of daily or weekly projects. Engineer new hires who receive direct supervision from these supervisors and who had worked one year with the organization, received ratings ranging from average to exceptional on their last evaluation (1 = poor / 2 = fair / 3 = average / 4 = above average / 5 = exceptional). Only one engineer new hire received an exceptional rating, of which the supervisor attributed to a "GOALS" document being originated at the beginning of the year outlining the performance expectations.

Recruiters

A focus group study conducted with undergraduate students for a major consulting firm determined that the best recruiters are: 1) enthusiastic; 2) trained in behavioral interviewing techniques; 3) well informed about all aspects of their company; 4) strong communicators (comfortable with "selling" the company to students); 5) line professionals (people who are actually doing the jobs they are hiring for); and 6) people who make the student feel important (Keever, 1998).

For each organization studied, there are three to 10 persons on the recruiting team. In recruiting for engineers, all organizations try to use a mix of human resource personnel; engineers; higher level managers; alumni and include various disciplines, levels and functions to be represented on the recruitment team, reinforcing some of the views of Keever (1998). All organizations indicated that they do not require formal training or specific educational requirements for staff to go out and recruit in behalf of the organization, as has in some cases been done in the past, but do require all to attend two- to eight-hour training on selecting new team members and interviewing techniques, including information on behavior-focused interviewing. It should be mentioned that though specific educational requirements are not required to recruit at universities, the classifications that employees are in do dictate specific educational requirements. For example, Organization Z requires specialists within its organization, including human resource specialists, to possess bachelor's degrees to be hired into this classification. All organizations focus on the Northcentral region for recruiting, with one organization also including northeastern region (see Figure 4.1).

The organizations that were surveyed recruit a number of majors based on the focus of their organization, which includes: computer science/computer engineering, electrical engineering, mechanical engineering, industrial engineering, engineering arts, manufacturing engineering and chemical engineering. However, of all percentages given for which majors are sought after, computer science/computer engineering and chemical engineering topped out at 60% of total recruiting efforts, for two of the organizations. Seeking these majors at universities allows organizations the ability to tap into cutting-edge engineering and computer-related developments through hiring graduates who have recently gained such skills (Scott, 1998). Mechanical and manufacturing engineering were also majors that were highly sought after by two organizations, with 40% and 30%, respectively.

Organizations cited the following methods the most, as effective ways to recruit engineers: on-campus interviewing, campus web postings, co-op and career/job fairs. These methods are reaffirmed by research reported in Recruiting Trends, 1998-99, which indicated that of 327 employers surveyed about their general recruiting strategies, the primary strategy utilized was on-campus recruiting and job fairs, receiving a 60% usage rating (MSU, Recruiting Trends, 1998-99). All organizations had tailored their recruiting efforts to locations and sources that produced the most positive outcome. As a result, their recruiting costs were low, ranging from $500-$1,500 per student, depending on location of the university visited and cost of the career/job fairs. This amount was substantially lower than research presented in Recruiting Trends, 1998-99 which indicated a range of $5,000 - $8,400 to recruit an engineer (MSU Recruiting Trends, 1998-99) and information presented by Cluff Associates who present information on

cost-per-hire metrics, citing $5,500 as the average cost to hire a college recruit (Scott, 1998). The difference could be to organizations calculating different factors into this cost, such as salary of recruiters and their time spent, recruiting worldwide as opposed to within a certain region, etc. However, some organizations indicated that they also utilize, site interviewing, special student group visitations, organization websites, and resume referrals to locate qualified engineering candidates. In addition to all organizations using on-campus interviewing as a strategy, it was learned that their tiers of recruitment include site interviews and two organizations also give plant tours before extending an offer to hire.

All organizations attribute their success in recruiting mainly to their co-op program and company reputation. Other responses given were new technology/new programs, tuition reimbursement programs, internet communication links, partnering with universities, plant tours, competitive benefits and presenting opportunities to apply what was learned in school. Michigan State University and University of Michigan were top producers of engineering graduates hired by the organizations who participated in this study. The organizations attribute this success to their co-op programs (all organizations indicated this source to be one of the main hiring pools), proximity to plant locations and university industry focus. Two organizations, however, did experience problems in finding technical majors, which Organization Z attributed to their not being a major automaker and associated salary issues, though they are competitive with their benefits package. Organization X felt their difficulty in locating technical majors, specifically electrical engineers, was due to the electrical engineering degree program combined with computer engineering and having a focus on integrated circuits and computer design,

rather than predominantly electrical engineering. Nonetheless, on average, organizations rate the recruit from public universities as a 4.0 (being above average). Of the three organizations, each hired one to seven engineer new hires for 97-98 and up to twenty-six for 98-99. Only one of the three organizations, offers signing bonuses, which is $2,500 on average. Most starting salaries are low to mid 40K, depending on the major. All organizations offered standard competitive benefits packages. One organization offered additional unique benefits to its new hires such as free monthly birthday lunches, on-site recreational facility, back-up child care program (for employees who needed someone to care for their children in emergency situations), holiday gifts, exempt overtime appreciation bonuses (bonuses for salaried personnel who worked exceptional overtime hours within a six-month period), on-site credit union and many others.

The major focus of this study was to learn what characteristics cause an engineering graduate to be hired from different perspectives within an organization. According to the recruiters of these organizations, organizational focus might be more on specific characteristics, but collectively recruiters listed the following characteristics to result in hirability at their organization: previous co-op experience, communication skills, teamwork abilities, computer skills, time management/prioritization, task commitment, GPA of 2.7-3.0 or above, innovativeness and appropriate course work. The following list of characteristics were given as those that could eliminate a graduate's chances of being hired: GPA of 2.6 or below, lack of computer skills, poor communication skills, not answering questions directly at the interview, inability to relate relevant experience to sought job competencies, and being late to the interview.

Findings

Being recruited and selected for employment is the vision of most college graduates. This is basically the reason most students pursue higher education—to gain worthwhile employment that allows an opportunity to transform theoretical knowledge into practical experience. But not all students gain employment so easily. Having the assumption that if a graduate applies to an organization, he or she has some belief that the organization could offer what is desired from an employer. Next, a match has to take place with the graduate possessing the characteristics that the organization desires. Oftentimes, graduates are not privy to what organizations desire in hirable candidates and therefore, are not prepared when seeking employment. With so many people seeking employment and a limited number of positions available, it behooves graduates to find out what organizations desire and make sure they are prepared to answer the call well ahead of their job search. It also is helpful for organizations to identify what a "hirable" candidate looks like from their perspective and make sure students know this.

This study inquired into the characteristics necessary for engineering graduates to be hired by employers. Each subject group (recruiters, engineer new hires and supervisors) proposed thematic information relating to hirable characteristics. In accord with McCracken's interview data analysis procedures (1988), these themes were analyzed between subject groups to determine relationships. Since none of the engineer new hires were told what characteristics the organization desired in hirable candidates at their initial interview, they were asked what characteristics they "believed" organizations were looking for. As an organizational agent, recruiters were asked what characteristics

their organization desired in hirable candidates, from their perspective. The following characteristics were comparable between the two subject groups:

1. computer knowledge
2. previous co-op experience
3. highly organized/prioritization skills
4. relevant course knowledge and/or degree
5. teamwork skills
6. good communication skills

Not only is it necessary to have an open communication channel between students and employers in revealing what causes hiring to result, it is also important that input from those who are closest to the work be involved in identifying what characteristics are needed for on-the-job success. Due to excessive flattening of organizational structures, it is necessary for graduates to come in the door ready to go to work, with some direction, but not much instruction. The role of the supervisor has changed due to the nature of the work, environment and available resources. Yet, they are close to the work. What better resources to include in the recruitment process, than supervisors who are responsible for overseeing the work and making sure the product or service is delivered? To tap into this resource, supervisors were asked what characteristics were necessary for on-the-job success and to what extent these characteristics are utilized. Relating the supervisors responses to recruiters identification of hirability characteristics, the following congruencies resulted:

1. project management (multi-tasking) skills
2. teamwork

3. communication skills

4. technical excellence (computer skills)

5. relevant coursework

6. self-starter

After being hired by an organization, engineer new hires need to know what is necessary to be successful on-the-job. Sometimes certain characteristics are sought, but are not directly related to job success. Having knowledge of what characteristics relate to the type of work to be done propels the graduate one step closer to being a top performer, thereby making the organization look better in the process. The following characteristics emerged as similarities between supervisor and engineer new hire subject group responses:

1. teamwork

2. communication skills

3. relevant coursework

4. self-starter/can-do attitude (motivation)

The information gained from this qualitative study makes a deposit into the research literature bank on the intricacies of recruitment and provides an understanding of "hirability" from the eyes of the employing organization. This understanding, includes the perspective of the recruiter as well as how the concept relates to on-the-job success considering the supervisor's perspective. In summary, engineering graduates who desire to be hired and successful on-the-job once hired, should walk through the door as a "total" package possessing the following characteristics:

1. previous co-op experience
2. relevant coursework
3. teamwork skills
4. communication skills
5. project management skills
6. highly organized/prioritization skills
7. be a self-starter
8. computer skills

A theory developed in this study is represented in Figure 4.2. The figure gives a schematic display of what causes one to be hired by an organization. This theory was developed based on the rationale that hirability goes beyond selection, which was often related to psychological testing or measuring constructs of reliability and validity by theorists in the late 60's and early 70's. The data collected in this study shed light on the simplification of organizational fit and the matching of characteristics in accordance with reality. This realization assisted the researcher in developing the 3-C Hirability Theory as an explanation to the concept of "hirability." Related theoretical assumptions and formulas are included to clarify the rationale as concluded by the researcher.

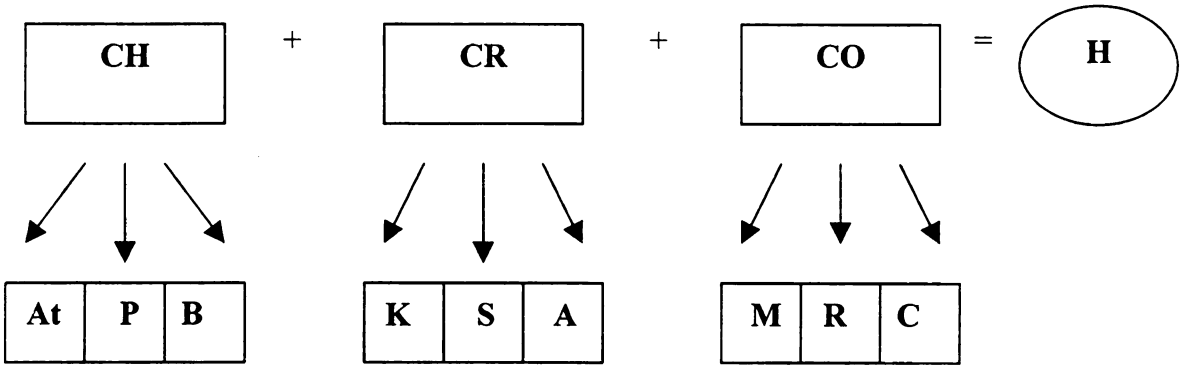

Figure 4.2: Watson's 3-C Hirability Theory.

Discussion and Recommendations

Summary

How, then, does the formulation of this theory gain practicality for engineering students, or any college student, in how he or she should prepare for the job search in order to increase his or her chances of gaining employment after graduation? Now with a better understanding of how multiple recruitment activities interact in accordance with various roles and perspectives within the organization, what actions can be taken by career placement professionals in developing innovative approaches that will help increase the number of students who land job offers? How is the information presented from the sample (three selected organizations focusing on engineering recruiting efforts) applicable to all organizations in distinguishing their needs versus selecting hirable candidates? How are the findings from this study similar to or different from those of other research involving hirability (or selection)? Last, given the results of this study, what are the implications for further study into future research on the concept of "hirability"?

Watson's 3-C Hirability Theory

Watson's 3-C Hirability Theory is the result of the data collected in this study shedding light on organizational fit and the matching of characteristics. Watson asserts that there are certain factors which influence whether a graduate is hired or not by an organization. Being selected, or chosen from a group of applicants, has a bearing on whether or not a person is hired for a job. A person must be selected to be hired for a job. But being selected, does not always mean that a "hire" will take place.

Each word has its own distinct meaning. Selection refers to choosing the most qualified or picking out the candidate who makes the best match with the organization from a group of applicants. Being selected for a job has more value once a candidate has been hired. Hirability goes beyond just being selected and takes into account the probability of a candidate being asked to perform certain functions for a certain wage for an organization (extension of a job offer) and the probability of the offer being accepted, thereby leading to induction by the organization. Therefore, Watson's 3-C Hirability Theory defines the concept of "hirability."

Watson's theory focuses on groups of factors--conditions that bring about a specific result--as being determinants of a candidate's ability to be hired by an organization. The researcher postulates that the right mix of character factors **(Ch)**, competency factors **(Co)** and credential factors **(Cr)** cause affects a candidate's ability to be hired **(H)** for a job. The greater the number of character, competency and credential factors a candidate has that match the needs of the organization, the greater the chances of the candidate being selected out of many, being extended a job offer and being hired by the organization.

A person's character is unique to an individual and consists of his or her's attitudes, personality and behaviors. Anne Frank (1929-1945) stated that "...the final forming of a person's character lies in their own hands" (Noble, 1995). As a result, a person's character impacts who he or she is as a person. Character influences how well a person develops specific competencies, which are reinforced, or affirmed by the credentials which define that person as a potential employee. Dr. Thomas Likona, said to

be one of the most prominent voices in the character education movement in the United States referred to "An anonymous sage wrote, 'When wealth is lost, nothing is lost; when health is lost, something is lost; when character is lost, all is lost'...in an article in the February 1998 issue of the *Phi Delta Kappan* (http://www.charactereducationinfo.org/index-2.htm).

At a given time, each person has a specific attitude **(At)** towards a specific issue and has distinctive individual qualities **(P)** that cause him or her to act **(B)** in a certain manner. For example, a person who has spent many years in the military and who has become accustomed to taking orders before taking action. The attitude this person has towards being ordered to do things affects the way he feels, thinks or interprets being ordered to do things and causes him to either submit or retaliate. A person who became accustomed to receiving orders and felt it was the way things should be, would have difficulty mastering a can-do, self-starter attitude if he or she were not able to separate the relevancy to particular environments. As a result, this person could avoid opportunities to take initiative, seek out information and ask many questions until a project was completed. Because of this, the candidate's character factors would be limited, thereby decreasing chances of being hired at an organization that desired this characteristic. An attitude is feelings shown or thought. Behavior is a person's conduct or way of acting. Wynne (1985, 1986, 1988) and Greer and Ryan (1989) formed an explanation of character stating that "good character rests not so much on having right or profound ideas but on doing "right" things or on engaging in acceptable conduct..."(http://www.quest.edu/wnarticles2.htm).

Personality is a person's distinctive individual qualities that collectively display the total being. A person's attitude, behavior or personality can be changed due to life experiences; changes in circumstances, environments or situations which have an impact and produce a given reaction. At a given time, each person has a certain range of understanding (or **K**nowledge) when combined with proficiencies (or **S**kills) and the power to do (or **Ab**ility) manifests competencies **(Co)**. Knowledge is defined as a person's range of understanding or what is known (learned) by a person at a particular point in time. Skills are abilities or proficiencies a person has in particular areas based on past opportunities to put into action. Ability is the power to do something. For example, knowledge of algebraic concepts is being able to articulate the formula for the slope of a line. Skills come into play when a person is able to reflect on opportunities where they had different algebra courses and performed certain applications to enable them to receive a certain grade in the course indicating their level of mastery. Ability is the candidate's power to do it again, being able to take that knowledge and apply it, thereby calculating the slope of a line by inserting appropriate information and determining the outcome. Knowledge, skills and abilities can change at any time due to additional learning or instruction influenced by a change of mind or perceptions and/or situations.

Credentials **(Cr)** consist of things that can be measured **(M)**, rated **(R)** or certified **(C)**. Credentials are defined as certifications; rights to certain authority; things that have been rated, judged, graded or evaluated according to a certain measurement of success. Credentials tell the employer a story that answers questions like: What level of competency or mastery? What specific requirements have been met? By whose standards and on what type of measurement scale? What rankings were attributed to

what was done or achieved? A candidate can increase the credentials that he or she holds as opportunities are presented and accepted to meet additional requirements in some form. Once a credential is received, it stands in time unless time dictates its relevancy and worth. Credentials for those seeking employment are normally academically related like courses and the grades received in them, course assignments and/or projects, licenses, degrees, etc. See Table 4.2 Watson's 3-C Hirability Theory and related postulates.

Table 4.2: Tenets of Watson's 3-C Hirability Theory.

Character	Attitude	Personality	Behavior
• A person's character influences how well he or she develops specific competencies which are reinforced or affirmed by the credentials the person possesses. • Each person has a specific attitude towards a specific issue and has distinctive individual qualities that define his or her personality which causes him or her to behave in a certain manner. • Attitudes are feelings shown or thought. • Behavior is a person's conduct or way of acting • Personality is a person's distinctive individual qualities that collectively display the total being. • Life experiences, changes in circumstances, environments or situations can alter a person's attitude, personality and behavior.			
Competencies	**Knowledge**	**Skills**	**Abilities**
• Each person has a certain range of understanding (knowledge) when combined with proficiencies (skills) and the power to do (ability) produces competencies. • Knowledge is defined as a person's range of understanding or what he or she knows. • Skills are proficiencies in particular areas based on past opportunities to put those proficiencies into action. • Ability is the power to do something, again and again. • Additional learning influenced by a change of mind and/or situation can cause a change in one's knowledge, skills and abilities.			
Credentials	**Measurable**	**Ratable**	**Certifiable**
• Credentials consists of things that can be measured, rated or certified, such as grades received in a course or on an assignment; a license or degree; a work performance evaluation with an "excellent" rating, etc. • Credentials answer questions, like: What level of mastery was a project completed at? What specific requirements were met? By whose standard and measurement? • A credential stands in time unless time dictates its relevancy and worth.			

Practical Application for College Students

The practical application of Watson's 3-C Hirability Theory to college students is mainly manifested in the schematic design. College students should prepare for job searches at organizations they have determined as suitable in matching their desires of an employer in the following manner:

1. Familiarize yourself with selected organizations who match your desire as a potential employer by obtaining company brochures, annual reports and written information on the organization, plant tours/site visits, attend student group presentations on campus, organizational websites, etc.
2. Find out what these employers are looking for in "hirable" job candidates by hidden messages or information accumulated from the items listed in #1. Items such as company brochures and organizational websites often reveal what type of potential employees the organization desires, what the organizational focus is, etc. Plant tours/site visits offer students a realistic look at the culture, environment, work and employees in action. Student group presentations by organizations allow students to ask specific questions about the organization, what it has to offer and what it desires from potential employees.
3. Once these characteristics have been identified, make a list of the characteristics and write a definition of what you believe the characteristic encompasses relative to the organization you are exploring. For example, "good communication skills" – good verbal communications skills to present design changes to upper-level managers; good writing skills to author reports on suggested product design changes.

4. Leave some space beneath each characteristic and definition. Write examples of how well you match the characteristic by indicating things that can be (or have been) measured, evaluated or rated. Write examples of how you can prove your character, competence and credential in each area. For example, list related courses (or assignments) and grades received, previous work experiences and length of employment, attributes that match characteristics and supporting examples.

5. Evaluate the strength of the characteristic response. If you need to focus more on the characteristic or develop it more, put a check by it.

6. After all characteristics have been evaluated, decide what action needs to be taken to develop the characteristic (e.g. training, courses, reading, volunteering, etc.).

7. Determine your **Hirability Quotient**: $\frac{\textbf{Ch} + \textbf{Co} + \textbf{Cr}}{\textbf{(AtPB) (KSAb) (MRC)}} = \textbf{S}$

Innovative Approaches

Career Placement Professionals can assist college students by developing innovative approaches that could include, but are not limited to the following:

1. Literature that enforces a focus on "hirability" in writing and what it means to the student in terms of preparation.

2. Focused "employment" counseling to students regarding possible suitable organizations based on the student's academic major and employment preferences.

3. The development of testing mechanisms that help to determine a student's hirability to be used as a plan for development prior to beginning a job search.

4. Interactive seminars that allow students to mock interview for potential positions based on "hirable" characteristics.
5. Assist students in being better prepared for interviews by providing guidance on how to demonstrate character factors, competency factors and credential factors in an interview setting.

Insight for Organizations

Other organizations might wonder how the conclusions of this study can assist their organization. This information is helpful to organizations in distinguishing their needs in order to select "hirable" candidates. Organizations should consider the following suggestions:

1. Evaluate the organizational focus relative to individual job functions, identify the mix of character factors, competency factors and credential factors that would cause an applicant to be hired.
2. Determine what attitudes, personality and behavior traits would identify the character the organization desires in a "hirable" candidate.
3. Determine what knowledge, skills and abilities would cause the candidate to be competent according to organizational standards.
4. Determine examples of measurable, ratable and certifiable credentials that could be presentable in relation to the vacant position.
5. Communicate the above to those who are serving as organizational agents involved in attracting, selecting or hiring.

6. Include desired characteristics of potential employees for specific job groups in communication channels utilized by the organization (e.g. website, brochures, written information, etc.). Dare to get the word out!

Recommendations

In surveying the literature, research exploring the concept of "hirability" from a theoretical perspective was non-existent. The most related research was a theory of personnel selection developed by Shoop (1975). However, Shoop's theory is based on three postulates: 1) personnel selection occurs within a finite set of applicants and decision makers; 2) associated with each applicant in the set is an index of satisfaction of the decisionmakers; and 3) the applicant selected is the applicant who maximizes the satisfaction of the decisionmakers. According to Shoop, the selection decision may or may not be influenced by the probabilities of job success or other outcomes. The findings of this study aided in the development of Watson's 3-C Hirability Theory. This theory supports Shoop's theoretical view to a certain extent, but go a step further to take into account organizational fit related to matching specific characteristics as determinants of whether a job offer will be extended or not versus the candidate's acceptance of the offer. The focus of Shoop's theory was on satisfaction and its relationship to selection. Watson's 3-C Hirability Theory extends beyond selection and looks at the probability of being hired, once the selection has been made. This is why grounded theory methodology (Glaser and Strauss, 1967) has relevancy in this study. Grounded theory methodology is a general methodology for generating theory, which emerges from obtained data rather than being deduced from an existing body of data or

theory. Grounded theory is based on the premise that theory is "an ever developing entity and not a perfected product" (Glaser and Strauss, 1967). This study's conclusions are based upon data obtained from study participants. The conclusions that emerged from this study provide a foundation for further study. W. B. Dockrell in Educational Research, Methodology and Measurement (1988) stated, "Researchers should not promise more than they can deliver and that consequently they should deliver what they have promised" (Noble, 1995). In agreement with this statement, the researcher affirms that the identified objectives of this study were satisfied. In looking at recruitment as a process, according to Barber (1998) there are phases of generating applicants, maintaining applicant status and influencing job choice. This study supports the findings of several other studies that have taken into account some aspect of the recruitment process. Research supports the findings in this study that many alternative recruitment sources or methods are being utilized to attract potential applicants. In regards to what Barber (1998) identifies as the Phase of Generating Applicants, this study supports findings that applicants are more interested in jobs located within their preferred geographic area (Barber & Roehling, 1993; Osborn, 1990; Rynes & Lawler, 1983) and that many employees would resist accepting jobs that require relocation (Turban, Campion & Eyring, 1995; Noe & Barber, 1993). This form of targeted geographical regions goes along with target recruitment that focuses on applicants with specific characteristics, which is the focus of this study. However, extensive literature research and Barber (1998) revealed that there is essentially no empirical evidence related to targeting specific applicant groups, or those with specific characteristics. Therefore,

specific and/or additional research in this area is greatly needed and should occur with the following questions in mind:

1. When should an organization target specific characteristics in potential candidates and what goes into the decision making process to do so?
2. What are the consequences of such targeting and what affect does it have on the promotability of the selected candidates over time?
3. What affect does revealing the specific characteristics an organization desires in its communication channels (e.g. organizational websites, company brochures, annual reports, etc.?

This study confirmed that when decision makers (applicants) have incomplete information regarding employment related issues (e.g. characteristics organization is seeking, nature of job functions, the applicant's probability of receiving a job offer, etc.), applicants use signals to make inferences (Spence, 1973; Rynes, 1991). However, the research that was reviewed spoke of the initial screening interview being one where recruiters attempt to acquire information about the applicant and also to provide information about the organization. This initial interview being one of "a dynamic exchange between two parties" (Barber, 1998). However, the findings of this study revealed the fact that the initial interview was more of the organization taking the lead in asking the questions to determine if the applicant matched the organization's needs. To add more clarity to the topic of initial interviews, additional research needs to be done with the following questions in mind:

1. Does the structure of the initial interview change in different settings (e.g. on-campus, on-site, etc.) and with different majors and with different levels (e.g. entry-level, mid-management, specialists, etc.)?
2. What effect does the structure of the initial interview have on an applicant's decision to maintain interest in the employer?

In looking at what Barber (1998) terms the Phase of Influencing Job Choice, this study looked at the process of matching an applicant's characteristics to what an organization desires. In searching the research, there was varied research done on the subjective factor of "job fit," but from the perspective of personality and values with organizational image (Tom 1971), matching of human resource systems with individual characteristics and other constructs. No research addresses the concept of "job fit" to matching organizational characteristics desired in potential candidates. Though Watson's 3-C Hirability Theory sheds light into the concept of "hirability" as it extends beyond selection, additional research studies exploring the concept of "job fit" or "job matching" in regards to characteristics necessary to be hired would supplement the literature in providing different angles of study.

Last, but not least, the manner in which engineers are educated and the content of their instruction, is vital in their preparation for the job search. This study confirmed that it is important that engineering students learn how to apply their knowledge to real-world situations. Being presented with a potential work situation in the classroom, allows students an opportunity to practice how he or she would respond in a similar work situation. An increase in applied learning opportunities during the college student experience, has major relevance to a student's on-the-job success and is connected to the

function of ABET. ABET 2000 confirms that engineering graduates are able to demonstrate certain knowledge and abilities. Engineering instructors who integrate applied learning in their course instruction help students produce the skills (or proficiencies) needed to complement their gained knowledge and abilities, thereby manifesting competencies. Further research is greatly needed in this area with the following questions in mind:

1. How does classroom applied learning opportunities impact a graduate's hirability?
2. What relationship does applied learning during the college student experience have with on-the-job success?
3. What effect does requiring applied learning opportunities to be included in a designated curriculum have with the quality of education a student receives?

Reflections

As I look back over the process of conducting this research study, I can see many committed prayers and conversations with my heavenly Father; many encouraging words from family members, who always support me wholeheartedly; many home-cooked meals and late-night snacks hand-delivered by my mother who declared she would help me in any way that she could; many nights of falling asleep leaving my car on the street, with a dad who never hesitated to pull it in; many phone calls from special friends who wondered if I had a minute to talk; many pains and sicknesses that slowed me down, but never forced me to quit; many devoted hours to collecting data, tape recording interviews

and transcribing field notes; many remembered sacrifices, yet none regretted; many trees being transformed into sheets of paper I would eventually compose my thoughts on; many books read or skimmed on subjects ranging from qualitative methodology to the art of hiring to surviving a dissertation. In the midst of all, many times I thought I would be overwhelmed, but I could always see myself finishing, even at the beginning. How could such a rewarding experience be so strenuous, stressful and demanding? I am reminded of a gospel song that says, "nobody told me that the road would be easy, but I don't believe he (God) brought me this far to leave me."

Professionally, I have always been interested in hirability—helping students become qualified for jobs they desire and to gain employment in those areas enabling them to utilize their knowledge, skills and abilities. With over 11 years in human resources, having experience working with recruitment, student training programs and the whole gamut of human resources issues. This Hirability Study has offered me a better understanding of what causes an engineering graduate, or any college graduate to be hired. The process is one that necessitates partnering between education and business. This partnering remains one that is yet to be totally birthed. However, those who have dared to share, act and respond have taken steps in the right direction. The Hirability Study presented me an opportunity to combine the contributions of my most uninhibited subjects, my education and practical work experience to offer assistance to students. I truly believe that the pursuit of knowledge has no relevance if it is not shared with others. As I share what I have with others, "I touch the future, I teach" [S. Christa Mcauliffe, 1948-1986] (Noble, 1995).

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