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THE EFFECTS OF OCCUPATIONAL STEREOTYPES OF ENGINEERS ON MANAGERIAL SELF-EFFICACY

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The Effects of Occupational Stereotypes of Engineers on Managerial Self-Efficacy

Mühendislere Yönelik Mesleki Kalıpyargıların Yönetsel Özyeterliliklerine Etkisi

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ABBREVIATIONS

STEM	Science, Technology, Engineering and Math

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ABSTRACT

This study is a qualitative study that explores the effects of engineers' occupational stereotypes on their managerial self-efficacy. This qualitative study's main purpose is to understand how engineers' managerial self-efficacy is affected by occupational stereotypes. Eleven participants who have engineering backgrounds were interviewed with semi-structured questions for this study. All the interviews were recorded with a voice recorder of the researcher's phone, transcribed, and the data were analyzed using the Qualitative Content Analysis technique via MAXQDA 20. Five main themes derived from the qualitative content analysis, these central themes are: **"Engineers Perception"**, **"Stereotypes Towards Engineers"**, **"Effects of Occupational Stereotypes"**, **"Managerial Self-Efficacy",** and **"Managers with Engineering Backgrounds"**. The results that have been found were parallel with the literature of stereotypes and efficacy. Results show that most participants agreed on engineers' occupational stereotypes (lack of interpersonal and social skills, high logical thinking, tedious and technical job). Participants also reported that managers with engineering backgrounds have poor relationships with subordinates, poor communication skills, and analysts. The results also showed that stereotypes have some overall effects, which participants reported that facilitation of self-development, engaging in counter-stereotypical behavior, disengaging, internalizing, and feeling of inadequacy. When the effects of stereotypes on managerial self-efficacy are highlighted, participants reported increasing their effort for a managerial role. However, the stereotypes decrease their self-esteem, engage in counter-stereotypical behaviors, decrease performance, and disengage from a managerial role. Even though participants reported that they feel competent for a managerial role, there are moderating factors in their managerial self-efficacy. For example, most participants reported that they rely on themselves, which eventually leads them not to be affected by the stereotypes. The other moderating factor is that the organization they are working at; in other words, if an engineer gets enough support and training from their organization, they will not be affected. Interviewed engineers mentioned that they feel incompetent in their

communication, job delegation, saying “no” to others, and self-promotion skills; however, they feel competent in subordinate relationships for managerial roles. Engineers feel better in managerial role self-efficacy when observing managers whom they can take as role models. Additionally, they think that training can improve managerial skills.

Keywords: Occupational Stereotypes, Managerial Self-Efficacy, Qualitative Content Analysis, Qualitative Research, Engineer

ÖZET

Bu nitel araştırma mühendislere yönelik mesleki kalıpyargıların yönetsel öz yeterliliklerine etkisini incelemektedir. Çalışmanın amacı niteliksel yöntemler kullanarak öz yeterlilik bağlamında mühendislerin mesleki kalıpyargılardan nasıl etkilendiklerini incelemektir. Bu araştırma kapsamında mühendislik geçmişine sahip 11 katılımcı ile yarı yapılandırılmış mülakatlar yapılmıştır. Tüm mülakatlar araştırmacının kişisel telefonu kullanılarak kaydedilmiş, deşifre edilmiş ve Nitel İçerik Analizi metodu kullanılarak MAXQDA 20 programı ile analiz edilmiştir. Nitel İçerik Analizi sonucunda beş ana tema ortaya çıkmıştır, bu ana temalar: **"Mühendislerin Algısı", "Mühendislere Yönelik Kalıpyargılar", "Mesleki Kalıpyargıların Etkisi", "Yönetsel Öz Yeterlilik**" ve **"Mühendislik Geçmişine Sahip Yöneticiler"** başlıkları altında toplanmıştır. Bulgular, kalıpyargılar ve öz yeterliliğe yönelik literatürle paralel olarak ortaya çıkmıştır. Sonuçlar, katılımcıların çoğunluğunun mühendislere yönelik mesleki kalıpyargılar üzerinde hemfikir olduğunu (kişilerarası ve sosyal becerilerin eksikliği, yüksek mantıksal düşünme, sıkıcı ve teknik iş) ve ayrıca mühendislik geçmişine sahip yöneticilerin kendisine bağlı çalışanlarla zayıf ilişkileri olduğunu, iletişimin becerilerinin zayıf olduğunu ve mantık odaklı düşünme stiline sahip olduğunu belirttiler. Sonuçlar ayrıca; kalıpyargıların bazı genel etkisi olduğunu ve katılımcıların kendi gelişimini kolaylaştırdığını, kalıpyargı karşıtı davranışlar içine girdiklerini, geri çekilme davranışında bulunduklarını, kalıpyargıları içselleştirdiğini ve yetersizlik hissettiklerini göstermiştir. Kalıpyargıların mühendislerin yönetsel özyeterlilik üzerindeki etkileri vurgulandığında ise katılımcılar, yönetsel bir rol için çabalarını artırdıklarını, ancak kalıpyargıların özgüvenlerini düşürdüğünü, kalıpyargı karşıtı davranışlar sergilediklerini, performanslarını düşürdüklerini ve yönetim rollerinden koptuklarını belirtmişlerdir. Katılımcılar genel olarak yönetsel bir rol için kendilerini yeterli hissettiklerini bildirmiş olsalar da, yönetsel öz yeterliliklerinde moderator bazı faktörler katılımcılar tarafından belirtilmiştir. Örneğin, katılımcıların çoğunluğu kendilerine güvendiklerini ve bunun da mesleki basmakalıplardan etkilenmemelerine yol açtığını bildirdi. Diğer moderatör faktör

ise çalıştıkları organizasyonlar olmakla birlikte; mühendisler eğer çalıştığı organizasyonların kendilerine destek olacağını ve gerekli eğitimleri sağlayacaklarını bilmeleri halinde kalıpyargılardan çok etkilenmediklerini bildirmiştir. Mülakat yapılan mühendisler iletişim, iş delegasyonu, başkalarına hayır deme ve kendini reklamını yapma konularında yetersiz hissettiklerini, ancak yönetim rolleri kendilerine bağlı çalışanlar açısından kendilerini yeterli hissettiklerini belirttiler. Ayrıca mühendisler, rol model alabilecekleri yöneticileri gözlemlediklerinde ve yönetsel becerilerin eğitimle geliştirilebileceğini düşündüklerinde yöneticilik rolleri için yeterliliğin arttığını belirttiler.

Anahtar Kelimeler: Mesleki Kalıpyargılar, Yönetsel Öz Yeterlilik, Nitel İçerik Analizi, Nitel Araştırma, Mühendis

CHAPTER 1

INTRODUCTION

This research focuses on the managerial self-efficacy of engineers regarding occupational stereotypes. Hilton & Hippel (1996) defined stereotypes as ‘‘beliefs about the characteristics, attributes, and behaviors of members of certain groups’’ (p. 240). Stagner (1950) and Triandis (1959) defined occupational stereotypes as the attributes or traits of certain occupations. Individuals’ self-efficacy beliefs are their views on their ability to effectively coping with challenging circumstances and accomplishing tasks (Di Giunta et al., 2010).

In the 1950s, theorists proposed occupational stereotypes that state various attributes or traits associated with occupations (Stagner, 1950; Triandis, 1959). Occupational stereotypes are defined as “a preconceived attitude about a particular occupation, about people who are employed in that occupation or about one's suitability for that occupation” (Lipton, O’Connor, Terry & Bellamy, 1991, p.129). Even though researchers agree on occupational stereotypes and their essential consequences, there is not enough consensus on occupations' judgment dimensions. For example, many studies found that occupational stereotypes are based on gender (Cejka & Eagly, 1999; White, Kruczek, Brown & White, 1989), and some studies focused on prestige or status (Bose & Rossi, 1983; Oswald, 2003; Smith, 1943). The gender-based stereotypes are especially harmful in Science, Technology, Engineering, and Math (STEM) fields as they may cause women to disidentify from a profession and leave very few women in leadership roles (Good, Aronson & Harder, 2008; Shapiro & Williams, 2012). Considerable research has depicted that stereotypes also impair women's STEM task performance in engineering (Bell, Spencer, Iserman & Logel, 2003; Logel et al., 2009). Additionally, the threat of negative stereotypes led women to underperform managerial and leadership tasks (Bergeron, Block & Echtenkamp, 2006; Hoyt & Blascovich, 2010).

Studies conducted to examine the perceptions of occupations in Turkey revealed that students held stereotypical beliefs for engineering. For instance, in a

study that examines the perception and attitudes of secondary school students towards engineers; the results showed that participants perceive engineers as qualified construction workers, repairers, managers, or designers, and they also have stereotypical beliefs about engineers' gender (Ergün & Balçın, 2018). In another study that explored the perception of various professions in Turkey, the results concluded that; construction, mechanical, electric-electronic, computer engineering, and district attorneys are rated as appropriate for men (Ulaş, Zorbaz & Kızıldağ, 2016).

Self-efficacy plays an important role in social and individual tasks within education and vocation areas (Ali, McWhirter & Chronister, 2005; Joët, Usher & Bressoux, 2011). For example, in the vocational domain, managers have different perceived managerial self-efficacy levels (Bandura, 1977). Self-efficacy is a critical construct in the academic performance and stereotype literature. Steele (1997) reported that negative stereotypes lead to a decrease in self-efficacy of African-American students.

Self-efficacy emerges as one of the determinants of career development, especially in the STEM fields such as science and engineering, where women are underrepresented. Women's career choices and career-related behaviors are influenced by their self-efficacy (Betz & Hackett, 1986). Rice, Lopez, Richardson, and Stinson (2013) found that women in STEM roles had low science-related self-efficacy, but this study provides little insight into the engineering stereotypes and their effect on managerial self-efficacy. Research suggests the relationship between academic performance and self-efficacy (Belmi, Barragan, Neale & Cohen 2015; Gonzales, Blanton & Williams, 2002; Steele, 1997; Steele & Aronson, 1995), there is a gap in the literature examining the effects of stereotypes on managerial self-efficacy. In the current research, the effects of engineers' occupational stereotypes on managerial self-efficacy are investigated. Exploring the effects of occupational stereotypes on managerial self-efficacy can expand the applicability of the stereotype theory on a domain (i.e., managerial self-efficacy) that has not been extensively explored. Besides, looking at the other variables that influence individuals' efficacy beliefs may expand Bandura's self-efficacy theory.

In the current study, a qualitative method was used to examine the effects of occupational stereotypes on engineers' managerial self-efficacy. For this, semi-structured interviews were conducted with engineers focusing on their occupational stereotypes experiences in their work and personal lives and how they are affected by these stereotypes in terms of their managerial self-efficacy. The current study will first introduce self-efficacy, narrowing to managerial self-efficacy and occupational stereotypes narrowed to stereotypes towards engineers and the connection between stereotypes and self-efficacy. The methodology section will describe semi-structured interviews and procedures. In the results chapter, the analysis derived from MAXQDA 20 will be presented with themes and sub-themes, and examples from participants. Finally, chapter five includes the discussion section of the study. The results derived from the analysis will be explained and interpreted regarding the contribution to the literature. The strengths, limitations, and suggestions for future research will also be discussed in chapter five.

CHAPTER 2

LITERATURE REVIEW

2.1 STEREOTYPES

The term stereotype is introduced by Lippmann (1922) as "pictures in our heads" (p. 59), and Allport (1954) defined stereotypes as "exaggerated belief associated with a category. Its function is to justify (rationalize) our conduct in relation to that category" (p. 191). Similarly, Cardwell (1996) defined stereotypes as fixed, over-generalized beliefs about a class of people or a particular group. Stereotypes are "beliefs about the characteristics, attributes, and behaviors of members of certain groups" (Hilton & Hippel, 1996, p. 240). Even though there are differences in definitions of stereotype, belief is a common aspect. Devine (1989) suggested that stereotypes often invoke without individuals' conscious awareness, and research shows that stereotypes are often unintentional (Goodwin, Gubin, Fiske & Yzerbyt, 2000). The stereotype's initial function is decreasing complexity and saving individuals' limited cognitive resources (Macrae, Bodenhausen, Milne & Jetten, 1994; Macrae & Bodenhausen, 2000). Individuals categorize others based on their ethnicity, gender, age, occupational or other attributes and assign specific group characteristics such as laziness, negligence. By categorizing others, individuals decrease the environment's complexity (Fiske & Neuberg, 1990; Posthuma & Campion, 2009).

2.1.1 Consequences of Stereotypes

Research demonstrates that stereotypes influence individuals' behaviors and usually lead to stereotype-consistent behaviors even though the stereotypical behavior is negative (Dijksterhuis & Bargh, 2001; Wheeler & Petty, 2001). Negatively stereotyped group members who have strong bonds with their groups are more likely to be vulnerable to negative stereotypes and may feel stigmatized

(Steele, Spencer, & Aronson 2002). Even though the group members do not believe the stereotypes are true, they may still suffer from anxiety for their performance or behavior, which might confirm the stereotypes referred to as a stereotype threat (Steele & Aronson, 1995). Individuals' self-worth is threatened by the possibility of being judged as having a low ability and fulfilling negative stereotypes (Steele, 1997). Besides, prolonged exposure to stereotypes makes stereotyped individuals vigilant and vulnerable (Purdie-Vaughns, Steele, Davies, Ditlmann & Crosby, 2008). Individuals vulnerable to stereotype threat lose their self-efficacy in stereotyped settings (Aranson & Inzlicht, 2004). Being chronically exposed to negative stereotypes, members of the stereotyped groups internalize the stereotypes, and as a result, the inadequacy becomes part of their personality (e,g., Allport, 1954; Bettelheim, 1943).

Positive stereotypes can improve an individual's negative impressions. Self-promoting and agentic women may emphasize the positive stereotypes related to communality and dependence, which are favorable impressions for them (Becker, Glick, Ilic, & Bohner, 2011; Moss-Racusin & Rudman, 2010). Levy (1996) showed that priming the positive old age-related positive stereotypes such as being wise increased older participants' memory task performance Shih, Pittinsky, and Ambady (1999) suggested that target group member's performance will be increased in the stereotyped domain when positive stereotypes are activated.

2.1.2 Occupational Stereotypes

The definition of an occupational stereotype is "a preconceived attitude about a particular occupation, about people who are employed in that occupation, or about one's suitability for that occupation" (Lipton et al., 1991, p.129). Occupational stereotypes are attributes or traits that individuals associate with various occupations (Stagner, 1950; Triandis, 1959). Holland (1959) claims that individuals have a list of occupational stereotypes that are reliable, valid, and stable enough to help them select their first jobs.

Even though empirical literature does not focus on occupational stereotypes, several studies investigated gender stereotypes. For instance, Shinar (1975) stated that the occupations which require high levels of rationality, assertation, and competence were perceived as masculine, whereas occupations with high levels of competence in nurturing, warmth, passivity, and warmth are viewed as feminine.

2.1.3 Stereotypes Towards Engineers

The individuals working in STEM fields are often characterized by highly stereotypical manner (Kendall, 1999; Schibeci, 1986; Steinke, 2005). In STEM fields, the stereotypes include a tendency toward social isolation and a singular focus on technology (Barbercheck, 2001). In the light of the recent research; negative stereotypes towards individuals in STEM includes a preference for social isolation, poor hygiene, a mundane lifestyle, and technology-driven (Barbercheck, 2001; Nassar-McMillan, S.C., M. Wyer, M. Oliver-Hoyo, 2011), obsessiveness and social skill deficits (Cheryan, Siy, Vichayapai, Drury & Kim, 2011). Besides, individuals in STEM areas are stereotyped as unattractive, naturally intelligent, and socially awkward (Cheryan, Plaut, Handron & Hudson, 2013; Ehrlinger, Plant, Hartwig Vossen, Columb & Brewer, 2018; Hannover & Kessels, 2004; Storage, Horne, Cimpian & Leslie, 2016). Computer programmers are typically profiled as introverted and logical (Dickerson & Gentry, 1983). Computer scientists are also stereotyped as socially awkward computer nerds obsessed with computers (Schott & Selwyn, 2000). They are technology-oriented and have a high interest in electronics and programming (Cheryan et al., 2011; Schott & Selwyn, 2000). Another stereotype towards computer scientists includes that they lack interpersonal skills (Beyer, 2014; Mercier et al., 2006; Schott & Selwyn, 2000). Wong (2017) portrayed that British students described computer scientists as antisocial, geeky loners in research conducted during a computing camp.

Additionally, there are positive stereotypes towards computer scientists and scientists in general. For instance, they are defined as geniuses (Schott & Selwyn, 2000, p. 298), intelligent (Beyer, Rynes, Perrault, Hay, & Haller, 2003, p.49),

logical (Schott and Selwyn 2000, p. 292), and with little interest in people (Schott & Selwyn, 2000). In a study of stereotypes of first-year engineering students and what it means to fit in engineering, the results indicated that students' descriptions were aligned with widely-accepted stereotypes of engineers (Brianna et al., 2019).

2.2 SELF-EFFICACY

Bandura's Social Cognitive Theory underlines how behavioral, cognitive, personal, and environmental factors interact to determine behavior and motivation (Bandura, 1977). The Social Cognitive Theory comprises four components for goal realization: self-reaction, self-evaluation, self-observation, and self-efficacy. Each of these components affects goal attainment and motivation, interrelated (Bandura, 1986). Self-efficacy is one of the components of the Social Cognitive Theory that is defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura (1997, p.3). It can be viewed as a task-specific version of self-esteem (Brockner, 1988). According to Bandura & Adams (1977), individuals' belief in their capability to perform a task can influence their actual behavior, performance outcomes, persistence, and choices. If an individual's perceived self-efficacy is low, they may avoid engaging in activities and may lack effort for challenging tasks (Bandura, Barbaranelli, Caprara & Pastorelli, 1996). Bandura (1977) defined four sources of information that individuals employ to judge their efficacy: performance outcomes, vicarious experiences, verbal persuasion, and physiological feedback, helping individuals determine if they can accomplish specific tasks. Self-efficacy has three dimensions: (a) the magnitude of efficacy expectations, the level of task difficulty a person believes they can attain; (b) the strength of efficacy expectation, the conviction regarding magnitude as strong or weak; and (c) generality, the degree to which the expectation is generalized across situations.

Self-efficacy plays a significant role in accomplishing social and individual tasks like health, education, and vocation (Ali et al., 2005; Joët et al., 2011). Di Giunta et al. (2010) stated that self-efficacy beliefs are conclusions of how

individuals can think they can cope with challenging circumstances or accomplish goals. Self-efficacy is hypothesized to affect persistence, effort, task choice, and achievement (Bandura, 1986, 1997; Schunk, 1995). The research on self-efficacy highlighted a stronger relationship between performance and self-efficacy beliefs rather than individual's general judgments of their skills and achievement (Schunk & Pajares, 2010). Self-efficacy theory has been applied to various domains, including achievement behavior (Bandura & Schunk, 1981; Schunk, 1984), career choice and development (Hackett & Betz, 1981), and motivation (Bandura & Cervone, 1983). An employee's sense of capability for a task influences their motivation, perception, and performance (Bandura, 1997). Individuals with low self-efficacy have pessimistic thoughts about their personal development and performance. Research suggests that racism, discrimination, negative stereotypes, and low acculturation decreases self-efficacy (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Patel, Salahuddin, & O'Brien, 2008). Bandura et al. (2001) stated that low self-efficacy damages individual and societal functions like social identities, occupational goals, physical and mental health, and motivation. As a contradiction when an individual believes in themselves it improves their executive and cognitive processes, such as academic achievement and decision-making (Bandura, 1995; Schwarzer, Mueller, & Greenglass, 1999). Self-efficacy beliefs are important since it influence individuals' susceptibility to depression, coping with adversity and failures, the effort they put on tasks, preserve in challenges and resilience to adverse situations (Bandura, 1997).

2.2.1 Managerial Self-Efficacy

Self-efficacy's importance as a determinant of achievement behavior, career, academic decisions, and career development was first proposed by Hackett and Betz (1981). The role of self-efficacy in career choices has long been recognized. For example, Holland (1997) states that individuals who lack self-efficacy may not pursue their career choices. Many studies have found the relationship between self-efficacy and work-related behaviors such as job

attendance (e.g., Frayne & Latham, 1987) and sales performance (e.g., Barling & Beattie, 1983). Besides, past research revealed that there is a strong relationship between performance and self-efficacy. Studies have shown that when individuals have high self-efficacy, they are more likely to sustain the effort to accomplish, initiate tasks, and face problems (Bandura, 1986, 1997; Stajkovic & Luthans, 1998). The relevance of self-efficacy in the managerial role is thus undeniable. Managers differ in their perceived managerial self-efficacy regarding their ability to believe in reaching their goals and completing a task (Bandura, 1977). There is a large volume of published studies that examined the relationship between self-efficacy and managerial-role-related constructs. For instance; in a simulation study, a relationship between self-efficacy and managerial decision making has been found (Bandura & Wood, 1989), and even though the managers are competent in their managerial roles, they can have low managerial self-efficacy (Atwater, Ostroff, Yammarino & Fleenor, 1998). The managers who perceive themselves as not effective in their managerial role, even though they are competent, feels threatened by the inability to meet the role expectation (Cho & Fast, 2012; Fast & Chen, 2009). Even though it depends on the organization, most managers face pressure to show self-efficacy and possess the skills to be effective in their managerial role (Fiske, Cuddy, Glick, & Xual, 2002; Mintzberg, 2009). In Turkey, as pioneering research, Işık (2001) investigated the construct of self-efficacy at managerial roles level, entitled “role efficacy”. This study conceptualized the task domains in terms of Mintzberg's (1980) central roles, namely, interpersonal roles (figurehead, leader, liaison); informational roles (monitor, disseminator, spokesperson); and decisional roles (entrepreneur, disturbance handler, resource allocator, negotiator). This research added following contemporary roles to the model: trainer, mentor, and continuous improver.

2.3 OCCUPATIONAL STEREOTYPES AND MANAGERIAL SELF-EFFICACY

This study focuses on the occupational stereotypes towards engineers and the effects on managerial self-efficacy. Self-efficacy is a core aspect of the Social Cognitive Theory of Bandura, and it is generally investigated as a determinant of behavior. Self-efficacy is "a dynamic set of self-beliefs that are linked to particular performance domains and activities" (Lent, 2005, p. 104). Bandura (1997) reported that individuals integrate and process information regarding their capability: verbal persuasion, physiological and emotional states, performance accomplishments, and vicarious experience. Stereotypes may serve as a vicarious experience in which individuals interpret what others who are similar to them are unable or able to do, which influences individuals' judgment of their efficacy. Bussey and Bandura (1999) referred to the impact of stereotypes in gender development as well. Gender stereotypes are preconceived attributes learned through observing models during childhood, and it influences an individual's judgment of efficacy when performing stereotyped masculine or feminine tasks.

Occupational stereotypes could be either negative or positive. For example, negative stereotypes about engineers can include social isolation, obsession with technology, poor hygiene, and a mundane lifestyle (Barbercheck, 2001; Nassar-McMillan et al., 2011), and positive stereotypes towards engineers can be "intelligent" (Beyer et al., 2003, p.49), "geniuses" (Beyer et al., 2003, p.49), and "logical" (Schott & Selwyn, 2000, p 292).

Some studies show that when individuals have high self-efficacy, they are more likely to sustain the effort for task accomplishment, initiate tasks, and endure when confronted with problems (Bandura, 1986, 1997; Stajkovic & Luthans, 1998). In this study, managerial self-efficacy refers to engineers' degree of confidence that they can perform a management position successfully.

Various studies found that stereotypes hurt efficacy beliefs (Burnette, Pollack & Hoyt, 2010; Niemann, 2001; Steele, 1997). In the study of Burnette et al. (2010), the results show that women's leadership self-efficacy decreased when a

gender-related stereotype was activated. Rice et al. (2013) found that female STEM majors have lower self-efficacy for science than men.

Even though research indicated a relationship between stereotypes and performance, self-efficacy and performance, stereotypes and self-efficacy, there is a gap in the literature examining the effects of occupational stereotypes on managerial self-efficacy, especially within the engineer population.

2.4 PRESENT STUDY AND RESEARCH QUESTIONS

Many factors have been known that impact managerial self-efficacy, so the researchers need to extend the literature and investigate different variables with diverse samples. The purpose of this thesis study is to examine the effects of occupational stereotypes on managerial self-efficacy.

An extensive search of the literature from various databases (e.g., PsycINFO, SAGE Premier, PsycArticles, and Google Scholar) revealed that no study had investigated occupational stereotypes engineers' effects on managerial self-efficacy. Most studies focused on the STEM fields and especially gender stereotypes of gendered images and women's ability in STEM roles (Cejka & Eagly, 1999; Cheryan et al., 2017; Clark et al., 2016). As a result of the lack of literature on occupational stereotypes and managerial self-efficacy, this study aims to provide a qualitative approach to engineers' occupational stereotypes and their effects on engineers' managerial self-efficacy.

Research questions of the current study focused on; how do engineers perceive engineering? What occupational stereotypes do engineers face? Which of the occupational stereotypes do engineers agree on? How do they see managers with an engineering background? To what extent they feel competent for a managerial role? How the occupational stereotypes affect their managerial self-efficacy? Even though the analysis and results reveal these concepts, this study's primary focus is to examine the occupational stereotypes towards engineers and their effects on engineers' managerial self-efficacy.

CHAPTER 3

METHODOLOGY

3.1 PARTICIPANTS

The researcher's professional and personal network was used in this research; the participants were recruited and selected via the convenience sampling method. The participants' demographic information was collected via the Consent Form (see Appendix A) (Table 3.1).

Table 3.1 Demographics of the Participants

Participants	Gender	Education Level	Major	Sector	Profession
1	Male	Bachelor's	Computer-Informatics	Tobacco Exportation	Manager
2	Male	Master's	Mechanical Engineering	Automotive	Senior Project Engineer
3	Male	Master's	Mechanical Engineering	Automotive	Project Management Officer
4	Male	Master's	Mechanical Engineering	Automotive	Durability Engineer
5	Male	Master's	Mechanical Engineering	Automotive	Team Leader
6	Male	Master's	Aerospace Engineering	Automotive	Business Development Coordinator
7	Male	Bachelor's	Mechanical Engineering	Automotive	Design Engineer
8	Male	Bachelor's	Mechanical Engineering	Automotive	Design Engineer
9	Male	Master's	Mechanical Engineering	Automotive	Design Engineer
10	Male	Bachelor's	Mechatronics Engineering	Automotive	Team Leader
11	Male	Master's	Physics Engineering	Telecommunication	Network Engineer

Twelve participants were asked for the interviews; however, 11 of the participants were available. All participants are employed in various positions within an organization and hold engineering degrees. Four of the participants are working in a mid-level managerial role, and seven of the participants are working in engineer-level positions. All the participants were male and held at least a bachelor's degree.

3.2 INSTRUMENTS AND DATA COLLECTION

The interview questions were semi-structured and focused on occupational stereotypes and their effects on engineers' managerial self-efficacy (See Appendices B and C). In designing the questions, the previous studies' main themes relevant to the present study were used. The interview questions started with general topics and detailed occupational stereotypes and managerial self-efficacy as the interview proceeds. The topics are "engineers' perception", "stereotypes towards engineers", "effects of stereotypes", "managerial self-efficacy" and "managers with engineering backgrounds" (See Appendices B and C). For every interview, 15 questions were asked to the participants. The interview questions begin with engineers' general perception and then lead to their experience on the effects of the stereotypes and how they feel competent or do not feel competent for a managerial role.

3.3 PROCEDURE

A qualitative research approach has been used in this research. In-depth, semi-structured interview questions were designed and conducted with participants (See Appendices B and C). After receiving the Istanbul Bilgi University Ethics Committee (See Appendix D), the data collection was started as an initial stage. The researcher's professional and personal connections have been contacted upon receiving ethical approval, and interview appointments were set for a proper time for both participant and researcher. Due to public health interventions during

COVID-19 all interviews were done remotely via an online communication platform Microsoft Teams. Before the interviews, online Informed Consent Form has been sent to participants via Google Docs (See Appendix A). Upon receiving approval for voluntary participation, online meeting requests were sent to the participants.

All interviews with the participants lasted between 40 to 63 minutes. The researcher's personal cell phone's audio recorder was used to record interviews, the approval for the voice recording was taken with the Consent Form (See Appendix A). After the interviews with all participants were completed, the researcher transcribed the interviews, excluding personal information such as the organizations and participants' names. Upon completing the transcriptions, all the transcribed data were uploaded to qualitative data analysis software MAXQDA 20. The data were analyzed using the software with the Qualitative Content Analysis research technique.

3.4 DATA ANALYSIS

The interview data collected via the researcher's personal cell phone audio recorder, the approval for the voice recording was taken via the Online Consent Form (See Appendix A). Upon completing the interviews, all the records were transcribed in Microsoft Word. The transcribed documents have been uploaded to qualitative data analysis software MAXQDA 20. This program allows the researcher to store the transcriptions, cross-connect the transcriptions, and take necessary notes. In addition to this, MAXQDA 20 enables creating themes and master themes by facilitating the coding.

Qualitative Content Analysis was used to analyze data and interpret its meaning (Schreier, 2013). The interviews were coded to determine the participants' repeated words and topics; upon coding each transcription, the master codes and sub-codes were created.

CHAPTER 4

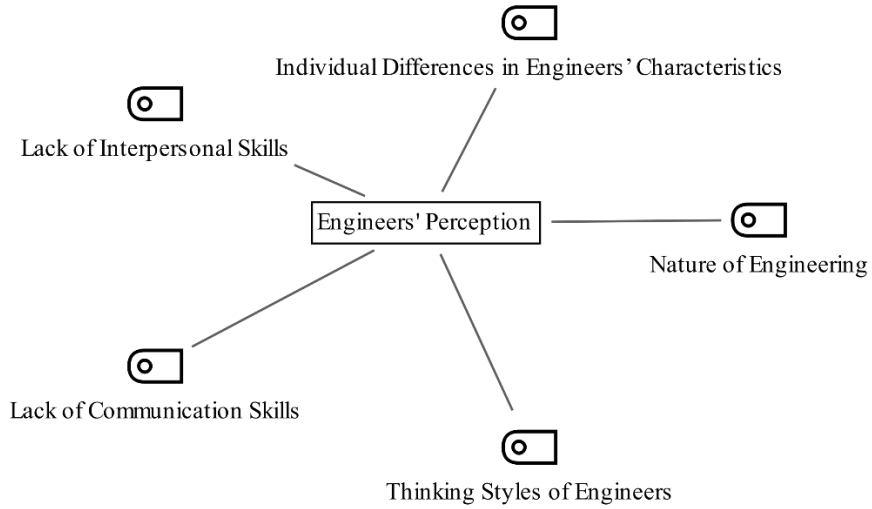
RESULTS

Within the research question on the effects of occupational stereotypes on engineers' managerial self-efficacy, the engineers' data through interviews was analyzed by Qualitative Analysis Program MAXQDA 20. The qualitative content analysis method has been used to analyze the interviews. Five main themes and 21 sub-themes were generated from the qualitative content analysis. The coded data divided into main themes based on the interview questions. The five main themes are “Engineers’ Perception”, “Stereotypes Towards Engineers”, “Effects of Stereotypes”, “Managerial Self-Efficacy” and “Managers with Engineering Backgrounds”.

4.1 ENGINEERS’ PERCEPTION

Participants reported their perception of how they see the engineering field and engineers. Sub-themes under Engineers’ Perception are “Nature of Engineering”, “Thinking Styles of Engineers”, “Lack of Communication Skills of Engineers”, “Lack of Interpersonal Skills of Engineers”, and “Individual Differences in Engineers’ Characteristics”.

Figure 4.1 Engineers' Perception and Sub-themes



4.1.1 Nature of Engineering

Participants reported that the nature of engineering itself is one of the determinants of behavioral outcomes. They explained that engineering is a technical area in nature.

Participants reported that engineering education has an impact on the characteristics of the engineers. They claim that engineering majors do not have soft-skill-related courses and coursework because of their technical nature.

> "Engineering faculty aims to train for engineering, not for being a manager. There are other majors in the universities for management". (Participant 3, Pos. 7)

> "You work individually for fluid mechanics until morning. In project courses, you only work with three other students, but you do not have to do interactive projects, presentations, or interviews; this leads engineers to become dull". (Participant 6, Pos. 16)

> "You teach engineers mathematics and such for four years does not teach communication, then you expect them to go out and socialize. If this person

goes home and only does their coursework, what can you expect?". (Participant 10, Pos 35)

Participants have stated that individuals' personalities lead to the decision to study the engineering area. They explained that some personality types are better predictors of choosing an engineering area since engineering does not require well-developed soft skills.

"Individuals who think rational and concrete usually chooses the engineering area, that is why engineers are this way". (Participant 2, Pos. 13)

"It was the same when I was younger, I think it is my character that led to it, or maybe I chose the engineering field because I am this way. I have never thought about being a lawyer or doctor. For example, lawyers should have good persuasion and self-expression skills". (Participant 4, Pos. 75)

Participants reported that the engineering area in work-life requires little to no communication with other people in nature.

"An engineer can do a task alone. You design or analyze somethings, sometimes short meetings are necessary, but most of the time, the work does not require communication with others, so engineers do not need communication. A computer engineer codes all day alone". (Participant 3, Pos. 25)

"There are engineering areas that you do not need to communicate with other people for days except asking something. I think lack of communication skills results from this". (Participant 8, Pos. 9)

4.1.2 Thinking Styles of Engineers

Participants reported that engineers' thinking styles are different from individuals who do not have an engineering background.

Participants stated that engineers have higher analytical thinking skills than individuals with no engineering background.

> "I think engineers have analytical thinking, more inclined to mathematical topics. They are analytic people; I mean more logic and benefit-damage oriented". (Participant 2, Pos. 3)

> "In my connections, I saw that people who are high in technical and analytical thinking does the engineering jobs". (Participant 5, Pos. 11)

> "In all engineering disciplines and principles, we are more focused on analytical and realistic thinking". (Participant 8, Pos. 7)

Participants also reported that engineers are more likely to use their logical thinking in other aspects of life, such as interpersonal relationships and other life-related issues.

> "The first prominent thing for an engineer is to try to make everything logic-based. So, we have a hard time and deficits in understanding abstract issues, which naturally leads to codding personal relationships and every other relationship in this way. They can assess and analyze everything, but this leads to problems on the emotional side". (Participant 3, Pos. 5)

> "Engineers are the people who can evaluate the situation and optimize the most suitable solution among themselves. However, they also project this logical thinking in their private life and other problems a lot". (Participant 5, Pos. 13)

Furthermore, participants stated that engineers' social skills are weak due to logical thinking in their interpersonal relationships.

> "As a result of engineers are high in logical thinking, their expression skills are low". (Participant 4, Pos. 45)

> "As a result of thinking hard on computational areas, engineers lack their social skills. For example, I cannot solve where the problems arise; maybe this results from my poor communication skills. Because we only see computational sides and patterns of everything, we cannot get out of the box". (Participant 9, Pos. 9)

Participants have reported that engineers have high problem-solving skills.

> "I think the strongest skill of an engineer is problem-solving. I can say they are good listeners but not good speakers, maybe because of their job or engineering formation, but they are deficient about this". (Participant 3, Pos. 17)

Participants have reported that engineers are high in mathematical intelligence.

> "I think the most significant difference in engineering from other occupations their mathematical intelligence is high". (Participant 3, Pos. 5)

> "I can tell that my friends in university and I, have high levels of mathematical and logical side. We rely on data more. Besides, when we talk with others, we ask for proof. That is why engineers highly rely on theory and logic". (Participant 4, Pos. 3)

Participant six added that engineers think very complexly compared to people who do not have an engineering background.

> "Engineers usually think complex. For example, while I was trying to solve a problem, my instructor always said to me to think less complex during my

geometry class; we have a good head on our shoulders". (Participant 6, Pos. 67)

4.1.3 Lack of Communication Skills of Engineers

Participants reported that engineers' communication skills are not very good in low self-expression, can not communicate with other people well enough, and do not have good presentation skills.

Participants reported that engineers have low self-expression skills therefore not very good at communicating with others.

> "I can say that engineers have low communication skills regarding self-expression". (Participant 3, Pos. 17)

> "People who work in non-quantitative areas are much more expressive; they like to stay more connected and communicated with each other. Because engineers are high in computational thinking, they are less expressive". (Participant 4, Pos. 45)

Some of the participants added that engineers are good listeners but low in self-expression.

> "I can say that engineers are good problem solvers and listeners, but they are not good speakers; this could be a result of education or maybe engineering itself. I can not say engineers are as good at expressing themselves as lawyers". (Participant 3, Pos. 17)

> "I think we are excellent listeners, but I highlight again we have problems expressing". (Participant 7, Pos. 27)

Participants stated that engineers do not know how to communicate well with others, which leads to a lack of communication skills.

"Most of the engineers do not know how to talk such that when they need to talk with customers, everything is piteous". (Participant 6, Pos. 14)

"According to my experiences, I usually observe engineers who cannot communicate well". (Participant 11, Pos. 15)

Some participants also described that engineers' presentation skills are not very good, resulting from poor communication skills.

"I think engineers' presentation skills might be low; maybe this can be improved by training". (Participant 4, Pos. 27)

"Our weaknesses are usually on the verbal side, such as presentation skills or not expressing a topic that we are very good at well". (Participant 7, Pos. 9)

4.1.4 Lack of Interpersonal Skills of Engineers

Participants reported that engineers' interpersonal skills are not good in such they usually only engage with others whom they feel like they are similar to them, being introverts, having a lack of empathy, being asocial, and having a hard time solving social problems.

Participants reported that engineers usually engage in relationships with similar people to lack interpersonal skills.

"An engineer who is high in rationality will have a hard time maintaining communication with other people; this leads them to communicate with people who are similar to them". (Participant 2, Pos. 39)

"What is expected from you is that doing your job right; writing the correct codes, designing, or analyzing something good and throughout the day, the times you need to communicate is minimal. Naturally, engineers are not extroverts; they are much more introverts". (Participant 3, Pos. 25)

"Engineers are socially selective; they only hang out with their environment, sit with their team". (Participant 7, Pos. 39)

Some of the participants claimed that engineers are introverts which leads to a lack of interpersonal skills.

"Maybe in management majors, there is an awareness about empathy. That is why engineers are not very strong in empathy skills". (Participant 3, Pos. 17)

"Engineers who usually work with computers are mostly introverts. When they want to learn something instead of asking others, they try to find the answers via the internet". (Participant 8, Pos. 7)

Furthermore, participant 10 noted that if others do not provide time for an engineer to process social interaction, they may become introverted.

"For example, engineers can talk meaningless, but you have to open them, they have a zipped file in their mind if you do not give them enough time to open it, engineers may become introverted". (Participant 10, Pos. 33)

Some of the participants reported that engineers lack empathy.

"I know that engineers' empathy skills are weak; maybe my empathy skill is low too". (Participant 2, Pos. 19)

Participant 10 added that engineers are not expected to be emphatic, so they have a hard time showing empathy towards other people, which eventually lowers their interpersonal relationships.

"The expectation from an engineer is not to be emphatic; they are expected to look from a mechanical side". (Participant 10, Pos. 21)

Participant seven reported that most engineers are asocial, which is also a part of their lack of interpersonal skills.

"For example, in a team of 20 engineers, the majority is asocial, the seventy percent of my classmates were asocial". (Participant 7, Pos. 19)

Participant one reported that young engineers have trouble with solving social problems.

"I observed that young engineers have more problems solving social problems; I used to be like that too". (Participant 1, Pos. 44)

4.1.5 Individual Differences in Engineers' Characteristics

Participants also reported individual differences among engineers; some may be more outgoing, and others may be introverted.

The majority of participants explained that individual differences play an important role in shaping engineers' characteristics; hence engineering prototypes cannot be generalized.

"I do not accept weaknesses or strengths due to individuals' occupations; I think it is a personal issue. Everybody has some strengths and weaknesses, and for engineering, these all depend on the person, not the occupation". (Participant 1, Pos. 15)

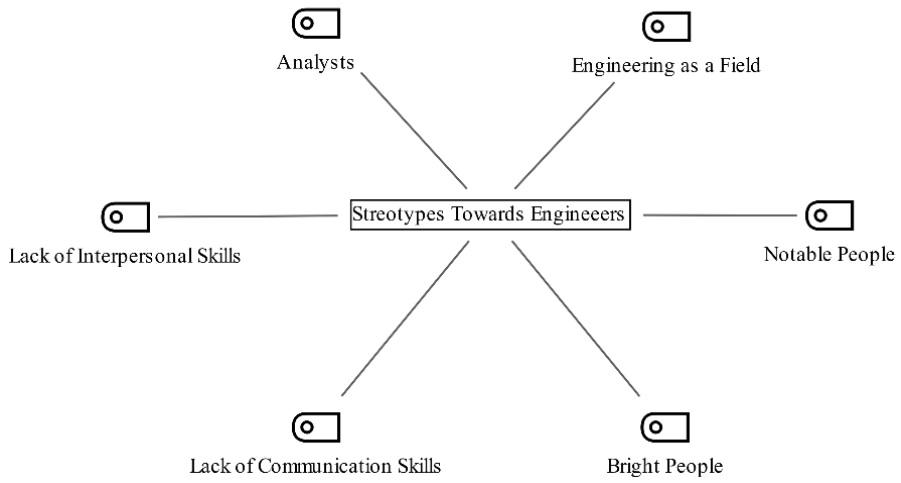
"In my opinion, social skills are mostly related to the individual it is not about engineering, it is something that can occur in every occupation." (Participant 4, Pos. 43)

"Being a dull person depends on the individual, not only because they are an engineer. Childhood, culture, and environment also shape it. If a person lived in an introverted family and if you add engineering to this, then it is certain". (Participant 10, Pos. 35)

4.2 STEREOTYPES TOWARDS ENGINEERS

Participants reported the stereotypes they come across by the individuals who do not have engineering backgrounds in response to interview questions. Sub-themes under Stereotypes Towards Engineers are “Notable People”, “Bright People”, “Lack of Communication Skills”, “Lack of Interpersonal Skills”, “Analysts”, and “Engineering as a Field”.

Figure 4.2 Stereotypes Towards Engineers Theme and Sub-themes



4.2.1 Notable People

One of the positive stereotypes that participants encounter is that engineers are respected and trustworthy individuals.

> “When you look at engineers like Elon Musk, they cannot express themselves very well, but they are doing fantastic jobs. Because of examples like Elon Musk, other people see engineers as respected people”. (Participant 5, Pos. 23)

"We are usually trusted; when we say something, others trust us because they think when engineers say something, they must have been calculated everything. I think this is a positive judgment of others towards engineers". (Participant 9, Pos. 37)

4.2.2 Bright People

Participants also stated that out-group members think engineers are bright people; they reported that one of the positive stereotypes towards engineers is others' perception of engineers as bright.

"I agree with other people that engineers are high in analytical skills and they are bright". (Participant 3, Pos. 29)

"Engineers are expected to be bright. When an engineer makes a mistake, they think 'I am an engineer, I cannot make a mistake, other people also see you like this". (Participant 10, Pos. 33)

4.2.3 Lack of Communication Skills

Participants reported that one of the stereotypes towards engineers is their lack of communication skills. The majority of participants stated that they experienced and observed this stereotype, and these participants agreed on this stereotype.

Some participants reported that out-group members think that engineers have low communication skills.

"I agree with everybody about the communication; it is low. I mean, we have deficits in expressing somethings". (Participant 7, Pos. 43)

Participant 11 noted that excessive length in speech -verbiage- is a preferred communication style in Turkey, and engineers are not good at it.

> “In our society, the verbiage is seen as a talent, and it is highly appreciated, and engineers do not have this skill. One of the most obvious stereotypes is that engineers lack this skill since they communicate more directly, so others think engineers do not possess necessary communication skills for a managerial role”. (Participant 11, Pos. 30)

Moreover, most participants reported that engineers’ conversations are technical, so they engage in boring conversations that will appear to others as their communication skill is not good.

> “People think engineers are not very talkative, silent, and like to talk with numbers or about cars and machines, which might be boring for these people”. (Participant 4, Pos. 63)

Participants also explained that out-group members think that engineers have low self-expression skills.

> “People may question engineers’ self-expression abilities since they do not react to anything and cannot express themselves”. (Participant 5, Pos. 34)

Participant 10 also noted that engineers need some time to process this might appear to others as low self-expression.

> “Engineers cannot express themselves; they think deviously, and there are deep processes in the brain that require time to process. So, engineers fall behind in communication”. (Participant 10, Pos. 31)

4.2.4 Lack of Interpersonal Skills

All participants stated that one of the stereotypes towards engineers is that they lack interpersonal skills, all the participants agreed on. Engineers are stereotyped as introverts, having poor social skills, asocial, and geeks regarding their interpersonal skills.

Participants reported that other people see engineers as introverts which causes engineers to seem to lack interpersonal skills.

> "Other people believe that engineers are asocial and introverts. My team leader is not like this, but I think my department manager is kind of like that". (Participant 7, Pos. 53).

Participants reported that engineers are stereotyped as having poor social skills.

> "It is imprinted in other people's memories as engineers wear glasses, are thin, asocial, and has a lack or non-social skills". (Participant 1, Pos. 3)
>
> "Others may think that engineers have fewer social skills compared to other people". (Participant 4, Pos. 55)

Several participants stated that people think about engineers as asocial people who prefer being solitary.

> "I think others see engineers as people who like to live solitary". (Participant 2, Pos. 33)

> "I heard that others stereotype's engineers as asocial individuals". (Participant 7, Pos. 31)

> "Others may think that engineers are asocial or prefer solitary" (Participant 9, Pos. 17)

Participants six and ten reported that other people stereotype engineers as geeks.

> "It is clear that engineer managers are geeks, and other people know that they are geeks. These engineers may have excellent technical skills, but their lack of soft skills leads other people to think of them as geeks". (Participant 6, Pos. 53)

> “Other people expect engineers to be a geek. For example, if you are a computer engineer, they ask you about why their computers shut down”. (Participant 10, Pos. 25)

4.2.5 Analysts

Most engineers reported that other people stereotype engineers for being analysts. Engineers thinking styles are described as mathematical and reasoning-focused.

Participants stated that others perceive engineers have computational thinking.

> “In my opinion, others think that engineers have computational and analytical thinking, as they use the left lobe of their brain more active and doing everything by using data”. (Participant 3, Pos. 3)

Participants two, eight, and ten reported that they hear stereotypes as engineers have reasoning-focus thinking styles.

> “I think others stereotype engineers as they have reasoning-focused thinking styles. It is because engineers are deficit emotionally. Okay, the emotional side is deficient, but not zero”. (Participant 8, Pos. 11)

Participants three, five, and eight added that engineers approach other life events with their reasoning focus thinking too.

> “I agree with the stereotypes about engineers as problem solvers and approaching problems with reasoning. Their difference from a doctor or a lawyer is that engineers use formulations and methodologies for other problems too”. (Participant 3, Pos. 3)

4.2.6 Engineering as a Field

All participants reported that engineering is a stereotypical occupation; engineering itself is considered as a field that stereotypes are embedded.

Most participants reported that others have stereotypical beliefs about the engineering fields, and those people do not have an idea of what engineers do.

> "I do not think people know what we do and how we live. I am not talking about engineers who work in sales or marketing; I am talking about engineers working in research and development areas". (Participant 5, Pos. 17)

According to the participants, others think that engineering is only a technical job, so it does not require sociality. They explained that it might be the reason leading to stereotypes about the lack of social skills.

> "Maybe others think about engineers as people who do not have many friends and likes computer-related activities such as gaming. Instead of going out; they spend time at home". (Participant 9, Pos. 17)

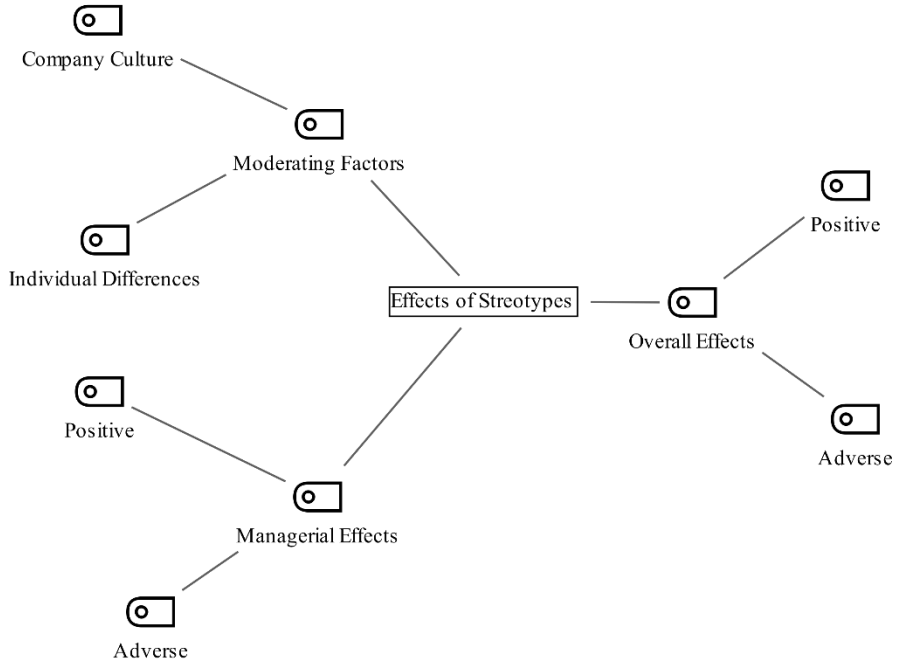
Participant 11 thinks engineers usually do technical tasks instead of joining social events, but working on technical tasks leads others to stereotype engineers more.

> "When others see engineers at work, they only see software on engineers' computer screens or see engineers trying to configure a device instead of joining other social activities. So seeing engineers working on the technical tasks facilitate stereotypes even more". (Participant 11, Pos. 36)

4.3 EFFECTS OF OCCUPATIONAL STEREOTYPES

Participants reported how they are affected by occupational stereotypes. Sub-themes under "Effects of Occupational Stereotypes" are "Overall Effects", "Managerial Effects", and "Moderating Factors".

Figure 4.3 Effects of Occupational Stereotypes Theme and Sub-themes



4.3.1 Overall Effects

Participants reported both positive and adverse overall effects outside of a managerial role of occupational stereotypes towards engineers.

4.3.1.1. Positive Effects

Participants reported that stereotypes do not only have adverse outcomes, sometimes creates positive effects. Several participants reported that occupational stereotypes facilitate them for self-development regarding the stereotypes.

> "Society codes you in a stereotypical way, but if you have awareness about what society thinks about you, then you may try to develop yourself. You can be outstanding as an engineer, but it is not enough by itself, you need to develop yourself". (Participant 3, Pos. 7)

> “At some point, stereotypes are positive since you can see your deficiencies and will put emphasis on these deficiencies to improve yourself”. (Participant 5, Pos. 40)

> “I am convinced that there are stereotypes, so I try to train myself, and I try to improve my communication skills”. (Participant 11, Pos. 40)

4.3.1.2. Adverse Effects

Participants described the adverse effects like; feeling obliged to engage in counter-stereotypical behaviors, disengaging from a managerial role, internalizing the stereotypes, difficulties in communicating with others, and a diminished sense of competence.

Several participants stated that engineers might engage in counter-stereotypical behavior to prove that stereotypes are not valid. They explained that when they hear stereotypes like engineers lacking social skills, they start to behave more socially.

> “For example, if they claim that you are not emotional -I am not talking about work-life, I am talking more generally.- and you are not emotional, you try to convince them that they are wrong. Even though you do not think about it, only because others say it, you try to behave atypically”. (Participant 8, Pos. 21)

Participants 10 and 11 reported that they have seen other engineers disengage from roles that require more communication and interpersonal skills.

> “Because of these stereotypes and phobias, for example, they avoid talking in public or interacting with people; therefore, they withdraw from these roles”. (Participant 11, Pos. 42)

Participant three stated that engineers internalize the stereotypes and start to believe these stereotypes are true.

> “Others think that engineers are thinking too analytical and computational, and they lack emotional intelligence. These stereotypes are understandable. However, engineers internalize these stereotypes because if you think they are true, you believe them too”. (Participant 3, Pos. 21)

Participant seven reported that he has difficulty communicating with other people because of the stereotypes out-groups have.

> “For example, you like a girl, but you have so much pressure from outside, you know that everybody has stereotypical beliefs. You go to the faculty of management, and the girl thinks, “Eww engineer! He is probably introverted and shy; he will not talk”, and with this pressure, you cannot even talk with the girl”. (Participant 7, Pos. 47)

Participant nine reported that because of the lack of social skill stereotypes towards engineers, they may feel lower competence and may start questioning themselves.

> “For example, when there is an emotional issue, people may stereotype you as you will approach the issue very rationally. This may make you feel inadequate and you may start to question yourself”. (Participant 9, Pos. 33)

4.3.2 Managerial Effects

All participants agreed the occupational stereotypes have an effect on managerial self-efficacy in some aspects. Participants reported potential positive outcomes to arise from the stereotypes, and all participants stated that there are adverse effects on managerial self-efficacy.

4.3.2.1. Positive Effects

Participants reported that stereotypes create positive effects too; they stated that stereotypes make them increase their effort to succeed and improve themselves for a managerial role.

> "When they tell me that I cannot do it, this triggers and motivates me more to prove them, they are unfair. This is an advantage, everybody should approach these stereotypes in this way". (Participant 3, Pos. 41)

> "If you ask my opinion, it does not matter to me, no matter what stereotypes they have. Because I am doing my job and I will improve whatever parts I need to improve. Here feedback mechanisms are important, I will try to improve myself as much as I can, at the end of the day being a manager is not rocket science". (Participant 11, Pos. 63)

4.3.2.2. Adverse Effects

Although most participants reported they do not get affected by stereotypes overall, however in terms of managerial self-efficacy, they stated some adverse effects of occupational stereotypes. They explained that their self-esteem for a managerial role decreases, they engage in counter-stereotypical behavior, decreased managerial performance, and disengaging from managerial roles.

Participants three and eight stated that stereotypes decrease their self-esteem for a managerial role.

> "Stereotypes lead to decrease self-esteem; engineers may think that they cannot be good managers just because others said so. When an individual has decreased self-esteem, there is no way they can be a good manager because they cannot manage a team or work process". (Participant 3, Pos. 39)

> “During my work on a university project, I was managing a team. When things go wrong, I faced some stereotypical approaches from others. These stereotypes make you unsure about yourself and lose your self-esteem”. (Participant 8, Pos. 37)

Several participants reported that they engage in counter-stereotypical behavior to prove that the stereotypes are incorrect and make stereotypes less self-relevant.

> “These stereotypes are not only in society; even in organizations, there are stereotypes. There are some sets of roles for you to be a good manager or technician; you are affected by these unavoidably. If you are against these stereotypes, you try to prove yourself and manage in a manner that is opposite of the stereotypes”. (Participant 3, Pos. 41)

> “Not because you want to do it but just not let others say something you make an effort to behave like them. That leads to doing things that you do not believe or think it is correct”. (Participant 8, Pos. 37)

> “For example, engineers know they lack social skills, and they add sociality coating to themselves. But it is like a robot that added unnatural sociality”. (Participant 10, Pos. 37)

Participants also stated that the relationships between subordinates and managers would be negatively affected by the stereotypes, leading to decreased performance.

> “What happens is that maybe that engineer became a manager, he is technically perfect, but he does not know how to talk and how to approach you; this is a very stereotype-consistent pattern. You, as his subordinate, think that how can you be able to work with this man. He is an introvert! In my opinion, stereotypes affect engineers this way”. (Participant 7, Pos. 69)

> “Engineers are expected to be bright and make more effort than expected from them, so engineers begin to be perfectionists, but they cannot be perfect. Eventually, they start nitpicking others; these people become very dangerous as managers; they become unhappy, but they make others not happy too”. (Participant 10, Pos 41)

During the interviews, some participants reported that engineers might disengage from a managerial role due to coming across stereotypes.

> “Even though an engineer has highly developed technical skills feel that their organization will not invest in their managerial soft-skills development, they may disengage from managerial roles. Because engineers are perceived as not having good human relations or lack of social skills, engineers naturally think they will be eliminated from managerial positions. This is an example I can give from my current company.”. (Participant 2, Pos. 79)

> “I observed that these stereotypes make engineers’ job difficult; I saw engineers who disengage from their current positions just because of these stereotypes as they hear sayings like ‘Can this man survive in there?’, ‘Can he manage the communication with customers?’, ‘He came from a more isolated environment!’ and ‘How powerful is he for a managerial role?’”. (Participant 11, Pos. 63)

4.3.3 Moderating Factors

Participants indicated moderating factors on the effects of the stereotypes coded under two themes: individual differences and organizational culture.

4.3.3.1. Individual Differences

Participants reported some individual differences in determining the degree that engineers will be affected by stereotypes. They explained that individual differences such as not caring what others say, not being open to changes, and believing themselves play an essential role.

The effect of stereotypes is not strong when they do not care what others think of themselves.

> "There is no way stereotypes affect engineers, not for me too. Because when we become managers, we do not hear what others say, the job and the project we are working on is more important to us so that it will not affect us. We do our job without listening to others; this is the reason we are successful". (Participant 1, Pos. 83)

> "I do not think stereotypes will affect us because engineers who came to managerial level positions already have the necessary skills. They would analyze their strengths and weaknesses. They will not care about the stereotypes; I would not too". (Participant 5, Pos. 66)

> "I do not attribute importance to what others say. Because of that, I do not get affected by stereotypes because I am trying to do whatever I want". (Participant 11, Pos. 59)

Participant seven added that lack of openness to change might harm the relationships at work as well.

> "Stereotypes affect managers' performance badly. For example, if employees are not happy working with this manager and the manager hears it, this will make them unhappy if that manager cannot change or does not believe in change". (Participant 7, Pos. 71)

Participant three noted that believing oneself is very important to handle the effects of the stereotypes.

> "Here, the keyword is 'belief', you have to believe it and say 'I can be a good manager, I can do this job well, I have skills and competencies for this'. I know my strengths and weaknesses". (Participant 3, Pos. 41)

4.3.3.2. Organizational Culture

Some participants reported that the effects of stereotypes might change depending on the organization that engineers work. If engineers can receive organizational support and the organizational structure consists of engineers, they will not be affected by stereotypes.

4.3.3.2.1. Organizational Support

Participant two reported that if the engineer feels that they will not receive organizational support, they may feel disadvantageous for a managerial role; thus, stereotypes will affect them badly.

> "Because some companies do not approach this way, I mean approach employees as humans and invest in their skills; engineers who realize that and know their social skills are weak might see themselves as disadvantageous". (Participant 2, Pos. 75)

4.3.3.2.2. Organizational Structure

Participants reported that the effects might vary depending on the organization itself. If the majority of the employees are engineers, stereotypes will not influence adversely.

> "If an engineer is promoted to a managerial role in a non-engineering company, they may fear whether they can be good managers because of

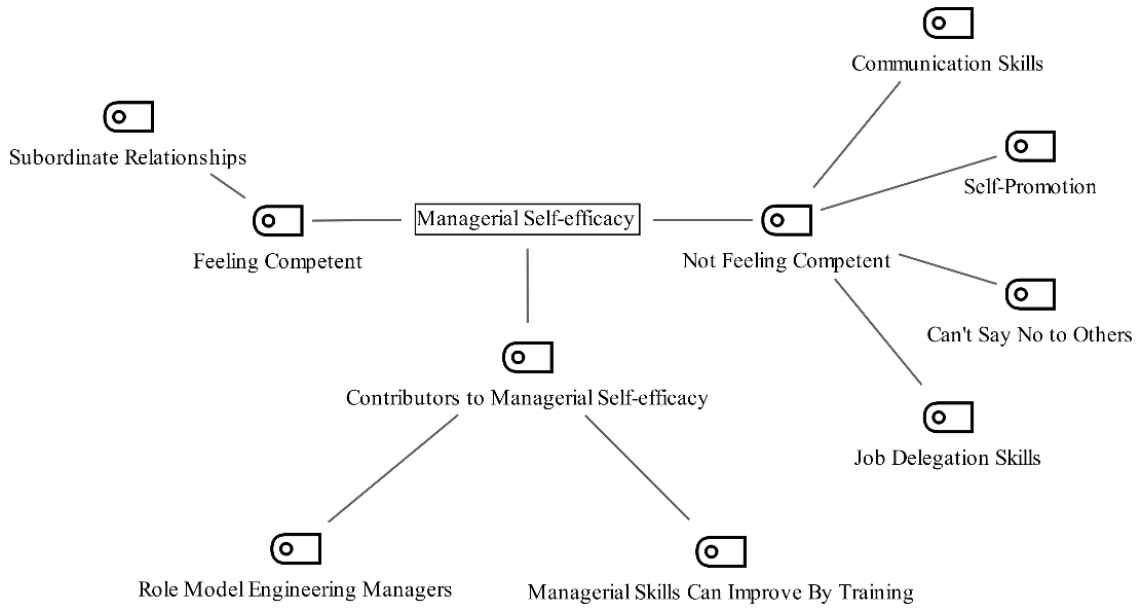
stereotypes. They will question whether they can please their subordinates since they do not possess the same characteristics. However, I do not think engineers who work in engineering companies will be affected negatively by stereotypes because there are only engineers there". (Participant 4, Pos. 122)

"In companies where most of the employees are engineers, the stereotypes will not harm engineers because everybody will be familiar with the engineer profile". (Participant 5, Pos. 75)

4.4 MANAGERIAL SELF-EFFICACY

In this master theme, participants' competency domains for their managerial self-efficacy are reported. The sub-themes for Managerial Self-Efficacy are "Feeling Competent", "Not Feeling Competent", and "Contributors to Managerial Self-Efficacy".

Figure 4.4 Managerial Self-Efficacy Theme and Sub-themes



4.4.1 Feeling Competent

Participants reported that they felt competent regarding subordinate relationships for a managerial role, which increased their managerial self-efficacy.

4.4.1.1. Subordinate Relationships

The majority of participants reported competency regarding the subordinate relationships. They explained that they could maintain positive relationships with the subordinates, so they felt competent in subordinate relationships for a managerial role.

Several participants stated that they could engage in positive communication with the subordinates.

> "After improving my theoretical knowledge, I want to improve my communication with others which I also see a deficit in my current managers. Even though I am silent and calm, I think I am high in tolerating. I believe that I can communicate with my subordinates better". (Participant 4, Pos. 110)

> "I believe I can provide good connections with the team". (Participant 5, Pos. 60)

Participant two reported that he is confident about his job follow-up skills.

> "For example, in my previous job, I had a role for two to three years in which I managed a team; I delegated tasks to the team and followed-up the tasks. My experience in that work was very positive for the team and me; I received positive feedback". (Participant 2, Pos. 51)

Participant five stated that he could show empathy towards subordinates.

"I can provide good empathy skills and have a foot in both camps of the new hires. I can tell my expectations without breaking up others' feelings; I am good at this". (Participant 5, Pos. 64)

4.4.2 Not Feeling Competent

All the participants reported that they did not felt competent for a managerial role; they need to improve their communication skills, job delegation skills, say "no" to other people, and lack self-promotion skills.

Several participants stated that they do not feel competent with their communication skills for a managerial role, and they need to improve them.

"I think communication is something that continuously improves because there is not a certain definition or parameter of communication; it has thousands of parameters. Even though you think you are skilled at communicating, it is never enough. It is easy to blame others but turning to yourself is hard. I work on my communication skills from the beginning, but it is still not enough". (Participant 3, Pos. 35)

"After improving my technical skills, I need to improve my communication skills which I see as deficient in my managers". (Participant 4, Pos. 110)

Participant eight noted that if he does not get along with the other person, he has difficulty maintaining communication and highlights that he needs to improve this skill.

"When I do not get along well with or do not like a person, I cannot maintain communication. I do not think I can be a good manager without overcoming such communication problems". (Participant 8, Pos 31)

Some participants reported incompetency with their job delegation skills.

"Engineers should improve their job delegation skills because at some point it is connected to communication skills. You must know your team well so

that you can delegate tasks effectively. If job delegation is not done correctly, it will harm the job quality. I need to work on my job-delegation skill". (Participant 3, Pos. 35)

"There are many things that I should improve, for example, job delegation". (Participant 10, Pos. 55)

Participants seven and eight reported that they could not say "no" to other people.

"It is essential to say no to others from time to time, in managerial positions. I do not consider myself good at standing for my thoughts because I cannot say "no" to other people.". (Participant 8, Pos. 31)

Participants one and eleven stated that they need to improve their self-promotion skills.

"My self-promotion skill needs improvement; I cannot promote myself well". (Participant 1, Pos. 54)

"Self-promotion is important in managerial roles. I am not sure if I can do this well". (Participant 11, Pos. 61)

4.4.3 Contributors to Managerial Self-Efficacy

Several participants indicated that they felt managerial self-efficacy because they see engineering managers as role models, and the stereotyped skills can be changed by training for a managerial role.

Some participants reported that there are managers with engineering backgrounds whom they can take as a positive role-model.

"I know some managers whom I can take as role-models. These managers contribute a lot to me, and I try to learn from them to see how managing is done". (Participant 3, Pos. 13)

"Managers who have a mission and vision will have good relationships with their subordinates, and good quality of work outcomes will arise. I can see this from my current team manager, and he does a great job. I want to be like him if I will be a manager in the future". (Participant 7, Pos. 57)

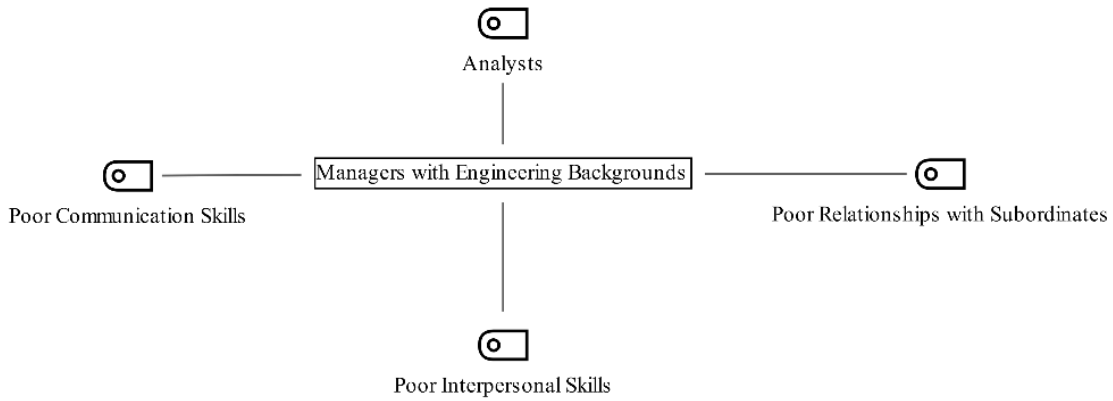
Several participants reported that managerial skills could be improved by training.

"In my opinion, education comes first; if there is something you feel incompetent or do not have sufficient efficacy, you need to have training about this". (Participant 9, Pos. 89)

4.5 MANAGERS WITH ENGINEERING BACKGROUNDS

The final theme is the engineers' perception of managers who have engineering backgrounds. Sub-themes under the theme Managers with Engineering Backgrounds are "Poor Relationships with Subordinates", "Poor Interpersonal Skills", "Poor Communication Skills", and "Analysts".

Figure 4.5 Managers with Engineering Backgrounds Theme and Sub-themes



4.5.1 Poor Relationships with Subordinates

The majority of participants reported that managers with engineering backgrounds have a hard time providing good relationships with their subordinates because of their poor communication, cannot inspire them, and can only maintain good relationships with the team if they do not need to communicate with the team.

Several participants stated that engineer managers have poor communication with the team.

> "I wish my manager were someone who talks with me from time to time. For example, he can say good morning or ask how I am. These will increase my motivation. Asking after someone is a requirement of managers and managers with engineering background does not have this". (Participant 4, Pos. 95)

Participant three reported that managers with engineering backgrounds could not inspire their subordinates.

> "Engineer managers are not leaders; they can not inspire their team; they manage in a way that their company codes". (Participant 3, Pos. 31)

Participant 11 reported that managers with engineering backgrounds could be successful in tasks that do not require communication. Otherwise, there will be problems with communication.

> "If the engineering team is a team that is not at the forefront in the company and does not require communication, then a manager with an engineering background is much better. I agree that there will be hard times communicating with others". (Participant 11, Pos. 46)

4.5.2 Poor Interpersonal Skills

The majority of participants reported that managers with engineering backgrounds have poor interpersonal skills.

Several participants stated that managers with engineering backgrounds lack empathy which causes them to have problems with their interpersonal relationships.

> "I knew an engineer who has good engineering skills, but in his new position as a manager, he created serious discomfort in the team by lack empathy skills and constant micro-management. It affected his subordinates badly, and I heard many complaints about him. Maybe because of his socially isolated engineering background, he did not have a chance to improve his interpersonal skills". (Participant 11, Pos. 46)

Some participants reported that engineers with managing backgrounds have a lack of skills in understanding other people.

> "For example, in the advertisement sector, a manager should understand the societies' needs, perceptions, and expectations. But I do not think a manager with an engineering background can be successful at this level in understanding others; they will be less successful compared to a non-engineer manager". (Participant 2, Pos. 45)

Participant 3 added that engineers do not like to deal with other people and are not very competent in people management.

> "Not every engineer can be a manager; most of them would not want it because engineers do not like to deal with other people". (Participant 3, Pos. 11)

4.5.3 Poor Communication Skills

The majority of participants reported that managers with an engineering background have poor communication skills.

Some participants reported that engineer managers have a lack of skills in communicating with others.

> "I think engineers are bad managers; they always look at everything computationally. Managers should have good social and communication

skills. I think engineering managers are way too deficient in these skills". (Participant 9, Pos. 49)

"Chemistry needs to exist a little with a manager and subordinates. If you keep good chemistry, you can be more successful. If the chemistry does not exist, you may not understand each other because engineering managers can be deficient in communication". (Participant 8, Pos. 27)

Participant five added that when an engineer is outstanding in their technical skills, their communication skills fall behind.

"Some very successful engineers can understand the machine language very well, but their communication with others is limited". (Participant 5, Pos. 54)

4.5.4 Analysts

Several participants explained that managers with engineering backgrounds are analysts compared to non-engineering managers. Here it is important to note that one of the stereotypes is engineers are analysts, as explained in the "Stereotypes Towards Engineers" main theme. Additionally, engineers demonstrate the same thinking style in their managerial roles too.

Some participants stated that engineer managers usually have more reasoning-focused thinking styles, and it is widespread among managers with engineering backgrounds.

"I had many different managers in places I worked. The most common thing was these managers were able to establish cause and effect relationship and always reasoning-focused". (Participant 5, Pos. 50)

Several participants stated that engineering managers have good analytical thinking skills.

> “Engineer managers can comprehend the nature of the issues and look at problems more analytically, and even though it is not related to mathematics, they always approach processes with mathematics”. (Participant 8, Pos. 29)

> “It is common for engineering teams to have managers with engineering backgrounds who are high in analytical skills”. (Participant 11, Pos. 46)

Participant seven reported that managers with engineering backgrounds are more prone to questioning.

> “They are not coherent, by coherency; I mean they do not easily accept what you do, they question even the smallest job I do. Every manager should question the works done. My current manager is like that too.” (Participant 7, Pos. 51)

CHAPTER 5

DISCUSSION

5.1 KEY FINDINGS OF THE STUDY

How engineers' managerial self-efficacy is affected by occupational stereotypes was examined in this research. Twenty-one sub-themes emerged under five main themes: "Engineers Perception", "Stereotypes Towards Engineers", "Effects of "Stereotypes", "Managers with Engineering Backgrounds" and "Managerial Self-Efficacy". The results indicate that even though most engineers are not affected by occupational stereotypes in overall managerial self-efficacy, some individual aspects are affected. There are moderating factors that may contribute to whether affected positively or adversely.

Engineers perception reported by the participants includes the nature of engineering, thinking styles, lack of communication skills, lack of interpersonal skills, and individual differences in engineers' characteristics. Participants stated that the nature of engineering shapes the identity of engineers. According to Leidner (2006), identity can evolve by the experience of work or education, which provides competence in individuals' intention to cope with difficulties. The participants also expressed their views on the lack of engineers' communication skills, which are parallel with the findings of Anderson et al. (2010), who interviewed engineers and reported the significance of deficiencies in communication skills.

The majority of participants agreed upon the stereotypes towards engineers on their lack of interpersonal and social skills and strong analytical thinking, parallel with the previous studies (Mercier et al., 2006; Schott & Selwyn, 2000). Besides, participants also reported that engineering is seen as a tedious field solely consisting of technical duties, which is in line with the findings of Aswad et al. (2011), Karatas et al. (2011), Oware et al. (2007), and Powell et al. (2012) that claims that engineering is perceived as a tedious field that draws the attention of

nerdy students only. When results about managers with engineering backgrounds were considered, most participants reported that those with engineering backgrounds have poor relationships with their sub-ordinates, poor communication skills, and analysts, which is parallel with the findings of stereotypes towards engineers in general.

The effects of the stereotypes that the participants reported were separated into three parts during the data analysis. Firstly, the overall effects, where participants reported both positive (e.g., facilitating self-development) and adverse effects (e.g., engaging counter-stereotypical behavior, disengaging, internalization, and inadequacy). Secondly, participants' managerial effects stated both positive (e.g., increase in effort) and adverse effects (e.g., decreased self-esteem, counter-stereotypical behavior, decreased performance due to negative relationships sub-ordinates, and disengaging). Finally, moderating factors (e.g., individual differences, company culture) were also reported by participants.

When results about the participants' managerial self-efficacy were taken into consideration, the results show that only one participant felt competent in terms of communication. However, four participants reported that they do not feel competent in their communication skills. Besides, engineers reported that they did not felt competent in job delegation, saying no to others, and self-promotion. The majority of the participants reported that they feel competent in terms of sub-ordinate relationships. Within the sub-theme “Contributors of Managerial Self-efficacy,” five participants reported managers who can be role-models to them, and four participants stated that managerial skills could be improved with training.

Although seven participants reported that they are not affected by a managerial role by the stereotypes, all participants agreed that stereotypes towards engineers affect their managerial self-efficacy. In this sense, it can be concluded while some engineers are affected by stereotypes, others may not be as affected; however, it depends on individual differences and the company they are employed. Seven out of 11 participants agreed that individual differences are among the most critical moderating factors in the occupational stereotypes' effects. These seven participants reported that they are not affected by the stereotypes since they do not

care what others think of them, and they are self-reliant. Self-reliance is defined as the capacity to rely on an individual's capabilities to meet one's personal needs (Gelfand & Triandis, 1998; Hmel & Pincus, 2002; Steinberg & Silverberg, 1986). Engineers who stated that they do not care about stereotypes because they rely on their own beliefs even though they know the stereotypes reported their managerial self-efficacy is not affected. As Bandura (1977, 1997) stated, self-efficacy is the person's belief in performing a specific task successfully. By extension, the dependence on one's own beliefs and self-reliance aligns with self-efficacy.

Another moderating factor of the effects of stereotypes on managerial self-efficacy is the organization's culture and organizational support. Four participants highlighted that if they do not get sufficient support from their organization or are working in a non-engineering company, they may feel disadvantaged and may fear taking on a managerial role. One participant working in an engineering company reported that engineers could fear managerial roles if they are working at a non-engineering company since they will be more likely to be targets of the engineering stereotypes. According to Steele (1997), when the situation leads individuals to fear the possibility to be judged based on the stereotype, the targets will underperform in that situation (Spencer et al., 1999; Steele, 1997; Steele & Aronson, 1995). One participant also stated the importance of organizational support for engineers. If the engineers tend to believe that they will be supported for a managerial role, their managerial self-efficacy will increase. Perceived organizational support refers to the belief that the organization values employee well-being and participation (Eisenberger et al., 1986). By giving positive feedback to employee's performance on their contributions, perceived organizational support would encourage employees to engage in mastery experiences. Besides, perceived organizational support may positively affect employees' emotional and physiological states (Rhoades & Eisenberger, 2002).

The overall effects on the engineers by the occupational stereotypes found throughout the study were; firstly, an increased effort for self-development, parallel to the studies of Kray et al. (2001, 2004), which found that when the stereotype threat is powerful enough, it increased the stigmatized participants' quality of

performance and effort. The research also claims that people may try harder to counter the negative stereotypes directed to their group; as shown in the effort was increased in black executives (Nkomo & Bell, 2003). The researchers found that African-American executives tried to perform exceptionally and worked harder to counteract the stereotype that they were incompetent. The second result found throughout the study is that engineers engage in counter-stereotypical behaviors. One way to make stereotypes less self-relevant is to engage in counter-stereotypical behaviors; in other words, people make reactive responses. For example, when females were threatened with the stereotype that males are better leaders, the stereotyped females showed more masculine communication styles (von Hippel et al., 2011). A segment of engineers showed disengagement from certain domains because of stereotypes. According to Nussbaum and Steele (2007), individuals disengage from the domain that threatens their self-esteem. The stereotypes may also reduce motivation and performance, leading to disidentification from the domain (Major, Crocker, et al., 1998; Major, Spencer, et al., 1998). One finding of the current study is that; engineers internalize the stereotypes, which is parallel with McKown and Weinstein (2003), which claims that if individuals are aware of stereotypes and think they are true, they internalize these stereotypes. Finally, participants reported that stereotypes lower their sense of competence, which is parallel with the literature, indicating that stereotypes lower one's self-assessment and sense of competence (Marsh & Scalas, 2010).

For the sub-theme, positive managerial effects of the stereotypes; five participants reported that the negative stereotypes lead engineers to increase their effort specifically in terms of self-development for a managerial role to fend off the stereotypes, which are consistent with the findings of previous studies (Kray et al., 2001, 2004; Oswald & Harvey, 2000).

For the sub-theme adverse managerial effects of stereotypes, engineers reported that they engage in counter-stereotypical behaviors due to stereotypes. The results of past studies stated that individuals engage in counter-stereotypical behaviors to make stereotypes less self-relevant (von Hippel et al., 2011). From the interview results, it is concluded that participants start to engage in counter-

stereotypical behaviors such as trying to look more communicative as managers even though it is not in their nature. Here, it is essential to note that engineers engaging in counter-stereotypical behaviors due to stereotypes by faking their social skills for managerial positions leads to emotional labor. Emotional labor involves faking, suppressing, or enhancing emotions to change the emotional expression. To display the job rules, employees usually manage their emotions as a response (Ekman & Friesen, 1975; Goffman, 1959; Hochschild, 1983). For example, participants tried to fake their behaviors for a managerial role (e.g., try to appear more social, behaving in a way that they do not want) due to stereotypes.

In addition to this, employees who feel threatened at work by negative stereotypes are more likely to disengage (Brenda Major, Spencer, et al., 1998). The results also indicated that engineers exposed to negative stereotypes could disengage from a managerial role. Four participants stated that they had seen examples of engineers who withdrew or disengaged from a managerial role due to stereotypes towards engineers they had been hearing. Furthermore, two participants reported that stereotypes lead engineers to decrease their self-esteem in engineers who are eligible for a managerial role, aligning with the previous findings. Negatively stereotyped individuals perceiving themselves from the perspective of their stigmatized status leads to a decrease in self-esteem under some conditions (Allport, 1954; Crocker, 1999; Major & Sawyer, 2009; Major et al., 1998).

Furthermore, participants reported that stereotypes lead to decreased managerial performance through negative relationships with sub-ordinates. Literature also suggested that the stereotypes lead to decreased performance; in a study by Dijksterhuis et al. (2001), it is suggested that female stereotypes led to performance decrements in women; moreover, the activation of elderly stereotypes led elderly individuals to walk slower (Hausdorff et al., 1999; Bargh, Chen & Burrows, 1996). African-Americans had decreased academic performance when African American stereotypes are activated (Steele & Aronson, 1995) and non-African-Americans (Wheeler & Petty, 2001). Besides, recent research offered that managers with low managerial self-efficacy are threatened by the employee voice and react defensively (Cho & Fast, 2012; Fast & Chen, 2009). When results about

managerial self-efficacy were considered, the sub-themes are; contributors to managerial self-efficacy, feeling competent, and not feeling competent. Only one participant felt competent with their communication skills, and four participants reported that they needed to improve their communication skills and when it was asked in what ways, they stated that they did not feel their communication was competent enough for a managerial role. Although five of the participants stated that managers with engineering backgrounds lack competency in communication skills, five of the participants stated that they also observed successful managers with engineering backgrounds they can take as role models even though there are negative stereotypes. This finding is parallel with Bandura's (1977) self-efficacy theory which posits that when individuals see people like them, it increased individual's belief of the capability to master comparable activities to succeed. Besides, Blanton and Miller (2000) stated that even though outgroup performance is superior to the individual's, exposure to positive models leads to an increase in performance and reduces the stereotype threat effects in a domain. For example, when a woman administers a math test with high mathematical competence, women performed similar to men, but women performed poorer when the test is administered by a man (Marx et al., 2005; Marx & Roman, 2002). By providing a role model that challenges the stereotypes eliminated the decrease in performance.

The training and education outcome found through qualitative research is also parallel with the previous studies' findings. The proper training of stereotyped group members increases self-efficacy in the relevant domain, which counteracts the stereotype threat (Hoyt, 2005). Four participants claimed that managerial skills could be improved upon with training and education, leading them to increase their managerial self-efficacy. The interviewed engineers stated that when they encounter stereotypes, they always can improve themselves with training for the stereotyped domains. Management training helps employees gain the skills and knowledge to meet environmental challenges (Rouiller & Goldstein, 1993). Therefore, most participants feel confident for managerial roles since they think stereotyped traits can be changed with enough training and self-development.

5.2 THEORETICAL AND APPLIED CONTRIBUTIONS

The present study has theoretical and applied contributions. Firstly, there are limited studies on the effects of occupational stereotypes on managerial self-efficacy, and no study focusing on engineers. This study is also unique as the sample consists of engineers in Turkey. Secondly, this study helps to understand the effects of occupational stereotypes on engineers' managerial self-efficacy based on the participants' experiences and observations. This study's findings enlighten the topics about what stereotypes engineers believe they are perceived with having, to what degree they agree on the stereotypes, how it affects them in the sense of managerial self-efficacy, and the individual and environmental differences that can moderate the effects on managerial self-efficacy. Finally, this research also contributes to measuring stereotypes towards engineers and the effects on managerial self-efficacy.

This study also has applied contributions to organizations and the academic setting. Firstly, the findings can be applied to organizations, especially organizations where engineers are employed. For example, during promotion planning of engineers to a managerial role, the findings could be considered. Most participants reported that even though there are stereotypes towards engineers and that they are aware of them, they will be successful as managers if trained and get sufficient feedback. Secondly, the results can apply to the academic setting since most participants reported that engineering majors' courses are very dependent on technical knowledge, and there are no soft-skill-related courses and projects available in the curriculum. As a result, engineers do not have a chance to improve their soft skills, leading to stereotypes. So, engineering faculties may re-design the curriculum to meet the soft skill education needs of engineers.

5.3 STRENGTHS

As a result of being qualitative research, there are many advantages of this study. For example, the results mainly focused on the experiences and observations

of the engineers. The participants' experiences and observations were collected with semi-structured interviews, which gave the researcher a chance to obtain detailed information about stereotypes engineers hear, the extent they agree to the stereotypes, and how it affects them in managerial self-efficacy. Furthermore, the interviews lead the researcher to discover individual differences by asking participants their feelings and observations. The other advantage of this qualitative research is that participants felt confident and very open to report their opinions.

Within the comprehensive literature review, it is observed that the studies mainly focus on the STEM field, which includes science, technology, engineering, and math fields; however, this study is unique as it mainly focuses on the engineering areas. The STEM field research mainly focus on gender stereotypes; in this research, the sample was male, enabling researchers to investigate the engineering field from a different perspective. The literature review showed that quantitative research is prominent on this subject matter, so this research will contribute to the literature as a qualitative one by focusing on individuals' unique experiences and observations.

5.4 LIMITATIONS

The recommended sample size of qualitative research is at least 12 (Braun & Clarke, 2013; Fugard & Potts, 2015; Guest et al., 2006). The current research had 11 participants. By a larger sample size, different experiences and observations could be obtained.

Another limitation of the research is that; participants might have been hesitant to answer some questions and manipulated their answers in favor of themselves, leading to social desirability. Bergen and Labonté (2020) stated that participants manipulate their answers in interviews to increase their social desirability, so participants' answers play an important role in qualitative research.

Another limitation of this research is that the sample consists of only male participants, no female participants were included in the research. Obtaining data

from female participants may have enhanced the variety and knowledge for this research topic.

Nine out of 11 participants work in automotive research and development companies, where the participants have mostly engineers as colleagues. The results can vary if data were obtained from a broader range of sectors.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

Future research suggestions reference the issues mentioned under the limitations section; female participants could be included in the research. During the literature review on stereotypes of the engineering field, gender stereotypes of women in STEM roles were mainly found; there is not much research that focuses on engineering stereotypes without gender focus. In addition to this, the results showed that self-reliance is crucial for not being affected by stereotypes. Self-reliance is described as a masculine trait and associated more with men; men are expected to be self-reliant; however, women are blamed for not being so (Prentice & Carranza, 2002). Therefore, female participants may experience different effects of stereotypes on managerial self-efficacy.

As stated in the limitation section, at least 12 participants are required for qualitative research; a bigger sample size can be used for future research as it will give a broader perception and more variability.

5.6 RESEARCHER'S REFLECTIONS

Working with engineers for almost three years, I had a chance to observe the difficulties engineers face in the workplace, making me want to have a deeper understanding of the problems they encounter. I came across the stereotypes towards engineers and their effects on their self-efficacy; being interested in stereotype and self-efficacy during my academic life and during the literature review, I have found no study focused on the effects of stereotypes on managerial self-efficacy of engineers.

During thesis work, all processes were challenging for me in the thesis proposal, ethics application, interviewing, transcribing, coding, and writing. It was also challenging for me to simultaneously try to do the study with a very demanding job. However, in the end, I see myself in a better position academically and personally from the point at which I started this journey. This study made me explore the area of stereotypes, self-efficacy, and engineering more profoundly, and each time I review the literature, I came across different concepts in the area, leading me to explore more.

As an initial phase of the study, I started to find participants, which was not very difficult because I have an engineer network from my professional and personal connections. Starting data collection during the COVID-19 Pandemic was difficult due to social interaction restrictions and health safety concerns, so I could only interview participants online. As a researcher, I would prefer face-to-face interviews since I believe it will make me and the participants more comfortable and connected.

During the initial interviews, I was excited because I only had one qualitative research interview experience during my master's class, although I have experience in job interviews as an HR Professional. However, I realized that I was getting better with each interview as a researcher.

The overall experience during this thesis study was inspiring and challenging for me. Furthermore, the experience of conducting qualitative research led me to learn about this research technique which I only had theoretical knowledge of previously. Besides, thanks to this study, I had a deeper understanding of the stereotypes and self-efficacy concepts.

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APPENDICES

Appendix A

Gönüllü Katılım Formu / Informed Consent Form

Gönüllü Katılım Formu / Informed Consent Form

Türkçe
Bu çalışmanın amacı, mühendislere yönelik önyargıların yönetsel özyeterliliklerine etkisini incelemektir. Bu çalışmanın bir parçası olarak bir mülakata katılmanız ve yarı yapılandırılmış açık uçlu soruları yanıtlamanız istenecektir. Bu çalışma yaklaşık 60 dakika sürecektir.

Mühendislere yönelik mesleki önyargıların yönetsel özyeterliliklerine etkisine dair bir çalışmaya katılmanız için onayınız istenmektedir.

Herhangi bir sorunuz varsa veya bu gönüllü katılım formunun bir kopyasını istiyorsanız, lütfen hazalbakkal@hotmail.com adresinden benimle iletişime geçin.

Katılımınız için şimdiden teşekkür ederim!
Hazal Bakkal

English
The purpose of this study is to investigate how occupational stereotypes of engineers affect their managerial self-efficacy. As part of this study, you will be asked to participate in an interview and answer semi-structured and open-ended questions. This study will take approximately 60 minutes.

Your consent for participation in a study about occupational stereotypes of engineers affects on their managerial self-efficacy is required.

If you have any questions or would like a copy of this consent letter, please contact me at hazalbakkal@hotmail.com

Thank you in advance for your participation!
Hazal Bakkal

Demografik Bilgiler / Demographic Information

1. Cinsiyetiniz nedir? / What is your gender?

Yalnızca bir şıkkı işaretleyin.

- ◯ Erkek / Male
- ◯ Kadın / Female
- ◯ Belirtmek istemiyorum / Prefer not to answer

2. Tamamladığınız en yüksek eğitim seviyesi nedir? / What is the highest level of education you have completed?

Yalnızca bir şıkkı işaretleyin.

- ◯ Lise / Highschool
- ◯ Önlisans / Associate
- ◯ Lisans / Bachelor's
- ◯ Yüksek Lisans / Master's
- ◯ Doktora / PhD
- ◯ Diğer: _____

3. Lisans bölümünüz nedir? / What is your major of your bachelor's?

_____

4. Mevcut istihdam durumunuz nedir? / What is your current employment status?

Yalnızca bir şıkkı işaretleyin.

- ◯ Çalışan / Employed
- ◯ İşsiz / Unemployed
- ◯ Öğrenci / Student
- ◯ Kendi işinde çalışan / Self-employed
- ◯ Diğer: _____

5. Hangi sektörde çalışıyorsunuz? / Which sector you are currently employed?

_____

6. Çalıştığınız işyerinde toplam çalışan sayısı kaç? / What is the number of employees in your workplace?

_____

7. Mevcut işyerinizde ne kadar süredir çalışıyorsunuz? / How long have you been working in your current work?

_____

8. Mevcut işinizde pozisyonunuz nedir? What is your position in your current work?

_____

Gönüllü Katılım Formu / Informed Consent Form

Bu onay formu, araştırmacının görüşmeyi kaydetmesine ve görüntülemesine ve konunun daha iyi anlaşılması için yorumlarınızı kullanmasına izin vermenizi ister.

This consent form asks you to allow the researcher to record and view the interview and to use your comments to enhance understanding of the topic.

9. Araştırma çalışmasına katılmayı kabul ediyorum. Bu çalışmanın amacını ve mahiyetini anlıyorum ve gönüllü olarak katılıyorum. Çalışmadan istediğim zaman herhangi bir ceza veya sonuç olmaksızın çekilebileceğimi anlıyorum. / I agree to participate in the research study. I understand the purpose and nature of this study and I am participating voluntarily. I understand that I can withdraw from the study at any time, without any penalty or consequences.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

10. Bu görüşmeden elde edilen verilerin araştırmacının bu konudaki yayınlarında kullanılmasına izin veriyorum. / I grant permission for the data generated from this interview to be used in the researcher's publications on this topic.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

11. Sonuçlar rapor edildiğinde kimse beni tanımlayamayacak ve adım yazılı raporun hiçbir yerinde görünmeyecek. / When the results are reported, no one will be able to identify me and my step won't appear anywhere on the report.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

12. Cevaplamak veya tamamlamak istemediğim soruları atlayabileceğimi anlıyorum. Gizlilik sağlamak için onay formunun veri kayıtlarından ayrı tutulacağını anlıyorum. / I understand that I can skip questions that I do not want to answer or complete. I understand that the consent form will be kept separate from data records to ensure confidentiality.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

13. Çalışma sırasında herhangi bir zamanda ceza ödemeden katılmamayı veya çekilmeyi seçebilirim. / I can choose not to participate or withdraw at any time during the study without penalty.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

14. Yanıtlarımın benimle hiçbir şekilde kişisel olarak ilişkilendirilmeyeceği anlayışıyla sözlü yanıtlarımın teyit edilmesini ve daha fazla analiz için kopyalanmasını kabul ediyorum. Transkripsiyon tamamlandıktan sonra, kaset kayıtları imha edilecektir. / My responses will not be personally associated with me, I agree that my verbal responses will be confirmed and copied for further analysis. After the transcription is complete, the tape recordings will be destroyed.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

15. Araştırmaya kendi özgür irademle çalışmaya katıldığımı anlıyorum. / I understand that I participated in the research of my own free will.

Yalnızca bir şıkkı işaretleyin.

- ◯ Onaylıyorum / I accept
- ◯ Onaylamıyorum / I don't accept

16. Bu araştırmaya katılmayı kabul ettiğinizi belirtmek için lütfen aşağıya adınızı yazın. / Please type your name below to indicate agreement to participate in this study.

_____

Appendix B

Mülakat Soruları

1- Neden mühendislik okumaya karar verdiniz?
2- Kendinizi bir mühendis olarak nasıl tanımlarsınız?
3- Sizce mühendislerin güçlü ve zayıf yönleri nelerdir?
4- Mühendislerin sosyal becerileriyle ilgili neler söyleyebilirsiniz? Güçlü ve zayıf yanlar nelerdir?
5- İnsanların zihinlerinde "mühendis" deyince hangi özelliklere sahip bir kişi canlanır? Zihinlerde bir mühendis prototipi varsa, bu mühendisin öne çıkan özellikleri nelerdir?
6- Sizce diğer kişiler/mühendis olmayanların mühendislere karşı nasıl önyargıları vardır? Hangi kişilik özelliklerine sahip olması beklenir?
7- Mühendislere yönelik önyargılara hangi konularda katılıyorsunuz?
8- Mühendislere yönelik bu önyargıların mühendisler üzerinde nasıl etkisi olur? Siz ne deneyimliyorsunuz? Bunu nasıl yönetiyorsunuz?
9- Sizce mühendisler nasıl yöneticilerdir? Hangi yönleriyle öne çıkarlar? Mühendislik işi yapılmayan bir sektörde, mühendis kökenli bir yöneticinin hangi özellikleri gözlemlenir?
10- Yönetici olmak ister miydiniz? Neden? Yönetici rolü üstlendiğiniz bir olaya örnek verir misiniz?
11- Teknik yöneticilik tarafında mı, ekip yöneticiliği tarafında mı ilerlemeyi tercih edersiniz? Neden?
12- Kendinizi yönetici rolü üstlenmek için/yönetici olarak ne düzeyde yeterli hissediyorsunuz? Hangi yönlerden hissediyorsunuz? Hangi yönlerden kendinizi geliştirmeye ihtiyacınız var? Yönetici olarak yetkinliklerinize ne kadar güveniyorsunuz?
13- Şuanki yöneticiniz mühendis kökenli mi? İleride yönetici olsaydınız şuanki yöneticinizi model alır mıydınız? Neden? Hangi yönlerini model alırdınız? Hangi yönlerini model almazdınız?

14- Sizce mühendislere karşı önyargıların bu kişilerin yönetici olarak kendi yeterliliklerine inancı konusunda nasıl etkisi olur?
15- Mühendislere yönelik bu önyargılar, bu kişilerin yönetici olarak performanslarını nasıl etkiler?

Appendix C

Interview Questions

1- Why did you decide to study engineering?
2- How would you describe yourself as an engineer?
3- What do you think are the strengths and weaknesses of engineers?
4- What would you tell about engineers' social skills? Strengths and weaknesses?
5- What profile does people think of when we say a typical engineer? If there is an engineer prototype in mind, what are the prominent features of this engineer?
6- What do you think others/non-engineers could say about "engineers"?
7- Which topics do you agree about stereotypes among engineers?
8- How do these stereotypes affect engineers? What are you experiencing?
9- Do you think if the engineers could be good managers? Why? Could you give an example of an incident you have experienced about this?
10- Would you want to be a manager? Could you give an example of an incident in which you assumed a managerial role?
11- Do you want to pursue your career as technical manager or team manager? Why?
12- To what extent do you feel competent to take on a managerial role? In which ways? In what ways do you need to improve yourself? To what extend do you trust your managerial competencies?
13- Have you ever encountered a manager with very strong technical skills but not strong managerial skills? If yes, in what ways does s/he stands out?
14- Do you think stereotypes against engineers affect their beliefs about their efficacy as managers?
15- How do these stereotypes against engineers affect their performance as managers?

Appendix D

Ethics Board's Decision

ETİK KURUL DEĞERLENDİRME SONUCU / RESULT OF EVALUATION BY THE ETHICS COMMİTTEE

Covid-19 salgını nedeniyle İstanbul Bilgi Üniversitesi İnsan Araştırmaları Etik Kurulu, 2020-2021 Güz döneminde teslim edilecek lisansüstü tezlerin onay yetkisini ilgili etik kurul alt komitelerine devretmiştir. / Due to the Covid-19 outbreak, Istanbul Bilgi University Human Research Ethics Committee has transferred its approval authority to the Ethics Board Sub-Committees organized within each graduate program. Thus, the graduate theses to be submitted in the fall semester of 2020-2021 should/must get the approval of the Ethics Board Sub-Committee within their own graduate program.

ETİK KURUL ALT KOMİTESİ DEĞERLENDİRME SONUCU / ETHICS BOARD SUB-COMMITTEE EVALUATION RESULT

Bu bölüm lisansüstü tez araştırmaları için ilgili Etik Kurul alt komitesince doldurulacaktır. / This part to be completed by the Ethics Board sub-committee responsible for graduate dissertation studies.

Başvuru Sahibi / Applicant: Bahar Hazal Bakkal

Proje Başlığı / Project Title: The Effects of Occupational Stereotypes of Engineers on Managerial Self-Efficacy

Değerlendirme Sonucu/ Result of Evaluation

1.Herhangi bir değişikliğe gerek yoktur. Veri toplama/uygulama başlatılabilir./ There is no need for revision. Data collection/application may commence : XX

2. Ret / Application Rejected : _____

Reddin gerekçesi / Reason of Rejection : _____

Değerlendirme Tarihi / Date of Evaluation: 12/03/2020

Unvanı, Adı, Soyadı / Title, Name, Surname: Ümit Akırmak

İmza / Signature:

Gergely Czukor