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Analyzing the Role of Soft Skills to Influence Engineering Students' Career Self-Efficacy and Satisfaction

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Dedication

I would like to dedicate this Thesis to the extraordinary individuals who have profoundly impacted my life. I want to express my deepest gratitude to Mamadama Sillah, my beloved mother, whose unwavering support and love have been my guiding light. I also extend my heartfelt appreciation to Aminata Sillah (Mama), whose wisdom and kindness have shaped me into the person I am today. Additionally, I am grateful to Bintu Sillah, who has been my strongest pillar and my unwavering support and a source of encouragement throughout this journey.

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The path has been long and challenging. I want to express my heartfelt gratitude to Allah, the most compassionate and merciful, for giving me the strength and ability to complete this thesis. Without His divine help, this achievement would not have been possible.

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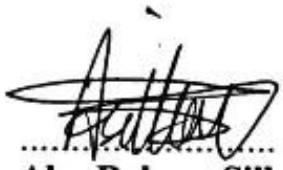
I would also like to convey my gratitude to Mr. Ousman Badgie, Mr. Nafiu Salele, and Farouq Iron-Baba for their tremendous guidance and support throughout this work. I am thankful to my friends and colleagues for their invaluable assistance and enriching discussions, which have been crucial to my professional growth. My heartfelt appreciation goes to my esteemed parents for their unwavering support, motivation, and consistent emphasis on the importance of academic pursuits.

Declaration of the author

This is to certify that the work presented in this thesis is an original work of me, **Abu Bakarr Sillah,** a student of the Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), The Organization of Islamic Cooperation (OIC), Dhaka, Bangladesh. This work has not been submitted to any other institutions for any other degree.



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Abstract

Today's engineering industry places a strong emphasis on the development of soft skills in the ever-evolving professional landscape. This study delves into the intricate connection between the acquisition of soft skills by engineering students, their confidence in their ability to succeed in their careers, and their overall satisfaction with their chosen career paths. The primary objective is to assess how the acquisition of soft skills impacts students' satisfaction with their career development. Specific goals include examining the relationship between perceived soft skills and career self-efficacy, assessing the influence of acquiring soft skills on career development satisfaction and identifying potential gender differences in these factors. A total of 277 engineering students took part in the data collection process, and the reliability and validity of the findings were ensured through rigorous data screening and analysis. The study utilized descriptive statistics, structural equation modeling (SEM), and various statistical tests to provide a robust framework for analysis. The participants' demographic profiles offered valuable insights into the characteristics of engineering students, aiding in the interpretation of the findings and their implications. The research uncovered significant relationships and mediation effects between perceived soft skills, career self-efficacy, interest and goals, outcome expectations, and soft skills satisfaction. Perceived soft skills emerged as a key predictor of career self-efficacy, interest and goals, and outcome expectations among students. Furthermore, the findings underscored the pivotal role of interest and goals in mediating the relationship between perceived soft skills and soft skills satisfaction. By evaluating the insights into the interplay between soft skills, career self-efficacy, and career satisfaction will be enhancing soft skills development to prepare engineering students for successful and fulfilling careers in the 21st century.

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Chapter 1: **Introduction**

1.1 Background

The importance of soft skills in the engineering industry cannot be emphasized enough in today's ever-changing professional world (Munir, 2022). While technical expertise remains a crucial foundation for any engineer, the ability to communicate, collaborate, and adapt to diverse environments is equally vital. Soft skills encompass interpersonal attributes such as communication, teamwork, problem-solving, and leadership, which are indispensable for success in the modern workplace (Parveen & Sharma, 2023). Nowadays, employers seek engineers who excel not only in their technical competencies but also in their proficiency in soft skills, enabling them to navigate intricate projects and interact effectively with colleagues and clients (Lohana, 2015). Being proficient in these skills enables individuals to work more effectively with others, handle conflict, and manage stress. Soft skills are especially important in fields that require collaboration, such as healthcare, education, and technology. By developing and honing these skills, individuals can enhance their professional growth and achieve greater success in their careers (Nagy, 2019).

The primary goal of all educational institutions is to produce competent students who are well-prepared for their future careers (Al Mamun, 2012). This is especially important when it comes to higher education and industry (Al Mamun et al., 2020; Shakeel et al., 2023). According to Lazányi (2015), the main objective of higher educational institutions concerning the industry is to educate and equip students with the knowledge, information, and skills necessary to increase their employment opportunities. And engineering institutions are no exception to that. In the past, soft skills were often overlooked in favor of technical expertise (Sreehari, 2021). However, today they are recognized as crucial for engineering graduates to reach their full potential (Berglund & Heintz, 2014). Effective communication skills, for example, help engineers explain complex technical concepts to colleagues and clients who may not have the same level of technical expertise. Similarly, teamwork and collaboration are essential for working effectively in interdisciplinary teams, which are increasingly common in today's workplace (Islam Karimov et al., 2023). Adaptability and problem-solving skills are also important soft skills for engineers. As technologies and work environments continue to evolve, engineers who can adapt quickly and

creatively solve problems are more likely to succeed in their careers. Ultimately, possessing strong soft skills can help engineers to build successful careers and make meaningful contributions to their organizations. Soft skills are a set of personal attributes that are becoming increasingly important for engineering graduates to possess to succeed in their careers. These skills encompass various traits and behaviors, including effective communication, teamwork, adaptability, and problem-solving. While technical expertise is still important, the ability to express complex ideas clearly, collaborate seamlessly with interdisciplinary teams, and adapt to rapidly changing work environments has become essential for professional success.

The American Board for Engineering and Technology has reflected the importance of soft skills by demanding graduating engineers possess a set of soft skills as a condition for accrediting engineering programs from which they have graduated (Yaacoub et al., n.d.). The pivotal role of soft skills in engineering education is underscored by the fact that technical work has become more collaborative and interdisciplinary in the last five years (Sokolova et al., 2022). Engineering disciplines are no longer siloed domains; they are integrated into multidisciplinary teams where effective communication and collaboration are paramount (Yazdanshenas et al., 2017). As industry continues to embrace innovation and globalization, engineers must possess not only technical acumen but also the ability to work across cultures, manage projects efficiently, and communicate complex ideas. Engineering graduates who excel in soft skills are better positioned to adapt to dynamic work environments, lead teams effectively, and drive innovation within their organizations (De Campos et al., 2020).

The need for soft skills in engineering students is growing at an unprecedented rate. Recognizing this growth in the engineering landscape, the universities have introduced courses aimed at developing soft skills in engineering students (Geraedts et al., 2022). However, despite such efforts, there is a perceived shortage of these skills, particularly among the younger generation, highlighting the necessity for targeted interventions and opportunities for students to develop their soft skills through international project collaboration and interdisciplinary contacts. To delve deeper into this aspect, this paper aims to analyze the role of soft skills in engineering students' satisfaction and career self-efficacy. The focus is to explore whether engineering students perceive that their acquired soft skills are adequately equipping them with the demands of the industry, and how satisfied they are with the progress they are making in developing these skills.

1.2 Problem Statement

Engineering students recognize the importance of soft skills in their career paths, attributing them to the ability to solve complex problems, collaborate across disciplines, adapt to emerging technologies, and continually acquire new knowledge and competencies (Caeiro-Rodriguez et al., 2021; Tell & Hoveskog, 2022). However, traditional engineering education often falls short in adequately imparting these essential skills, prompting exploration into innovative, student-led learning methodologies as potential facilitators of soft skills development (Fernández-Arias et al., 2023). As professional sectors become increasingly digitalized, the significance of soft skills in engineering practice has become even more pronounced, highlighting the need for their integration into educational curricula (Byrne et al., 2020). Engineering students exhibit diverse perceptions regarding their competency and confidence in utilizing soft skills professionally. While some students acknowledge the significance of soft skills, such as communication and professionalism, in the workplace and express eagerness to engage in professional development opportunities for further enhancement (Sanichar, 2022), concerns persist among students regarding their readiness for job-seeking and their ability to effectively apply requisite skills for successful employment (Bondareva et al., 2022). Furthermore, a recent study revealed that nearly half of the respondents lacked confidence in their soft skills, indicating a pervasive lack of awareness and appreciation for these skills among the graduating students (Van Kieu & Minh Tran, 2021). Also, numerous studies have demonstrated evident gender disparities in the acquisition and perception of soft skills among engineering students. For instance, Fernández-Arias et al.(2023) found that female students were rated higher in work behavior and social skills, thereby implying nuanced gender-based differences in the perceived value of soft skills (Fernández-Arias et al., 2023). Similarly, Rokooei (2023)'s research highlighted how female students in engineering and construction programs differed in their perceptions of career characteristics, industry familiarity, expected growth, and discrimination experiences compared to male students, all of which influenced their major and career path choices (Rokooei, 2023). Thus, this study attempts to effectively evaluate the role of soft skills in shaping career self-efficacy and satisfaction in the engineering students.

1.3 Research Objectives and questions

This study aims to analyze and evaluate the role of soft skills on the level of satisfaction and self-efficacy in career development among students pursuing engineering studies. By investigating the relevance and influence of soft skills on the career self-efficacy and career aspirations of engineering students, this study aims to provide insights into the importance of developing soft skills alongside technical expertise in the field of engineering for career success. The research will involve an in-depth analysis of various factors that could influence the relationship between soft skills, satisfaction, and career self-efficacy among engineering students. Thus, the key objective of this study is to assess the role of soft skills acquisition on students' satisfaction regarding their career development. The specific objectives of this study are to

- To examine the relationship between students' perceived soft skills and career self-efficacy.
- To assess the role of soft skills acquisition and satisfaction in career development
- To identify potential gender differences that influence students perceived soft skills, career self-efficacy, and satisfaction.

To achieve these objectives the following three research questions are going to be investigated-

RQ1: What is the relationship between engineering students' perceived soft skills and their career self-efficacy?

RQ2: What roles do the perceived soft skills play in engineering students' satisfaction with their career development?

RQ3: What gender differences exist in engineering students' perception of soft skills, career self-efficacy, and satisfaction?

1.4 Significance of the study

The research holds great significance as it aims to delve into the intricate ways in which the acquisition of soft skills impacts the career satisfaction and self-efficacy levels of engineering students. By undertaking this study, the aim is to make substantial contributions to the field of engineering education and career development by shedding light on the nuanced relationship between soft skills and professional success within the engineering domain.

The study highlights the significant impact of soft skills on career satisfaction and self-efficacy in the field of engineering. It emphasizes the need for educational institutions to incorporate training programs that focus not only on technical expertise but also on vital soft skills like communication, teamwork, and problem-solving abilities. This suggests that a well-rounded engineering curriculum should include the intentional development of these essential skills to better prepare students for their future careers.

The research findings underscore the importance of incorporating a well-rounded approach to engineering education that places equal emphasis on the cultivation of technical expertise and non-technical skills. This approach can facilitate the development of comprehensive educational structures that effectively equip students to navigate the diverse and complex demands of real-world engineering settings.

By recognizing the significant influence of soft skills on career self-efficacy and satisfaction, these professionals can develop more targeted and impactful support strategies. This, in turn, will empower students to bolster their confidence and attain higher levels of contentment in their chosen career trajectories.

The study aims to investigate potential gender differences in the perception and impact of soft skills within STEM fields. By exploring how these differences may affect individuals, the research contributes to the ongoing discourse on gender equity in STEM. The findings have the potential to inform the development of targeted policies and initiatives aimed at reducing gender disparities. Ultimately, this can help ensure that both male and female students have equal opportunities to develop the essential skills needed for successful careers in engineering and related fields.

For employers and professional development organizations, the study offers compelling evidence highlighting the significant impact of soft skills on career satisfaction and performance among engineering professionals. This underscores the importance of implementing tailored training programs and workshops designed to cultivate the essential soft skills necessary for career progression and overall job fulfillment within the engineering field.

The study significantly enhances the theoretical framework of Social Cognitive Career Theory (SCCT) by providing empirical evidence that validates the connections between soft skills, career self-efficacy, and career satisfaction. This not only adds depth to our understanding of career

development theories but also lays a solid groundwork for future research delving into related constructs.

The primary objective of the research is to enhance the future professional prospects of engineering students by emphasizing the significance of soft skills. By cultivating a learning environment that prioritizes the acquisition of these skills, educational institutions can significantly elevate students' overall contentment with their career paths and their level of readiness for the demands of the professional realm.

The findings of this study have far-reaching implications for the field of education. They have the potential to influence educational practices, curriculum development, career counseling, gender equity initiatives, professional development programs, theoretical frameworks, and student outcomes. The study advocates for an integrated approach to engineering education that acknowledges the crucial importance of soft skills in shaping successful and fulfilling careers. This integrated approach is poised to make a significant impact on the education and career paths of future engineers.

1.5 Outline of the Thesis

Throughout the following chapters, an in-depth exploration of various critical aspects will be undertaken.

In Chapter 2, a detailed and extensive review of relevant literature will be conducted to define and provide context for soft skills within the field of engineering. The emphasis will be placed on highlighting the significance of soft skills and their direct impact on the career paths of engineering graduates. Additionally, this chapter will explore diverse perspectives on social cognitive career theory and examine its relevance as the framework for the present research.

Moving on to Chapter 3, a comprehensive explanation of the methodology selected for the study will be provided. This will include a detailed outline of the specific approaches and techniques employed in the research, offering a clear insight into the research process.

Chapter 4 will involve a meticulous analysis and presentation of the findings gathered. This section will offer valuable insights into the data collected and shed light on the outcomes of the research.

It will provide a comprehensive understanding of the findings and their implications, contributing to the broader body of knowledge in this field.

In Chapter 5, a comprehensive analysis of the results obtained from the research will be conducted. This will involve a detailed exploration of the implications of our findings, as well as an in-depth discussion of the potential future research directions that stem from our work. Ultimately, this chapter will culminate in a comprehensive conclusion that brings together the key insights and contributions of our study.

1.6 Conclusion

In this chapter, the problem being investigated is thoroughly outlined, providing a comprehensive understanding from the outset. The research objectives are clearly defined, building on the insights shared in the preceding sections. The chapter delves into the extensive impacts and effects of applying versatile soft skills on the satisfaction of engineering students, identifying a literature gap that the current study aims to address. Furthermore, the chapter emphasizes the importance of understanding how to best integrate these soft skills into the engineering institutions. It also acknowledges that while soft skills offer numerous benefits, there are potential negative effects that warrant study, comprehension, and mitigation.

Chapter 2: **Literature Review**

In this chapter, the aim is to provide an in-depth literature review that not only defines and contextualizes soft skills within the specific domain of engineering but also emphasizes their significance and impact on the career trajectories of engineering graduates. A comprehensive examination of diverse perspectives on the social cognitive career theory and its relevance as the framework for this research will be conducted. This review will serve as a foundational pillar for our subsequent discussions and analysis.

2.1 Soft Skills

The term "soft skills" encompasses a broad range of personal qualities and interpersonal abilities that contribute to an individual's professional success. Although there is no universally accepted definition, literature highlights the importance of soft skills in personal and professional success. Soft skills enable individuals to deal with various situations and people effectively, leading to improved performance and productivity. Employers highly value individuals with excellent soft skills, as they contribute to a positive work environment and foster a culture of collaboration and creativity. Effective communication and teamwork are essential elements of successful individuals and organizations, making soft skills a critical component of professional development.

2.1.1 Concepts of Soft Skills

Soft skills are a crucial component of a person's overall skill set. They are considered as part of "generic skills," which include knowledge, active cognition, conation, affection, and sensory-motor abilities. This approach, known as the generic skill components approach, was proposed by Lamri & Lubart (2023). Generic skills are transferable skills that are essential for employability at some level for most individuals, as stated by Sanguinetti (2004). Transferable skills, also known as soft skills, are considered generic skills that can enhance career mobility and job prospects by showcasing one's potential to prospective employers (Watson, 2003). Employers look for transferable skills when hiring individuals, and these abilities include communication, problem-solving, and leadership. University students aim to develop these skills alongside technical knowledge for better job prospects (Collins-Nelsen et al., 2022). Developing soft skills is essential for individuals to be successful in their career as they enhance an individual's ability to work

collaboratively and adapt to change. These skills can help individuals to improve their job performance and advance in their careers.

Employability skills, also known as soft skills, are crucial for securing employment and developing emotional intelligence (Kumar & Sharma, 2019). Entry-level jobs, in particular, necessitate a proficiency in soft skills (Subedi, 2018). Soft skills that can impact employability include the ability to recognize and regulate emotions, exhibit creative thinking, understand and empathize with others, engage in analytical reflection, and establish meaningful relationships with employers (De La Concha Solís et al., 2023). Graduates' soft skills in the workplace are increasingly becoming a top priority for employers (Al-Mamun, 2012).

According to Cherusheva (2023), soft skills are vital professional skills that encompass emotional, communicative, and managerial components, as well as personal qualities that emphasize human-centered approaches. On the other hand, professional skills are skills that involve the selection, combination, and appropriate use of knowledge, skills, and other acquisitions, including values and attitudes, for the successful resolution of specific professional situations in a particular field of professional activity, as stated by Vrinceanu (2022). Cohen (1985) suggests that the skills and knowledge necessary for working in one-to-one situations, such as interviews, are essential prerequisites for good professional training. Ultimately, soft skills are a collection of people management skills that are crucial for many professions and job positions (Matteson et al., 2016).

Soft skills are a set of interpersonal, employability, and professional competencies that are essential for success in the engineering industry. These skills encompass a broad spectrum of abilities that enable individuals to communicate effectively, collaborate seamlessly, and adapt flexibly to changing work environments. Soft skills are an integration of generic, employability, and professional skills, which together form a holistic understanding of their importance in shaping the fulfillment and career self-confidence of engineering students. Generic skills refer to a set of core competencies that are fundamental to all fields of work, such as problem-solving, critical thinking, creativity, and teamwork. Employability skills are those that are specific to a particular industry or profession, such as technical expertise, project management, and leadership. Professional skills, on the other hand, are those that are essential to succeed in a professional environment, such as communication, time management, and networking.

2.1.2 Concept of Soft Skills in Engineering Context

Soft skills for engineering students include commitment, self-confidence, self-esteem, cooperation, and creativity. These skills are enhanced through student-led projects focusing on sustainability and mobility in applied engineering education (Tell & Hoveskog, 2022). By participating in these projects, engineering students can develop a deeper understanding of how their coursework translates to tangible solutions that address real-world challenges. They can also develop valuable communication skills and learn to think creatively about solving complex problems. Osman et al (2016) added that Critical thinking and problem-solving skills are highlighted as the most important soft skills for engineering students in the context of civil engineering practice. According to Cuinas & Sanchez (2022), Soft skills for engineering students include communication and interaction with non-technical individuals, emphasized through role-playing in electrical engineering programs to address concerns related to electromagnetic exposure effects.

Holik et al (2023) conducted a comprehensive study on the significance of developing soft skills in addition to hard skills in STEM education, with a particular focus on social skills. The study found that engineering students need to develop several soft skills, including problem-solving, reliability, resilience, communication, self-efficacy, readiness and independent work, to succeed in their careers. The researchers highlighted the importance of soft skills in engineering education, which include communication, teamwork, and leadership. They also pointed out that the most important soft skills are problem-solving, reliability, resilience, communication, and independent work. Moreover, the research emphasized the importance of self-perception when it comes to soft skills. Students need to identify with their soft skills to improve them, and the study found that engineering students often identify themselves as having strong reliability, problem-solving, independent work, responsibility, and cooperation skills. Based on the findings, the study recommends that engineering programs should focus on developing these five soft skills among students to prepare them for successful careers in the field.

Almeida & Buzady (2022) have conducted research and identified several important soft skills that are essential for engineering students. These soft skills include leadership, conflict management, diplomacy, and emotional intelligence. It has been suggested that engineering students can develop and improve these skills through the use of the FLIGBY serious game in

higher education. The FLIGBY game is designed to simulate real-life situations and challenges that require the application of these soft skills. In addition to the above-mentioned skills, Jillins (2001) has also emphasized the importance of other soft skills for engineering students. These skills include people management, communication, problem-solving, adaptability, and leadership. Developing these soft skills can greatly benefit engineering students, as they are essential for success in the workplace and in their personal lives. It is crucial for higher education institutions to provide opportunities for engineering students to develop and improve these skills through various teaching methods, such as practical exercises, case studies, and simulations.

2.1.3 Importance of soft skills for engineering Students

The importance of soft skills for engineering graduates cannot be overstated. They have been shown to improve productivity, decision-making, and communication in various professional environments, making them highly desirable attributes for employers seeking efficient and effective team members (Bataklar & Toy, 2023). In fact, as Sreehari (2021) notes, soft skills are now considered just as important, if not more so, than technical knowledge. This recognition of the significance of soft skills in the workplace is discussed, with key skills such as self-awareness, emotional intelligence, teamwork, cross-cultural communication, and personal accountability proposed as essential for professional success. Soft skills encompass a range of non-technical abilities, including communication, problem-solving, decision-making, adaptability, and time management, which are all critical to increasing productivity, fostering positive relationships, and achieving project goals.

Effective communication, time management, leadership, problem-solving, and interpersonal skills are critical for successful job performance, particularly for new graduates. Unfortunately, these soft skills are deficient among graduate engineers due to a lack of formal education and training (Afroze et al., 2019). Companies seek individuals who can add value to their culture and provide a fresh outlook. Active learning techniques in engineering programs can help foster soft skills like self-motivation, cognitive flexibility, leadership, time management, and conflict resolution (Nicola et al., 2018). According to Hirudayaraj et al (2021), entry-level engineers demonstrate proficiency in all ABET-required skills but do not meet organizations' expectations for 24 out of 26 skills. The most valuable soft skills for entry-level engineers include dependability, teamwork, accountability, self-motivation, and a positive attitude. The soft skills requiring improvement are the ability to

communicate with diverse groups, time management, effective writing, managing uncertainty in relationships and situations, and cross-generational communication.

2.1.4 Role of Soft Skills in influencing the career success of engineering students

Soft skills such as teamwork, leadership, networking, and multiculturalism have a significant impact on the career of engineering students. They enhance their work performance and meet the industry's demands for the 21st-century engineer, as highlighted in the research of Lauana et al. (2022a). By supplementing technical knowledge with social abilities, soft skills expand professional opportunities for engineering students, aid in master's thesis performance and increase their overall career prospects, as implemented at National Research University, according to Sokolova et al. (2022). Soft skills also play a crucial role in engineering students' career readiness and job search confidence. Despite high self-evaluation, students express uncertainty about their competitiveness and applying crucial skills outside the university for successful employment, as stated in the research of Bondareva et al. (2022). Debnath et al.(2012) found that students recognized the importance of enhancing their soft skills for a competitive advantage in the job market. His study prompted students to focus on developing team and interpersonal skills. Interestingly, there was no significant difference in attitudes towards soft skills between male and female students.

Volunteering can be a great way for engineering students to acquire soft skills like teamwork, creativity, and self-management. These skills can enhance their employability, making them desirable, productive, and promotable employees in their careers (Osipov et al., 2022). According to a study by Munir (2021), soft skills have a significant impact on the careers of engineering students. South African engineering professionals believe that soft skills education should receive more focus in engineering curricula to ensure professional success. Soft skills, such as communication, teamwork, and leadership, are crucial for engineering students' careers as they complement technical knowledge and enhance employability and effectiveness in the workplace (Srivastava & Kuri, 2021). Soft skills also bridge the gap between industry expectations and university preparation, influencing career aspirations and significantly impacting engineering students' careers (Itani & Srour, 2016).

In (2023) Paredes-Velasco et al. used an interdisciplinary approach to enhance soft skills in engineering students. They used realistic problems to create a challenge-based learning

environment for students. In a social service project called "Edumakers," students designed inclusive teaching materials for visually impaired children. This project helped foster empathy, complex thinking, and social intelligence skills in engineering students. Olais-Govea et al. (2022). conducted a study on the effectiveness of the "Edumakers" project. They found that engineering students improved their soft skills through this challenge-based learning approach. Additionally, Módné Takács et al.(2022) used gamification methods to enhance soft skills and motivation in engineering students during online learning. The aim was to strengthen intrinsic motivation and active knowledge acquisition among students.

2.1.5 The Concepts of Soft Skills in the Bangladesh Context

Soft skills play a crucial role in enhancing employability and career advancement opportunities in Bangladesh. They serve as a bridge between academic preparation and industry demands, making graduates more attractive to employers (Nusrat, 2016). Employers highly value attributes such as effective communication, strong leadership, and adept problem-solving skills, especially in the business sector, where these skills are vital for sustainable employment (Nusrat & Sultana, 2019). Additionally, soft skills contribute significantly to the achievement of Sustainable Development Goal 8, which aims to promote sustained, inclusive, and sustainable economic growth, as well as full and productive employment and decent work for all (Alam & Sharmin, 2023). In the specific professional context of Bangladesh, soft skills are essential for effectively integrating specialists into socioeconomic professions, underscoring their significance in fostering professional development (Varhata et al., 2023).

Soft skills play a crucial role in the success of engineers in Bangladesh, encompassing various important attributes such as communication, teamwork, leadership, and critical thinking (atigur, 2019). The employability of engineering graduates in Bangladesh is heavily influenced by their soft skills, with a specific emphasis on communication, interpersonal skills, ability to work under pressure, teamwork, analytical ability, self-motivation, deadline orientation, leadership, problem-solving, and proactivity (Afroze, 2019; Nusrat, 2018). These skills are vital for ensuring sustainable employment and fostering career growth. They can be honed through various avenues including self-training, institutional training, language sessions, presentation skills development classes, and social programs (Afroze, 2019). It is widely recognized that soft skills are integral to the overall personality development of engineering students, with specific dimensions such as

leadership, conflict management, self-management, decision-making, continuous learning, empathy, negotiation, and creativity being highlighted as pivotal (Balaji, 2009).

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Universities and training institutions in Bangladesh play a crucial role in fostering the development of soft skills among engineers, addressing the current challenges faced by engineering graduates in acquiring essential interpersonal and communication skills (Lauana et al., 2022b). The shift towards Education 4.0 emphasizes the need for incorporating socio-emotional skills like teamwork, leadership, and multiculturalism into the curriculum to meet the demands of the evolving job market (Almeida & Morais, 2023). Studies highlight the importance of integrating soft skills training within engineering education to enhance graduates' employability and competitiveness in the job market (Afroze et al., 2019). Furthermore, research indicates a disparity between the soft skills emphasized in academic curricula and those required by employers, emphasizing the necessity for universities to bridge this gap through tailored training programs (Nusrat & Sultana, 2019). However, according to Munir (2021) Soft skills training lacking in engineering education institutions in Bangladesh while engineering professionals in Bangladesh seek more focus on soft skills.

2.1.6 Gender Disparity in soft skills development for career success.

The development of soft skills in the workplace is significantly influenced by gender dynamics. Studies have shown that women in the early stages of their careers in scientific fields experience an increase in self-confidence and are more likely to stay in their jobs when they actively work on enhancing their soft skills (Allen, 2022). Moreover, gender constructs within organizations can either support or hinder organizational learning, thereby impacting the environment for soft skills development (Lowry, 2022). There is also a noticeable deficiency in soft skills within the current workforce, with various systemic factors such as negative attitudes and the lack of emphasis on soft skill development in educational and professional training programs contributing to this gap (Scott, 2022). It is imperative to address these gender-related challenges and advocate for a more inclusive approach to soft skills training in order to establish fair opportunities for all individuals in the workplace.

Research on the significance of soft skills for career advancement and their gender disparities suggests that, overall, there are no significant differences in soft skill abilities between male and female students (Setiati, 2023). However, specific soft skills such as teamwork, decision-making, problem-solving, time management, and critical thinking are perceived to be more important by students (Majid et al., 2012). These skills are also deemed essential for success in the workplace, with self-awareness, emotional intelligence, teamwork, cross-cultural communication, and personal accountability standing out as key soft skills (Sreehari, 2021). Moreover, the importance of soft skills in career success, job satisfaction, and productivity is underscored, with effective communication, teamwork, leadership, stress management, and emotional intelligence being particularly highlighted (Tripathy, 2020).

However, neglecting to address gender discrepancies in the development of soft skills can have significant repercussions on professional advancement, especially for women. Studies indicate that women often encounter social, organizational, and personal obstacles in their career growth (Fernández-Arias et al., 2023). Therefore, initiatives aimed at enhancing women's confidence in soft skills are vital for maintaining a diversified STEM workforce (Položki Vokić et al., 2019). Additionally, the physical effects of motherhood on job performance can have long-lasting impacts on relevant skills, particularly for mothers, potentially contributing to the gender pay gap (Melin & Correll, 2022). Failing to rectify these discrepancies not only impedes the progress of women

in their careers but also perpetuates the lack of gender diversity in various fields, ultimately constraining the overall potential of the workforce (Healy & Heissel, 2022).

2.2 Social Cognitive Career Theory

The Social Cognitive Career Theory (SCCT) is an insightful model that illuminates how personal factors, contextual elements, and socio-cognitive variables shape the development of career interests and behaviors (Zola et al., 2022). It places great emphasis on the value of learning experiences, self-efficacy, and outcome expectations in this process, and is rooted in Bandura's social cognitive theory (Lent & Brown, 1996). Given its relevance to the field of career counseling, SCCT can be highly valuable in helping clients make informed career choices (Khasanah et al., 2021). Additionally, the theory underscores the significance of human agency, which refers to individuals' capacity to intentionally influence their circumstances (C. P. Chen, 2015). A social cognitive framework for understanding career development, emphasizing personal agency and extra-personal factors, along with propositions for future research and a meta-analysis (Lent et al., 1994). They presented a comprehensive framework for understanding career development, which considers the role of individual factors such as personal agency and external influences. They also highlighted the need for future research in this area and provided valuable insights into the subject matter through a meta-analysis. Overall, this work is a significant contribution to the field of career development and provides a solid foundation for further exploration of the topic.

2.2.1 Models of Social Cognitive Career Theory

The Social Cognitive Career Theory (SCCT) is a comprehensive framework consisting of five models, which provide a holistic understanding of career behavior (Lent & Brown, 2019). These models are interest, choice, performance, satisfaction, and career self-management (Lent & Brown, 2013). The theory emphasizes the importance of social cognitive variables, such as self-efficacy and outcome expectations, in shaping career-related decisions and actions (Lent et al., 2016). Additionally, it highlights the significance of adaptive, process behaviors in career self-management (Lent & Brown, 2013). Furthermore, the theory has expanded to include domain satisfaction and career self-management, paving the way for future research and application (Brown & Lent, 2019). In summary, SCCT is a valuable framework that can aid in promoting optimal career development (Appling et al., 2022).

2.2.2 Why Social Cognitive Career Theory

The Social Cognitive Career Theory (SCCT) is a robust framework that offers insights into how soft skills impact the career satisfaction and self-efficacy of engineering students. Lent, Brown, and Hackett (1994) developed SCCT, which suggests that individuals' career decisions and achievements are influenced by their self-efficacy beliefs, outcome expectations, and personal objectives. This theory presents a comprehensive perspective that sheds light on how engineering students' acquisition of soft skills relates to their views on their career pursuits' efficacy and satisfaction.

SCCT emphasizes the role of self-efficacy beliefs in shaping individuals' career decisions and behaviors. It emphasizes the importance of self-efficacy in career development, including interest, career choice, and performance aspects. It has been chosen as the theoretical base to explain career self-efficacy (Firdaus et al., 2019). In the field of engineering education, students' confidence in their ability to apply soft skills such as communication, teamwork, and problem-solving is of paramount importance. These skills are critical for success in the field of engineering and can significantly impact students' satisfaction with their academic experiences and their perceived efficacy in future career roles. Therefore, it is essential to examine how engineering students' self-efficacy beliefs in soft skills evolve over time. By understanding how these beliefs change and develop, educators can gain insights into enhancing students' confidence and competence in these essential competencies. This study aims to investigate the factors that influence engineering students' self-efficacy beliefs in soft skills and explore ways to improve students' confidence and competence in these areas.

SCCT highlights the importance of outcome expectations in influencing individuals' career choices and persistence. Research on outcome expectations in Social Cognitive Career Theory (SCCT) has revealed several key findings. Appling et al.(2022) and Segal et al.(2002) both found that interventions based on SCCT can enhance outcome expectations, leading to more purposeful career beliefs and behaviors, and higher intentions to become self-employed. However, (Lindley, 2005) found that outcome expectations were positively related to perceived barriers for women, suggesting a more complex relationship. These studies collectively highlight the importance of considering individual and environmental factors in understanding and enhancing outcome expectations within the framework of SCCT. Engineering students' perceptions of the outcomes

associated with developing soft skills, such as increased employability, career advancement, and job satisfaction, can shape their motivation to cultivate these skills. Understanding how engineering students' outcome expectations regarding soft skills impact their satisfaction and career self-efficacy can inform strategies to enhance students' engagement and success in their academic and professional endeavors.

The relationship between academic self-efficacy, goal orientation, and personal goal setting has been explored in several studies. Ye (2021) found that these factors are significantly related among high school students, with self-efficacy and goal orientation influencing personal goal setting. This relationship was further supported by Schoenfeld et al. (2017) in the context of accounting students' career goals, where self-efficacy and outcome expectations were positively correlated to become a certified public accountant. Segal et al. (2002) extended this to the prediction of self-employment goals, showing that higher entrepreneurial self-efficacy and outcome expectations were associated with greater intentions to become self-employed. These studies collectively highlight the importance of self-efficacy and goal orientation in shaping personal goals, particularly in the academic and career domains. SCCT underscores the significance of personal goals in guiding individuals' career development and decision-making processes. Engineering students' aspirations for their future careers, aligned with the acquisition of soft skills, can drive their efforts to enhance these competencies and navigate their professional pathways effectively. By exploring how engineering students' personal goals intersect with their perceptions of soft skills and their impact on satisfaction and career self-efficacy, this study can shed light on the motivational factors that drive students' pursuit of excellence in both technical and interpersonal domains.

Social Cognitive Career Theory (SCCT) has been applied to various aspects of career satisfaction. Lent and Brown (2006) proposed a model that integrates core SCCT variables with personality traits and contextual factors to explain vocational and educational satisfaction. Rasdi and Ahrari (2020) further developed this model, demonstrating its applicability in predicting life satisfaction among university students. Lent and Brown (2008) extended the theory to subjective well-being, particularly job satisfaction, by considering multiple sources of satisfaction. Wickramaratne (2021) expanded the theory to include the impact of career development culture and senior

management support on career satisfaction, suggesting that organizations should foster a supportive environment to enhance employee satisfaction.

The social cognitive career theory (SCCT) is effective in predicting life satisfaction (Mohd Rasdi & Ahrari, 2020). This theory may have potential in assessing the satisfaction of soft skills among graduate students, as it focuses on the importance of self-efficacy and outcome expectations in career development. However, there has been limited direct research on applying SCCT to soft skills satisfaction in graduate students. Other factors, such as interaction with U.S. students, language abilities, and perceived discrimination, have been found to impact satisfaction in academic and social experiences among international graduate students (Perrucci & Hu, 1995). Soft skills, such as communication and problem-solving, have been recognized as essential competencies for successful employability (Kuregyan & Khusainova, 2022).

Research findings have consistently highlighted the crucial role of soft skills in shaping career self-efficacy and employability of graduate students. Soft skills encompass a wide range of interpersonal and intrapersonal attributes, including self-regulation, motivation, social skills, leadership, teamwork, and communication. Al-Mamun (2012) has contributed to the understanding of how these skills significantly impact the professional trajectories of graduate students. Moreover, the significance of these soft skills becomes particularly pronounced during the transition from university to the professional world. This transition phase is pivotal, as it directly influences job search self-efficacy and eventual employment outcomes.

The Social Cognitive Career Theory (SCCT) serves as a valuable framework for comprehending the influence of these soft skills on career self-efficacy. This theory emphasizes the pivotal role of personal factors, particularly self-efficacy, in shaping individuals' career development trajectories. By focusing on the interplay between personal attributes, environmental influences, and behavioral outcomes, SCCT provides a comprehensive lens through which to understand the complexities of career development.

2.3 Conclusion

This study can greatly benefit from employing the Social Cognitive Career Theory (SCCT) as the theoretical framework. By utilizing SCCT, can offer valuable insights into the psychological mechanisms of the intricate interplay between soft skills. SCCT provides a structured approach

that can help you analyze how engineering students perceive their soft skills development and how it influences their satisfaction with their educational experiences, as well as their confidence in navigating future careers in the engineering field. By using SCCT, can delve deeper into the factors that shape students' perceptions of their soft skills development and examine how these perceptions affect their career decision-making and goal-setting processes. Ultimately, our study can contribute to a better understanding of the role that soft skills play in the education and career development of engineering students and inform the design of more effective interventions and programs aimed at enhancing these skills.

Chapter 3: **Theoretical Framework and Research Model Development**

3.1 Introduction

This chapter delves into the theoretical framework and research design of the study. The primary objective of this study is to evaluate the impact of soft skills acquisition on students' satisfaction with regards to their career development. In this study, the Social Cognitive Career Theory was utilized to provide a robust framework for examining the diverse effects of soft skills on the career development of engineering students. The emphasis of SCCT on self-efficacy, outcome expectations, and the interplay of personal and environmental factors makes it well-suited to address the objectives of this study. This theoretical foundation ensures a comprehensive and structured analysis, offering valuable insights into the influence of soft skills on career satisfaction and efficacy among engineering students.

3.2 Theoretical Framework

The Social Cognitive Career Theory (SCCT) is a model that provides a comprehensive framework for understanding career satisfaction, considering both individual and contextual factors. Developed by Lent in 2006, this social cognitive theory emphasizes the importance of core social cognitive variables, personality traits, and contextual variables, all of which are intrinsically linked to job satisfaction. In other words, the theory suggests that job satisfaction is affected by a complex interaction between a person's self-efficacy, goals, and personality traits, as well as by the broader context in which they work. Moreover, Foley & Lytle (2015) has extended this theory by examining the impact of work discrimination on self-efficacy and work satisfaction in retirement-age adults. This research supports the idea that personality traits and career strategies are significant determinants of career satisfaction. Specifically, career strategies mediate the relationship between personality traits and satisfaction, indicating that a person's approach to their career is just as important as their inherent personality traits in determining their satisfaction with their work. Therefore, the SCCT is a valuable tool for understanding job satisfaction, and its insights can be useful for individuals, managers, and organizations who are interested in creating a more fulfilling work environment.

Social Cognitive Career Theory (SCCT) is a widely researched theory with numerous applications in various fields. For instance, Cunningham et al. (2005) applied SCCT to sport and leisure career choices and found that self-efficacy and outcome expectations significantly impact vocational interests and career goals. Similarly, O'Brien & Heppner (1996) has extended SCCT to the training of career counselors, suggesting that interventions based on SCCT can help improve interest, involvement, and performance in career counseling. Byars & Hackett (1998) has reviewed the application of SCCT to the career development of women of color, highlighting the impact of gender, ethnicity, and cultural factors on career self-efficacy and outcome expectations. Moreover, Pérez-López et al. (2019) have applied the social cognitive model of career self-management, a component of SCCT, to the entrepreneurial career decision, demonstrating the role of adaptive behaviors in this context. Collectively, these studies suggest the broad and diverse applicability of SCCT in understanding and influencing various career-related phenomena.

Over the years, researchers have explored various theories to gain a deeper understanding of career development and satisfaction. One such theory that has gained significant traction is the Social Cognitive Career Theory (SCCT). It posits that career development is a product of the interplay between personal, behavioral, and environmental factors. In recent times, studies have shown that applying the principles of SCCT can have a profound impact on career satisfaction and self-efficacy. A considerable body of research has been conducted to explore the effectiveness of SCCT in enhancing vocational interests and career exploration. Lent et al.(2016) and Cunningham et al. (2005) found that self-efficacy and outcome expectations, which are the key components of SCCT, are positively associated with vocational interests and career exploration. Lent & Brown (2006) further extends these findings by proposing a model that integrates SCCT variables with personality traits and contextual factors to understand job satisfaction. The model posits that individuals with high self-efficacy are more likely to pursue challenging and innovative careers that match their interests and values. On the other hand, those with low self-efficacy may opt for less challenging careers that match their skills but may not be satisfying in the long run. Adachi (2004) also supports the SCCT by demonstrating the significant relationship between career self-efficacy, outcome expectations, and vocational interests. The study found that individuals who have a higher degree of self-efficacy and positive outcome expectations tend to be more interested in pursuing careers that align with their interests.

3.2.1 Research Model and Hypothesis Development

The Social Cognitive Career Theory (SCCT) has undergone expansion to encompass a comprehensive model for comprehending satisfaction in educational and vocational pursuits (Lent & Brown, 2006). Further refinements to this model have been made to predict life satisfaction in university students, with a better-fitting alternative model outperforming the original SCCT (Mohd Rasdi & Ahrari, 2020). The SCCT has also been applied to the workplace, with a strong emphasis on job satisfaction and the interplay of multiple sources of satisfaction (Lent & Brown, 2008). Moreover, the influence of career development culture and senior management support on career satisfaction has been explored within the SCCT framework, revealing both factors to have a positive impact on satisfaction (Wickramaratne, 2021). **Figure 1** is the adopted framework for this study.

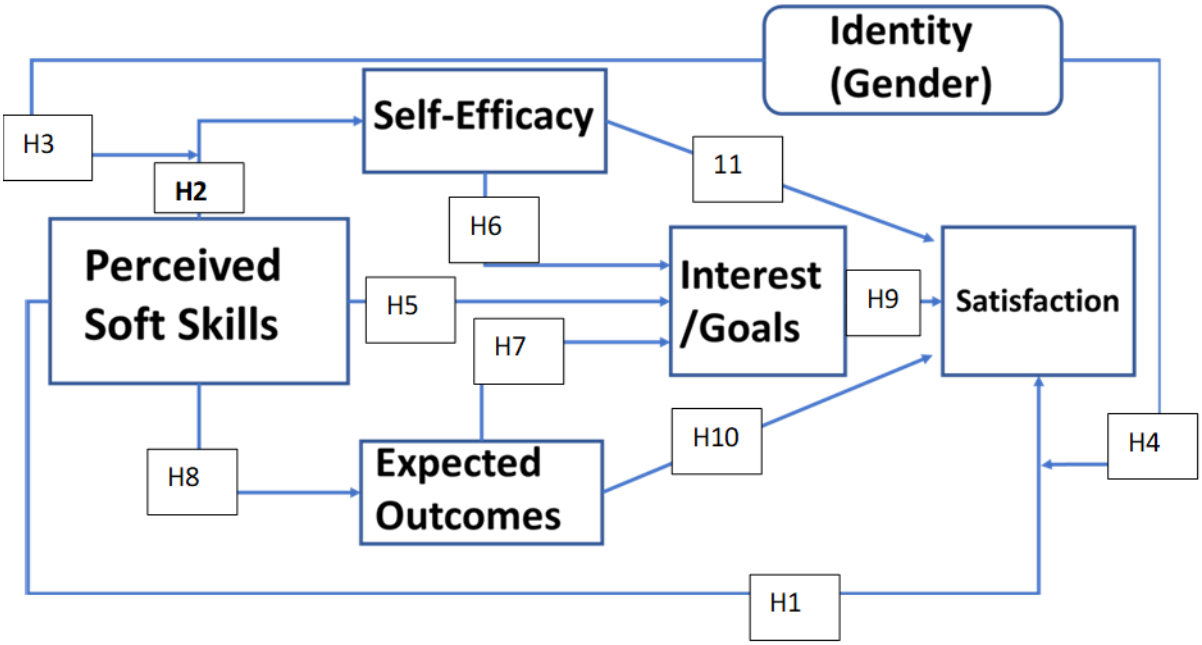

***Figure 1**: Theoretical Framework (Lent & Brown, 2006)*

3.2.1.1 Perceived soft skills.

The study in question focuses on the concept of perceived soft skills, which refers to a list of 10 skills that are considered crucial for engineering graduates and highly sought after in the engineering industry (Chan et al., 2017). Research has consistently demonstrated the significant

impact of perceived soft skills on overall job satisfaction. In a study conducted by (Dabke, 2015), it was revealed that the soft skills of management interns were strongly correlated with the effectiveness of their internships and their subsequent permanent placement opportunities. This finding is further supported by Palumbo (2013), who emphasized the direct influence of soft skills on overall job satisfaction. Additionally, the vital role of soft skills, particularly analytical ability, reasoning skills, and emotional intelligence, is improving employability within large corporations.

Research in the field suggests that the perceived importance of soft skills, such as communication, teamwork, and problem-solving, plays a significant role in shaping career self-efficacy (Aryani et al., 2021; Majid et al., 2012; Ngo, 2024). Individuals, including students and employees, who acknowledge and value these skills tend to exhibit higher levels of self-efficacy, which ultimately leads to greater engagement in their careers (Aryani et al., 2021).

Existing literature supports the idea that soft skills, such as teamwork, decision-making, problem-solving, time management, and critical thinking, play a crucial role in career success and advancement (Majid et al., 2012; Tripathy, 2020). These skills are particularly emphasized in the 21st-century workforce, with educators highlighting their significance. It is expected that employees continuously enhance their hard skills and refine their soft skills to remain competitive in the job market (Tripathy, 2020). Employers highly value these skills and consider them a key differentiator for job applicants.

The perceived importance of soft skills significantly impacts career outcome expectations, with both students and employees recognizing their value for career advancement and employment (Majid et al., 2012; Ngo, 2024). These skills, such as teamwork, collaboration, leadership, and problem-solving, are viewed as essential for career engagement, especially among high school and university students (Aryani, 2021). The relevance of soft skills in achieving career success, job satisfaction, and productivity is also underscored, with a call for continuous development and enhancement of these skills (Tripathy, 2020).

The study posits a hypothesis that perceived soft skills have a positive impact on multiple factors that influence student satisfaction, such as self-efficacy, goals, and expected outcomes. Specifically, the hypothesis suggests that the more students perceive themselves to possess these soft skills, the more likely they are to feel satisfied with their academic and professional pursuits. These hypotheses suggest that there is a strong correlation between the development of perceived

soft skills and students' overall satisfaction with their education and career prospects in the engineering field.

H1: Perceived soft skills (PS) positively influence soft skills satisfaction (SS).

H2: Perceived soft skills (PS) positively influence self-efficacy (SE).

H5: Perceived soft skills (PS) positively influence interests and goals (IG).

H8: Perceived soft skills (PS) positively influence outcome expectation (OE).

3.2.1.2 Gender Difference

Numerous studies have delved into the relationship between personality traits and career satisfaction, with specific emphasis on the social cognitive career theory. One such study conducted by Abd Aziz et al. (2011) found that career strategies play a mediating role in the relationship between personality traits and career satisfaction, with extraversion emerging as a significant predictor. Another study by Lounsbury et al. (2003) identified emotional resilience, optimism, and work drive as key personality traits that are closely related to career satisfaction. In a subsequent study, Lounsbury further emphasized the role of conscientiousness and tough-mindedness in determining career satisfaction. These findings were later supported by Lent & Brown (2006) who integrated social cognitive variables with personality traits and contextual factors to better understand work satisfaction.

Personality traits are defined as consistent patterns of thoughts, feelings, and actions that are unique to individuals (Allik et al., 2015). These traits are best measured by multiple indicators and can predict various important criteria such as job performance and mental health. The Big Five Theory, which includes extraversion, agreeableness, openness, conscientiousness, and neuroticism, is a widely accepted model for understanding personality traits (Yunus et al., 2018). However, there is an ongoing debate about the relative influence of traits and situational forces on behavior (Diegelman & Subich, 2001).

In this model, gender difference is used as a personality trait that influences both perceived soft skills and career satisfaction. By considering gender as a personality trait, a more nuanced understanding can be gained of how personality traits intersect with contextual factors such as gender's role in career satisfaction.

H3: Gender influences the relationship between perceived soft skills (PS) and self-efficacy (SE).

H4: Gender influences the relationship between perceived soft skills (PS) and skills satisfaction (SS).

3.2.1.3 Self-Efficacy

Self-efficacy is considered as a major driving factor in preparing students and that social competence is an important dimension of self-efficacy associated with student readiness and satisfaction (Al Mamun et al., 2022). Specifically, self-efficacy is a critical element in the satisfaction model of the social cognitive career theory. According to Xin et al. (2018) career decision-making self-efficacy effectively mediates the relationship between career exploration and affective well-being. This was further supported by research, which indicated that emotional self-efficacy has a positive effect on career satisfaction, where self-perceived employability plays a mediating role. Nauta's (2004) study expanded on this by demonstrating that self-efficacy also acts as a mediator between personality factors and career interests. In this model, we hypothesize that perceived soft skills have a positive correlation with self-efficacy, which in turn impacts satisfaction. Additionally, gender differences may influence the relationship between soft skills and career self-efficacy, and both satisfaction and self-efficacy, along with outcome expectation, positively influence goal/interest. The result of this relationship also plays a crucial role in determining satisfaction levels.

According to Holtschlag et al. (2019), individuals with higher core self-evaluations, a component of self-efficacy, tend to experience more positive emotions when pursuing their career goals, leading to greater career satisfaction. This finding is further supported by Rigotti et al. (2020), who found that career-related self-efficacy positively influenced career satisfaction. However, the relationship between self-efficacy and satisfaction is not straightforward, as indicated by Holtschlag et al. (2019), who discovered that low social efficacy beliefs were associated with higher career satisfaction. This suggests that the influence of self-efficacy on soft skills satisfaction may be moderated by other factors. Lastly, Komarraju et al. (2014) demonstrated that increased career self-efficacy predicted college students' motivation and satisfaction, underscoring the significance of self-efficacy in career development.

Studies have indicated that career self-efficacy, which refers to an individual's belief in their ability to succeed in their chosen career, is impacted by various factors including gender, academic performance, and the processing of self-efficacy messages (Kelly, 1993). This self-efficacy, in turn, plays a role in shaping career decision-making, job performance, and the pursuit of career objectives (Haghdani, 2013)

H6: Self-efficacy (SE) positively influences interests and goals (IG).

H11: Self-efficacy (SE) positively influences soft skills satisfaction (SS).

3.2.1.4 Expected Outcomes

The social cognitive career theory posits that expected outcomes play a crucial role in determining job satisfaction and overall life satisfaction. This idea is supported by numerous studies conducted in various settings. For instance, Lee & Shin (2017) research on Korean secondary school teachers found that outcome satisfaction, a key component of the theory, directly impacted both job and life satisfaction. Similarly, Diegelman & Subich (2001) highlighted the role of outcome expectations in predicting interest, pursuit intentions, and career planning. Mohd Rasdi & Ahrari (2020) study further reinforced these findings by suggesting that the alternative model of the social cognitive career theory, which includes expected outcomes, is effective in predicting life satisfaction in university students.

Research consistently demonstrates that outcome expectations play a significant role in shaping career interests and goals. For example, Direito et al. (2012) discovered that increased outcome expectations for a specific degree resulted in a greater intent to pursue it. Similarly, Betz & Voyten (1997) noted that outcome expectations were the strongest predictor of career exploration intentions. Shoffner et al. (2015) emphasized the importance of outcome expectations in influencing career aspirations, particularly in STEM fields. Lent et al. (2008) also conducted research in this area.

Building on these previous studies, this research hypothesizes that outcome expectations have a positive influence on both goals and satisfaction. A better understanding of the influence of expected outcomes on career-related decisions and overall well-being can help individuals make informed choices and lead fulfilling lives.

H7: Outcome expectation (OE) positively influences interests and goals (IG).

H10: Outcome expectation (OE) positively influences soft skills satisfaction (SS).

3.2.1.5 Goal Progress

The social cognitive career theory proposes that career satisfaction is influenced by goals and interests. Several studies have explored this relationship, yielding important findings. Learning and performance goal orientations can moderate the relationship between objective career success and life satisfaction. Similarly, Diegelman & Subich (2001) demonstrated that self-efficacy and outcome expectations, both of which are influenced by goals and interests, significantly predict interest and pursuit intentions in a specific field. Lent & Brown (2006) proposed a model that integrates core social cognitive variables, including goals, with personality traits and contextual factors to explain vocational and educational satisfaction. Additionally, Cunningham et al. (2005) applied social cognitive career theory to sport and leisure career choices, finding that self-efficacy and outcome expectations positively influence vocational interests and choice goals. These studies collectively support the idea that goals and interests play a significant role in shaping career satisfaction within the social cognitive career theory framework. Given these insights, we hypothesize that goals and interests have a positive influence on the career satisfaction of engineering students.

H9: Interests and goals (IG) positively influence soft skills satisfaction (SS).

3.2.1.6 Soft Skills Satisfaction

The Social Cognitive Career Theory (SCCT) proposes a satisfaction model that is influenced by a multitude of factors. Lent & Brown (2006) developed a model that integrates various core social cognitive variables, personality traits, and contextual factors to understand satisfaction in both vocational and educational pursuits. Rasdi & Ahrari (2020) built on this model, demonstrating its usefulness in predicting life satisfaction among university students. Foley & Lytle (2015) extended the model to retirement-age adults, finding that work satisfaction is influenced by life satisfaction, self-efficacy, and personality traits, and is a predictor of continued work. Additionally, Sökmen & Kenek (2018) explored the mediating role of career satisfaction in the impact of job characteristics on intention to leave, suggesting that factors such as task significance, skill variety, autonomy, and feedback can influence career satisfaction and reduce the intention to leave.

In this specific model, this study have adopted the concept of soft skills satisfaction, which aims to determine whether engineering students are satisfied with the soft skills that they perceive to

have for their career success. This involves evaluating their level of satisfaction with skills such as communication, teamwork, adaptability, and problem-solving, which are essential for success in the engineering field. By assessing this aspect of satisfaction, we can gain a better understanding of the factors that influence career success and identify ways to support and improve the soft skills development of engineering students.

3.3 Conclusion

The study will utilize the Social Cognitive Career Theory (SCCT) as the theoretical framework to comprehensively examine the role of soft skills in the career development of engineering students. SCCT emphasizes the significance of self-efficacy, outcome expectations, and the interaction between personal attributes and environmental factors. This focus makes SCCT particularly well-suited for addressing the specific objectives of this study. By leveraging this theoretical foundation, the study aims to conduct a structured and comprehensive analysis, providing valuable insights into how soft skills influence career satisfaction and efficacy among engineering students.

Chapter 4: **Methodology**

4.1 Introduction

This chapter aims to provide an in-depth understanding of the research methodology utilized in this study. It delves into the research context, population and sampling technique, instrument design, instrument reliability and validity, data collection procedure, and data analysis. In order to achieve the objective of this study, three research questions have been formulated to guide this study. Firstly, we seek to explore the relationship between students' perceived soft skills and career self-efficacy. Secondly, we aim to understand how perceived soft skills impact career satisfaction. Lastly, we aim to investigate to what extent potential gender differences can influence students perceived soft skills, career self-efficacy, and satisfaction. Through thorough examination of these research questions, we hope to gain a deeper insight into the impact of soft skills on career development and satisfaction.

4.2 Research approach

For this study, we have employed a deductive research approach. This approach entails the testing of existing theories or hypotheses through the gathering and analysis of empirical data. It begins with a theoretical framework or hypothesis and then progresses to data collection and analysis to validate or contradict the initial assumptions. This method commences with a theory or hypothesis and includes the development of a research strategy to test the hypothesis. It is commonly linked with quantitative research, where the aim is to test theories and establish causality. The deductive approach is methodical and organized, enabling the generation of generalizable and dependable findings.

The deductive approach was chosen for this study due to its alignment with social cognitive career theory, which serves as the foundational framework for examining the influence of soft skills on students' satisfaction and career self-efficacy. This method allows for empirical testing of hypotheses derived from theory and supports the structured and systematic analysis essential for quantitative research. By enabling the formulation of specific hypotheses and the use of statistical methods, the deductive approach facilitates objective measurement and analysis of variables through standardized instruments. This approach is well-suited to the study's objective of quantitatively assessing the relationships between soft skills, career self-efficacy, and satisfaction.

Through the testing of hypotheses derived from established theory, the deductive approach offers predictive insights that can inform evidence-based decisions and recommendations based on the findings of the study.

4.3 Research method

Research methods are systematic and well-thought-out plans and procedures employed by researchers to gather, analyze, and make sense of data. These methods play a crucial role in guaranteeing dependability, validity, and precision of research outcomes. A wide array of research methods exists, each tailored to specific types of research inquiries and goals. The primary categories of research methods include - Quantitative, Qualitative and Mixed Method research.

Quantitative research methods are a set of investigative techniques used to gather and analyze numerical data to identify and understand patterns, relationships, and trends. These methods typically involve the use of surveys, experiments, and statistical analysis. Researchers employ quantitative methods to test hypotheses, make predictions, and draw statistically valid conclusions based on the data collected. Qualitative research methods are a set of techniques used to gather and analyze non-numerical data, such as words, images, or objects. These methods include but are not limited to interviews, focus groups, and content analysis. Qualitative research is particularly valuable for exploring complex phenomena, understanding meanings, and gaining insights into participants' perspectives. The Mixed Methods approach is a research methodology that combines quantitative and qualitative techniques to provide a comprehensive and in-depth exploration of the research problem. By utilizing both types of data, researchers can compare and contrast their findings, gaining a more nuanced understanding of the subject matter. This approach not only enhances the depth of analysis but also allows for a more thorough and robust interpretation of the research findings.

In this study, quantitative research methods have been adopted. This is influenced by the precise goals and characteristics of the research questions presented in this study. The primary aim of this research is to evaluate the impact of soft skills on the satisfaction and career self-efficacy of engineering students. This necessitates the quantitative examination of relationships and variables in order to effectively measure their impact and significance.

The quantitative research method is an ideal choice for this study due to its ability to provide numerical data, conduct statistical analysis, and identify patterns and trends. The research is focused on quantitatively assessing the perceived level of soft skills, career self-efficacy, and satisfaction. This will be achieved through the use of structured instruments such as surveys, which will enable precise measurement and quantitative analysis of these variables. In addition to that, utilizing quantitative methods is crucial for effectively testing hypotheses in research. In this particular study, the primary objective is to investigate and analyze specific connections, for instance, exploring the correlation between individuals perceived soft skills and their career self-efficacy. These relationships can be examined and verified through the application of various statistical techniques, providing valuable insights into the interconnectedness of these variables.

Furthermore, the process of quantitative research typically involves working with larger sample sizes, which can help to enhance the generalizability of the findings. In the context of this study, the primary objective is to offer valuable insights that have the potential to be applied to a wider and more diverse population of engineering students. Through the implementation of standardized research instruments and rigorous statistical analysis, researchers can effectively minimize bias and ensure that their findings are both objective and reliable. This approach promotes the generation of robust and trustworthy results, which is essential for advancing scientific knowledge and informing evidence-based practices.

4.4 Populations and Sample

4.4.1 Population and Participants

The study encompassed a diverse population consisting of Ph.D., Masters, BSc, and Diploma students from various international, private, and public universities. The sample was made up of approximately 280 engineering university students who voluntarily participated in the study. The participants were from different nationalities and included both males and females, irrespective of the year of their studies and specialization. The age range of the participants was between 17 and 54 years, with the average age being 18.73 years and a standard deviation of 1.41. It is worth noting that 75% of the participants were male.

4.4.2 Sampling Technique

The study employed cross-sectional data sets collected from university students. Self-report questionnaires are widely used to measure students' soft skills, with a focus on communication, leadership, decision-making, teamwork, and problem-solving (Mwita et al., 2023). These skills are seen as crucial for students' self-fulfillment and well-being, as well as their professional development). The use of these questionnaires has been particularly effective in the field of engineering, where they have been used to assess the achievement of specific soft skills (Soto-Sanz et al., 2019).

A convenience sampling method was used to select the respondents for this study. The participants in convenience sampling are selected based on their accessibility and proximity to the researcher. It is a nonprobability sample technique. To overcome the lack of representativeness brought on by this sampling strategy, a sizable sample is essential. Since they are aware of its advantages in terms of simplicity, accessibility, speed, economy, and participant availability, many researchers respect and recommend this sampling approach. The selection of the appropriate sample enables the instrument to be adjusted for the most efficient and objective data collecting in accordance with the objectives.

4.5 Survey questionnaire development

The research study in question employs a comprehensive questionnaire that is designed with utmost care and precision. The questionnaire comprises 31 items that are organized systematically into five distinct sections based on the research model. The first section of the questionnaire captures the demographic data of the respondents. The second section deals with the measures of the independent variable, Perceived Soft Skills. The third section focuses on the mediating variables, namely Self-efficacy, Expected Outcomes, and Goals and Interests. The fourth section of the questionnaire measures the dependent variable, Soft Skills Satisfaction. Finally, the fifth section delves deeper into the moderating variable - Gender Difference. All the items used to measure these variables have been carefully adapted from prior literature and are measured on a five-point Likert scale with response choices ranging from “Strongly Disagree (1)” to “Strongly Agree (5)”. The questionnaire is designed in a tabulated format, and a summary of the survey questionnaire is provided in the table below.

After conducting an extensive review of the literature, we successfully selected and refined the items for this study. **Table 1** contains items for the perceived soft skills and the coding adopted for easy analysis. These items were adopted from Chan et al. (2017), and out of 6 items, four were used for this study.

***Table 1**: Items for Perceived Soft Skills*

Construct	Items	Coding
Perceive Soft Skills (PS) (Chan et al., 2017)	I can engage in building and maintaining relationships.	PS1
	I can work with others.	PS2
	I can communicate effectively.	PS3
	I can solve engineering problems.	PS4
	I can think critically and independently.	PS5
	I can organize things timely.	PS6
	I can understand what professionalism is.	PS7
	I can be flexible when facing unexpected situations.	PS8
	I can search and manage information.	PS9
	I can act as a leader in a team.	PS10

Likewise, for **Table 2**, it contains the items for self-efficacy and the coding for easy analysis. These items were adopted from G. Chen et al. (2001). Out of 6 items, four were adopted for this study.

***Table 2**: Items developed for Self-Efficacy*

Construct	Items	Coding
Self-Efficacy (SE) (G. Chen et al., 2001)	I can achieve most of the goals that I have set for myself.	SE1
	When facing difficult tasks, I am certain that I can accomplish them.	SE2
	I think that I can obtain goals that are important to me.	SE3
	I believe I can succeed in achieving my goals.	SE4
	I believe I can successfully overcome challenges in my career.	SE5
	I am confident that I can perform effectively on many different tasks.	SE6
	I can do most tasks very well compared to other people.	SE7
	I can perform quite well even when things are tough.	SE8

Table 3 contains items for the outcome expectation and the coding adopted for easy analysis. These items were adopted from Betz & Voyten (1997); out of 6 items, four were used for this study.

***Table 3**: Items developed for Outcome Expectations*

Construct	Items	Coding
Outcomes Expectations (OE)	If I learn more about different soft skills, I will make a better career decision.	OE1

(Betz & Voyten, 1997)	If I know my interests and abilities, then I will be able to choose a good career.	OE2
	If I get the proper education, I will make a better career decision.	OE3
	If I spend enough time to attain soft skills, I can make a good career decision.	OE4

Table 4 includes items for interest and goals from Betz & Voyten (1997). They had 8 items, and we adopted 4 for this study.

Table 4: *Items developed for Interest and Goals*

Construct	Items	Coding
Interest and Goals (IG) (Betz & Voyten, 1997)	I intend to spend more time learning about soft skills than I have been	IG1
	I plan to talk to lots of people about soft skills	IG2
	I am committed to learning more about my abilities and interests	IG3
	I intend to get all the soft skills I need for my career choice	IG4
	I plan to talk to advisers or counselors in my institution about different career opportunities.	IG5

Table 5 contains items for the satisfaction of soft skills and the coding adopted for easy analysis. These items were adopted from Greenhaus et al. (1990). Out of 6 items, four were adopted for this study.

Table 5*: Items developed for Soft Skills Satisfaction*

Construct	Items	Coding
Soft Skills Satisfaction (SS) (Greenhaus et al., 1990)	I am satisfied with what I have achieved using my soft skills.	SS1
	I am satisfied with the progress I am making with my skills to achieve career Goals.	SS2
	I am satisfied with the progress I am making with my skills for advancement in higher studies.	SS3
	I am satisfied with the progress I am making toward meeting my goals for the development of new skills.	SS4

The items for this study were gathered from multiple sources and then underwent expert validation to ensure their relevance and clarity (See **Appendix A**). The validation process involved distributing the form to three experts, whose responses were generally satisfactory, with some constructive comments that were taken seriously and addressed. After the expert validation, the questionnaire was completed by four students to further evaluate its clarity and convenience.

4.6 Content Validation of the Survey Instrument

In this section, we focused on the Content Validation of the Survey Instrument. The items for this study were collected from various sources and then subjected to expert validation to ensure their relevance and clarity. The Scale-level Content Validity Index (S-CVI) plays a crucial role in evaluating the overall content validity of a scale (Polit & Beck, 2006). The validation process involved distributing the form to three experts, who were faculty members of the Department of Technical and Vocational Education at the Islamic University of Technology. Their responses were generally satisfactory, and we also received constructive comments, which were addressed accordingly.

The content validation process for the instrument was conducted following the principles outlined by the ABC of Content Validation and Content Validity Index (CVI) calculation (Yusoff, 2019). Three experts were involved in this evaluation, providing ratings on a scale of 1 (Not Relevant) to 4 (Highly Relevant) for 31 items. The purpose of this section is to present a detailed analysis of the expert ratings and the resulting content validity metrics.

4.6.1 Content Validity Index (CVI)

The Content Validity Index (CVI) serves as a statistical tool for measuring the content validity of individual items, known as I-CVI, as well as the overall scale, referred to as S-CVI. The I-CVI is a representation of the percentage of experts who have rated an item as either 3 (Quite Relevant) or 4 (Highly Relevant). On the other hand, the S-CVI can be calculated as the average of the I-CVIs (S-CVI/Ave) or as the proportion of items that have achieved unanimous agreement among experts (S-CVI/UA). This method serves as a valuable measure for ensuring the validity of assessment items (Lau et al., 2018).

4.6.2 Expert Ratings and I-CVI Calculation

In **Table 6**, you can find the ratings provided by each expert for every item, along with the count of experts who rated the item as 3 or 4, and the I-CVI values associated with each item. The I-CVI for each item is computed using a specific formula.:

$$I - CVI = \frac{Total\ number\ of\ experts}{Number\ of\ experts\ rating\ the\ item\ 3\ or\ 4}$$

4.6.3 Agreement (UA) and Proportional Chance (pc)

In order to provide a more comprehensive evaluation of each item, two extra metrics were computed. The first metric is Universal Agreement (UA), which determines if all experts rated the item as 3 or 4. A value of 1 signifies unanimous agreement, whereas 0 signifies disagreement among the experts. The second metric, Proportional Chance (pc), indicates the probability of the item being rated as 3 or 4 purely by chance.

4.6.3.1 Modified Kappa (k)*

To account for chance agreement, the k* statistic was applied to adjust the I-CVI (Polit & Beck, 2006). This was calculated using the following formula:

$$K* = \frac{I - CVI - pc}{1 - pc}$$

Based on k* values, items were categorized into four interpretation categories

Remove: $k* \leq 0$
Poor: $0 < k* \leq 0.4$
Fair: $0.4 < k* \leq 0.59$
Good: $k* \geq 0.6$

4.6.4 Interpretation

The analysis of the data revealed some key findings, which are summarized in **Table 6**. Specifically, items 4, 9, and 21 showed low I-CVI values and negative k* values, indicating poor agreement among the experts who participated in the study. Due to this lack of consensus, it was recommended that these items be removed from further consideration. On the other hand, items 1, 12, 18, 19, 22, 26, and 30 demonstrated moderate agreement among the experts, with I-CVI values that suggested fair content validity. As for the remaining items, they all exhibited high I-CVI values and positive k* values, indicating strong agreement among the experts and demonstrating strong content validity for these items. The analysis revealed that the scale has strong content validity, with the majority of items demonstrating good agreement among the experts.

***Table 6**: Content Validity Index (CVI)*

Items	Expert-1	Expert-2	Expert-3	Experts	Agree	I-CVI	UA	pc	k*	Interpretation
Item-1	4	3	2	3	2	0.67	0	0.38	0.47	Fair
Item-2	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-3	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-4	1	2	4	3	1	0.33	0	0.38	-0.07	Remove
Item-5	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-6	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-7	3	4	4	3	3	1.00	1	0.13	1.00	Good
Item-8	3	3	3	3	3	1.00	1	0.13	1.00	Good
Item-9	1	2	3	3	1	0.33	0	0.38	-0.07	Remove
Item-10	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-11	4	3	3	3	3	1.00	1	0.13	1.00	Good
Item-12	4	2	3	3	2	0.67	0	0.38	0.47	Fair
Item-13	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-14	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-15	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-16	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-17	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-18	2	3	3	3	2	0.67	0	0.38	0.47	Fair
Item-19	2	3	4	3	2	0.67	0	0.38	0.47	Fair
Item-20	3	4	4	3	3	1.00	1	0.13	1.00	Good
Item-21	2	2	4	3	1	0.33	0	0.38	-0.07	Remove
Item-22	2	3	4	3	2	0.67	0	0.38	0.47	Fair
Item-23	4	4	3	3	3	1.00	1	0.13	1.00	Good
Item-24	3	4	3	3	3	1.00	1	0.13	1.00	Good
Item-25	4	4	4	3	3	1.00	1	0.13	1.00	Good
Item-26	2	4	4	3	2	0.67	0	0.38	0.47	Fair
Item-27	3	3	4	3	3	1.00	1	0.13	1.00	Good
Item-28	4	3	4	3	3	1.00	1	0.13	1.00	Good
Item-29	3	3	3	3	3	1.00	1	0.13	1.00	Good
Item-30	2	3	3	3	2	0.67	0	0.38	0.47	Fair
Item-31	4	3	4	3	3	1.00	1	0.13	1.00	Good
Proportion Relevance	0.74	0.87	0.97			**0.86**	**0.68**			
						S-CVI/ Ave	**SCVI/ UA**			

4.6.5 Scale Validity Summary

The assessment of the scale items' relevance involved calculating the content validity index (CVI) for each expert. The results indicated that Expert 1 had a proportion relevance of 0.74, Expert 2 had a proportion relevance of 0.87, and Expert 3 showed a proportion relevance of 0.97. The overall content validity of the scale was evaluated, revealing an S-CVI/Ave of 0.86, suggesting a high average content validity across all items, and an S-CVI/UA of 0.68, indicating a significant level of universal agreement among the experts. The scale demonstrates strong content validity based on the experts' assessments, providing a solid foundation for its use in the intended context.

The instrument's content validity is well-supported by a Scale-level Content Validity Index (S-CVI/Ave) of 0.86, indicating a high level of overall agreement among the experts involved in the evaluation. However, upon closer examination, it was determined that Items 4, 9, and 21 showed low expert agreement and should be modified or removed from the instrument. However, It's important to note that according to Torres-Malca (2022), when there's low agreement among experts on a particular item, it's more beneficial to modify the item rather than outright remove it. In such cases, the Scale-level Content Validity Index serves as a useful guide for modifying the item to ensure its validity (Zasali et al., 2023). Based on the feedback from the experts, thorough modification of the low agreed items were considered based on the guideline given by Spoto et al. (2023). The remaining items received mostly favorable ratings, illustrating their relevance and representation of the construct being measured. This thorough analysis affirms the instrument's robustness and suitability for the intended research purposes.

4.7 Data Collection Procedure

The study that was conducted made use of a cross-sectional survey instrument to gather data. To ensure maximum participation and convenience, the survey questionnaires were distributed both online through Google Forms and as printed documents. Before filling out the questionnaire, the participants were provided with an overview of the study and its objectives. It was emphasized that participation in the survey was completely voluntary, and that the questionnaire was designed to ensure anonymity and confidentiality of their identity.

To ensure the validity and reliability of the survey, a pilot version was distributed to 20 students. Their feedback was used to assess the suitability, readability, ambiguity, and complexity of the scale. Based on the responses received from the students, the survey was modified accordingly to ensure its effectiveness.

The questionnaire was distributed to the students through various social media platforms, while the printed copies were distributed by the research team who visited the university libraries, academic buildings, and student dormitories on several occasions, and at different times. Whenever a student agreed to participate in the survey, they were asked to fill out the questionnaire and provide it to the researcher present at the venue. The survey was conducted over a period of

three months and resulted in a response rate of 100% for the printed forms, with a cumulative total of 280 questionnaires being collected.

4.8 Data Preparation and Analysis Technique

4.8.1 Data preparation

The survey was designed to gather information from engineering students, and it was conducted both online and in hard copy. The study had a total of 280 participants, but upon data screening, it was discovered that three responses in the physical copies were incomplete. This indicated that some of the participants did not pay enough attention while filling out the survey. As it was important to ensure the validity and reliability of the study, these incomplete responses were removed from the analysis. After the removal of these responses, the final sample size was reduced to 277 engineering students, who provided complete and accurate data for the study.

It is of utmost importance to ensure that the data acquired for any analysis is free of anomalies before proceeding with any data analysis procedure. Therefore, the preparation and filtering of data are essential components of effective data analysis. In this study, descriptive statistics were employed to characterize the participants based on their attribute data. The choice of statistical method used in this study was motivated by the nature of the research. The measurement model was analyzed using structural equation modeling (SEM), and the resulting theoretical model was tested for its ability to explain the data through model fit analysis. During the data analysis process, three responses were screened out of the data set due to inconsistencies in the answers provided, resulting in 276 samples that could be analyzed. All these steps ensured that the acquired data was reliable, and the resulting analysis was accurate and informative.

4.8.2 Data analysis technique

The survey data was analyzed using IBM SPSS and SmartPLS, software tool that are widely recognized and used for data analysis in various fields, including social sciences and forestry. (Gaur & Gaur, 2009) has provided a comprehensive guide to using SPSS for statistical analysis, covering a range of techniques from basic to advanced. Additionally, (Rahman & Muktadir, 2021) have emphasized the importance of SPSS in social science research, highlighting its effectiveness in quantitative data analysis. Moreover, researchers have presented case studies of SPSS application in forestry production and scientific research, demonstrating its versatility across

different domains. These studies collectively underscore the significance of SPSS as a powerful and adaptable tool for data analysis in research. SPSS is known for its ability to handle large sets of data and its user-friendly interface, making it an ideal choice for researchers and analysts in various fields.

Table 6 provides a comprehensive breakdown of the analysis carried out for this study. It includes information about the specific type of data analysis utilized, the tools and methodologies employed, and details regarding the size and characteristics of the population studied used to analyze the research questions as stated below.

> **RQ1:** What is the relationship between engineering students' perceived soft skills and their career self-efficacy?
>
> **RQ2:** What roles do the perceived soft skills play in engineering students' satisfaction with their career development?
>
> **RQ3:** What gender differences exist in engineering students' perception of soft skills, career self-efficacy, and satisfaction?

***Table 7**: Statistics, Data Analysis Techniques and Tools*

Objective	Data Source	Data Analysis Technique	Tools	Population
Data preparation	Survey questionnaire	Descriptive Statistics, Reliability, Normality of Data	SPSS	277
RQ1		Structural Equation Modelling (SEM)	SmartPLS4	
RQ2		SEM	SmartPLS4	
RQ3		SEM (Multigroup)	SmartPLS4	

4.9 Funding and Ethical Declarations

In accordance with the regulations set by the Committee for Advanced Studies and Research (CASR) at the Islamic University of Technology, the research detailed in this thesis was approved on 7 May 2024, with **Ref. No. CASR/54/2024/05/Proc/001**. The implementation of this research strictly adhered to the university's established policies and procedures that govern the execution of research activities, thereby ensuring the impeccable maintenance of the highest ethical standards throughout all phases of the study. The ethical considerations associated with this research have been thoroughly addressed. In accordance with the university’s ethical guidelines, informed consent was obtained from all participants involved in this study. Measures were taken to ensure

the confidentiality and anonymity of the participants, and all data were handled with the utmost care to prevent any misuse or breach of privacy.

All resources and funding used in this study were provided by the Islamic University of Technology. This research did not receive any financial or material support from external organizations that could potentially influence or compromise the integrity and impartiality of the research findings. This declaration underscores the commitment to conducting this research with complete autonomy and objectivity.

4.10 Conclusion

In this chapter, we have delved into the theoretical framework that will serve as the foundation for this study, namely the Social Cognitive Theory and all its constructs. We have also thoroughly examined the populations and sampling techniques utilized in this study. Furthermore, we have extensively covered the data preparation processes and the data analysis techniques that have been employed. In the next chapter, the focus will be shifted to a detailed discussion of the data analysis.

Chapter 5: **Results and Data Analysis**

This chapter delves into the statistical analysis and insights that were obtained from the survey data. The focus of the analysis is to determine the role of soft skills on the career self-efficacy and satisfaction of engineering students, while also investigating the underlying relationships between these variables. In other words, the chapter aims to explore the perceived soft skills of engineering students and how they relate to their career satisfaction while validating the proposed model. The analysis starts with a presentation of the participants and demographic information using descriptive statistics. Following this, validity and reliability assessments are conducted to evaluate the inherent relationships between the latent and measured variables. Structural equational modeling is then used to gain a better understanding of the interrelation between the variables, and to explore the mediating role played by self-efficacy, expected outcomes, goals and interests. This chapter provides a comprehensive analysis of the data collected from the survey and sheds light on the relationships between various factors that influence the career satisfaction of engineering students.

5.1 Descriptive Analysis

5.1.1 Description of Demographic Information

5.1.1.1 Age

Based on the responses collected, we have found that the age range of the participants was between 18 and 49 years. However, as displayed in **Figure 2**, the majority of the respondents, accounting for roughly 63.1% of the total, fall within the age range of 20 to 23. Specifically, age 21 had the highest number of respondents, accounting for 28.9% of the total, followed by age 22 with 18%, age 20 with 17%, and age 23 with 10.1%. This information can help understand the demographic profile of the participants and can provide insights into their preferences, behaviors, and attitudes.

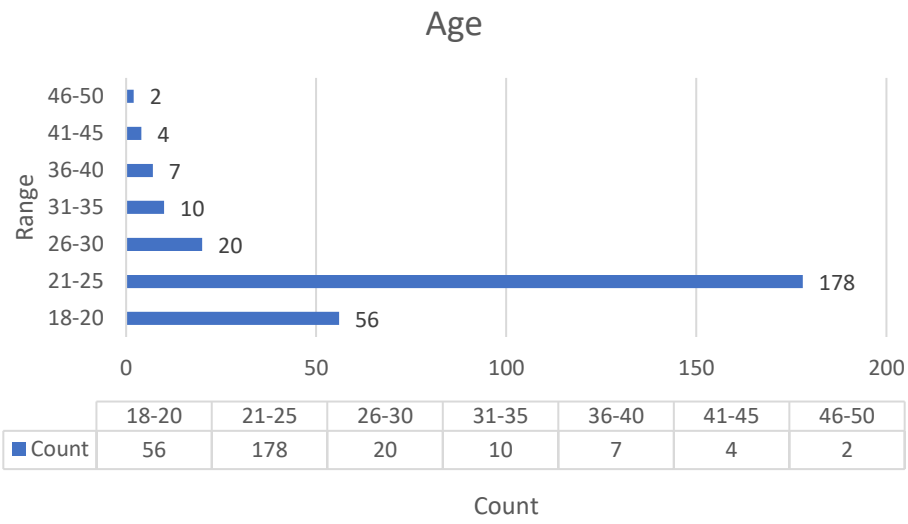

***Figure 2**: Age Range*

5.1.1.2 Gender

The study's participants had a diverse demographic profile. Most participants were males, making up 77.62% of the total sample size. Females, on the other hand, accounted for a significantly smaller portion, comprising only 22.38% of the study's participants (See **Figure 3**).

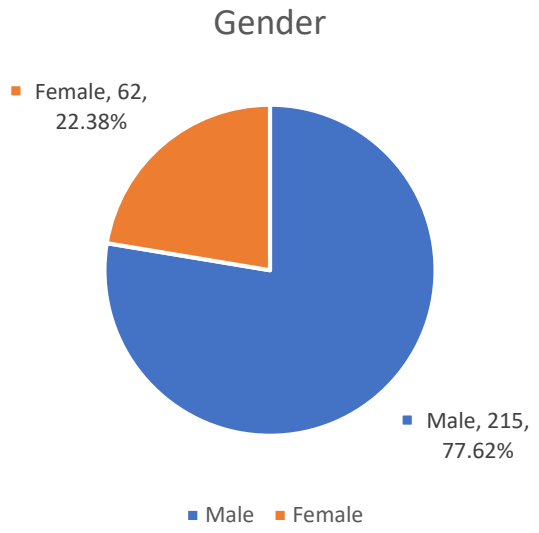

***Figure 3**: Gender*

5.1.1.3 University Status

In the study, it was found that the majority of the participants, precisely 97%, attended international universities. From **Figure 4**, a small percentage of only 2% were enrolled in private institutions, as compared to the majority who were attending foreign universities. Even fewer participants, only 1%, were found to be enrolled in other types of institutions.

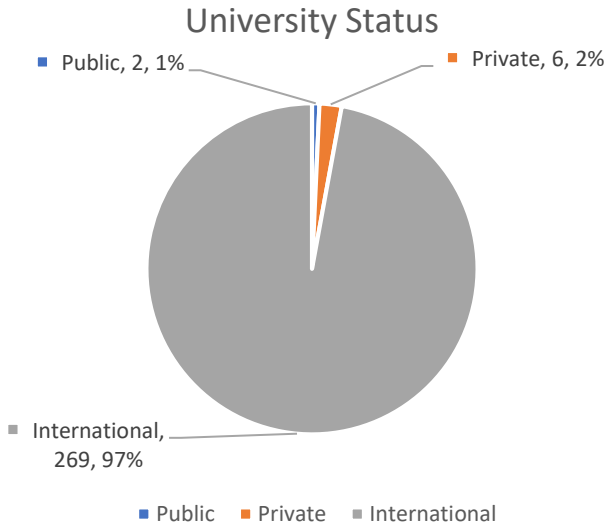

***Figure 4**: University Status*

5.1.1.4 Student Status

The study found that most of the participants were domestic students, accounting for 73% of the total sample size. This implies that many students who took part in the research were Bangladesh nationals. On the other hand, only 27 % of the participants were identified as international students currently studying in Bangladesh, indicating that a much smaller portion of the sample size was composed of individuals from foreign countries (See **Figure 5**). The participants were mainly from Computer Science Engineering, Software Engineering, Electrical and Electronics Engineering, Civil and Environmental Engineering, Mechanical and Production Engineering, and Biomedical Engineering. The majority of the participants are from Software Engineering. These participants are current students from year 2 to year 4 for bachelor's, year 3 for diploma, and year 2 for masters.

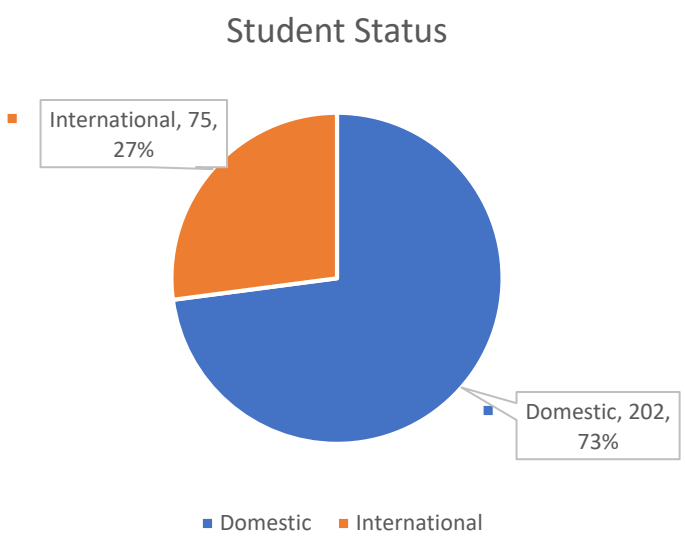

***Figure 5**: Student Status*

5.1.1.5 Academic Level

According to the survey results displayed on **Figure 6**, most of the participating students, i.e., 94.9%, were enrolled in undergraduate programs, while a small percentage of 4.3% were pursuing their master's degree, and only 0.7% were enrolled in diploma courses. Interestingly, the survey did not have any PhD students participate.

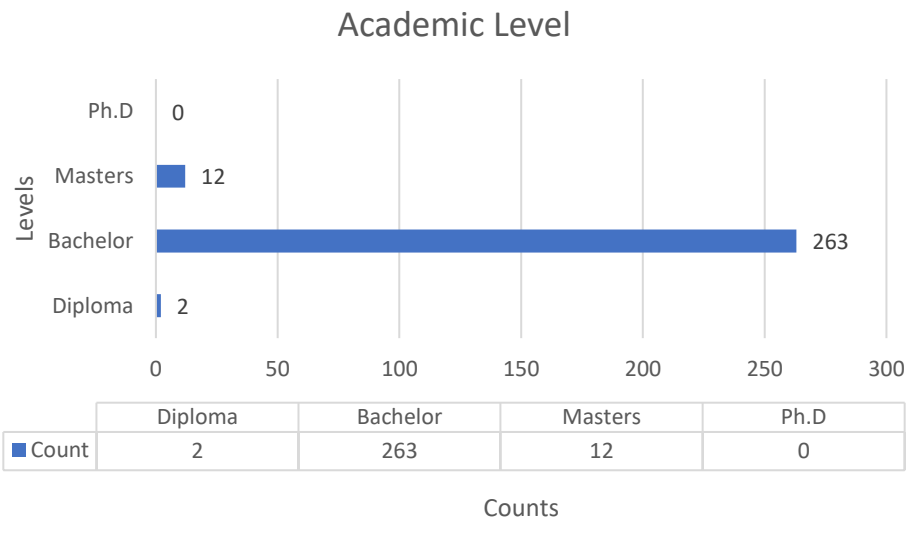

***Figure 6**: Academic Levels*

***Table 8**: Summary of the demographics of the participants.*

Category		Frequency (N= 277)	Percentage
Gender	Male	215	77.62%
	Female	62	22.38%
University	Pubic	2	1%
	Private	6	2%
	International	269	97%
Student Status	Domestic	202	73%
	International	75	27%
Academic Level	Diploma	2	1%
	Bachelor	263	95%
	Master	12	4%
	Ph.D	0	0.0%

The survey was conducted both online and in hard copy, with a total of 280 students participating. However, upon data screening, it was discovered that three responses in the physical copies were incomplete, indicating a lack of attention from the participants. As a result, these responses were removed from the study, leaving behind a final sample of 277 engineering students. The participants' demographic profile was diverse, with males making up a significantly larger portion than females. Additionally, the vast majority of participants (97%) were attending foreign universities, while only a small percentage (2 %) were enrolled in private institutions and even fewer (1%) were in state universities. Most of the participants were domestic students (73%), while only a quarter (27%) were overseas students. Most of the students (95 %) were pursuing bachelor's degrees, with a few pursuing master's degrees (4%) or diplomas (1%). No PhD students participated in the survey. The distribution of participants by gender, age, university type, student status, and academic level is shown in **Table 9.**

5.1.2 Descriptive Statistics of the Individual Items

Skewness and kurtosis are used to assess the symmetry and peakedness of a distribution, respectively. If a distribution is perfectly normal, the skewness and kurtosis values would be close to 0. A positive skewness value indicates that scores are clustered to the left at the low values, whereas a negative skewness value suggests a clustering of scores on the high end (right-hand side of a graph). A positive kurtosis value indicates that the distribution is rather peaked, with long thin tails, while a kurtosis value below 0 indicates a relatively flat distribution with too many cases in the extremes.

***Table 9**: Descriptive statistics of the individual items*

Constructs	Items	Mean	Std. Error of Mean	Median	Std. Deviation	Skewness	Kurtosis
Perceived Soft Skills	PS1	3.83	.060	4.00	1.002	-.677	-.025
	PS2	4.12	.051	4.00	.852	-1.109	1.682
	PS3	3.79	.058	4.00	.959	-.662	.297
	PS4	3.60	.056	4.00	.926	-.390	-.098
	PS5	3.82	.061	4.00	1.011	-.866	.675
	PS6	3.71	.064	4.00	1.065	-.499	-.364
	PS7	3.91	.056	4.00	.936	-.867	.714
	PS8	3.80	.057	4.00	.956	-.571	-.004
	PS9	4.02	.051	4.00	.855	-.812	.770
	PS10	3.80	.061	4.00	1.019	-.537	-.379
Self-Efficacy	SE1	3.56	.058	4.00	.971	-.350	-.403
	SE2	3.61	.054	4.00	.897	-.395	-.045
	SE3	3.97	.054	4.00	.892	-1.022	1.265
	SE4	3.96	.057	4.00	.943	-.997	1.039
	SE5	3.92	.054	4.00	.897	-.722	.337
	SE6	3.83	.054	4.00	.898	-.757	.786
	SE7	3.50	.058	3.00	.969	-.210	-.260
	SE8	3.54	.059	4.00	.983	-.405	-.183
Expected Outcome	OE1	4.30	.050	4.00	.826	-1.314	2.063
	OE2	4.33	.049	5.00	.810	-1.204	1.275
	OE3	4.18	.057	4.00	.946	-1.144	1.032
	OE4	4.23	.052	4.00	.868	-1.245	1.612
Interest and Goals	IG1	3.82	.056	4.00	.939	-.522	-.087
	IG2	3.48	.060	3.00	.995	-.268	-.251
	IG3	4.02	.053	4.00	.887	-.884	.856
	IG4	3.91	.053	4.00	.889	-.641	.243
	IG5	3.79	.062	4.00	1.026	-.780	.267
Soft Skills Satisfaction	SS1	3.15	.072	3.00	1.193	-.108	-.941
	SS2	3.18	.065	3.00	1.086	-.081	-.762
	SS3	3.17	.069	3.00	1.142	-.035	-.859
	SS4	3.31	.068	3.00	1.126	-.167	-.825

In the analysis carried out, we found negative skewness for all constructs, indicating that the scores were clustered on the higher end. In terms of kurtosis, we observed a mixture of positive and negative values, with the positive values exceeding the negative ones. Specifically, expected outcomes exhibited positive values in all its items, while skill satisfaction had negative kurtosis in all its items. For the rest of the constructs, we found both positive and negative kurtosis values. To gain a better understanding of the shape of the distribution, Tabachnick & Fidell (2019) recommend inspecting the distribution's shape using a histogram. It is worth noting that with

reasonably large samples, skewness does not make a substantive difference in the analysis, and kurtosis can result in an underestimation of the variance. However, the risk of underestimation is reduced with a large sample size (200+ cases).

5.1.3 Reliability and Descriptive Statistics of Theoretical Constructs

***Table 10**: Reliability and Descriptive Statistics of the Theoretical Constructs*

Constructs	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis	alpha
PS Total		2.00	4.90	3.8960	.74525	-.835	.334	.892
SE Total	277	1.63	4.88	3.6600	.79837	-.921	.698	.894
OE Total		2.00	5.00	4.1900	.83939	-1.152	1.062	.817
IG Total		2.00	5.00	3.7120	.85065	-.307	-.603	.828
SS Total		1.00	5.00	3.6000	.91572	-1.073	1.293	.835
Reliability statistic								.962

According to the findings presented in **Table 2**, the coefficient alpha value of 0.962 indicates that the internal consistency among the constructs is very good, as it is well above the threshold of 0.8. It is worth noting that an internal consistency value higher than 0.9 is considered excellent, while a value higher than 0.7 is deemed acceptable (Betcherman & Blunch, 2008). Therefore, the results suggest that the constructs demonstrate strong internal consistency. Furthermore, this analysis revealed that the skewness for all the constructs is negative, indicating that the data is skewed to the left. Only the constructs of interest and goal exhibit a negative Kurtosis, which suggests that the distribution of data for these constructs is flatter than a normal distribution. Overall, these findings provide valuable insights into the quality of the data and the reliability of the constructs under investigation.

5.1.4 Assessing the Normality of Data

5.1.4.1 Kolmogorov-Smirnov and Shaprio-Wilk's Test

The Kolmogorov-Smirnov test is a statistical method used to determine whether a given dataset follows a particular distribution, such as a normal distribution. It is especially useful when the parameters of the distribution are unknown or when dealing with non-normal distributions. The test compares the observed cumulative distribution function (CDF) of the data with the theoretical CDF of the specified distribution.

The test is non-parametric, meaning it does not rely on any assumptions about the parameters of the distribution being tested. The null hypothesis (H0) for the Kolmogorov-Smirnov test is that the data are distributed according to the specified distribution. The alternative hypothesis is that the data do not follow

the specified distribution. The test statistic used in the Kolmogorov-Smirnov test is the maximum absolute difference between the empirical cumulative distribution function (ECDF) of the observed data and the cumulative distribution function (CDF) of the theoretical distribution. This statistic is used to assess the goodness-of-fit between the observed data and the theoretical distribution.

The degrees of freedom for the test represent the number of independent values or quantities that can be assigned to a statistical distribution. In the context of the Kolmogorov-Smirnov test, the degrees of freedom are related to the sample size and the specific distribution being tested. The significance level associated with the test statistic indicates the probability of obtaining the observed results if the null hypothesis is true. A significance level below the chosen alpha threshold (usually 0.05) indicates rejection of the null hypothesis, suggesting that the data do not follow the specified distribution. This means that there is evidence to suggest that the observed data significantly deviate from the specified distribution.

The Shapiro-Wilk test is a statistical test commonly used to determine whether a given dataset follows a normal distribution. It is based on the correlation between the dataset and the corresponding normal scores. Similar to the Kolmogorov-Smirnov test, the null hypothesis (H0) of the Shapiro-Wilk test states that the data are normally distributed.

The test statistics in the Shapiro-Wilk test measure the degree of difference between the observed data and the expected values assuming normality. In this test, the degrees of freedom are calculated based on the sample size. The significance level associated with the test statistic represents the probability of observing the data if the null hypothesis is true. If the significance level is below a pre-determined alpha threshold, typically 0.05, the null hypothesis is rejected, suggesting that the data does not adhere to a normal distribution.

The Sig. values associated with each variable (PS Total, SE Total, OE Total, IG Total, SS Total) on **Table 13** for both the Kolmogorov-Smirnov and Shapiro-Wilk tests are less than 0.05 ($\alpha = 0.05$), indicating statistical significance. Therefore, we reject the null hypothesis (H0) for all variables, suggesting that the data do not follow a normal distribution. This implies that the assumptions of normality required for certain parametric statistical tests may not be met for these variables. As a result, alternative non-parametric tests or transformations may be more appropriate for analyzing these datasets. It's worth noting that the Lilliefors Significance Correction is applied when the Kolmogorov-Smirnov test is used on smaller sample sizes to adjust the significance level accordingly. However, since the provided results do not include the corrected significance levels, we focus on the standard significance levels provided for interpretation.

***Table 11**: Kolmogorov-Smirnov and Schapiro-Wilk's Test*

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Constructs	**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
PS Total	.070	277	.002	.973	277	.000
SE Total	.071	277	.002	.975	277	.000
OE Total	.141	277	.000	.888	277	.000
IG Total	.109	277	.000	.966	277	.000
SS Total	.109	277	.000	.974	277	.000
a. Lilliefors Significance Correction						

5.1.4.2 Assessing Histograms, Normal Q-Q Plot, and Box Plots.

When examining the normality of data, various techniques are utilized to ensure a thorough assessment. These methods include the use of histograms, Normal Q-Q plots, and box plots. Each approach offers distinct perspectives and works in harmony with the others, enabling a comprehensive evaluation of the data's normality.

Histograms

Histograms are bar graphs depicting the frequency distribution of a dataset, offering a quick visual assessment of the distribution's shape. They enable the observation of symmetry, central peak, and data spread. By displaying the frequency of data points across intervals, histograms allow for the identification of deviations from normality, such as skewness, multimodality, and outliers (Casement & McSweeney, 2022). However, the effectiveness of histograms can be influenced by the choice of bin width and may be less informative with smaller sample sizes.

Normal Q-Q Plots (Quantile-Quantile Plots)

Q-Q plots compare the quantiles of the data distribution against the quantiles of a theoretical normal distribution. Ideally, if the data follows a normal distribution, the points on the Q-Q plot will align along a straight line. Deviations from this line indicate departures from normality, such as heavy tails (kurtosis) or skewness (Oppong & Agbedra, 2016). The addition of confidence bands to Q-Q plots enhances their utility by providing an objective means of determining whether observed deviations are statistically significant or attributable to random variation.

Box Plots

Box plots offer a summary of the data's central tendency, spread, and potential outliers. They display the median, quartiles, and extremes of the data, with the box representing the interquartile range (IQR) and whiskers extending to the minimum and maximum values within 1.5 times the IQR from the quartiles.

Outliers are plotted as individual points. Box plots are effective for quickly identifying skewness and outliers, providing insights into the data's symmetry and the presence of unusual values (Casement & McSweeney, 2022). However, compared to histograms and Q-Q plots, box plots do not convey detailed information about the distribution shape.

5.1.4.2.1 Interpretation of Histograms, Normal Q-Q Plot, and Box Plots for Perceived Soft Skills (PS)

The histogram in **Figure 7** illustrates the frequency distribution of the PS Total variable within the dataset. The distribution appears to be approximately normal, with a central peak indicating that the majority of data points are clustered around the mean value of approximately 3.94. The mean of the distribution is 3.940297, which is close to the peak of the histogram, suggesting that most scores are centered around this value. The data points range from approximately 2 to slightly above 5, indicating a moderate spread around the mean. The standard deviation of 0.8043705 further quantifies this spread, showing that the data are reasonably dispersed around the mean. The distribution shows a slight skewness to the left, as the tail on the left side is longer than on the right. This skewness is minor, indicating that while the distribution is not perfectly symmetrical, it is close to normal. There are a few data points at the lower end of the range (around 2), which could be considered outliers, given their distance from the central cluster of data. The histogram provides a clear visualization of the distribution of PS Total, indicating a nearly normal distribution with a slight left skew and a few potential outliers at the lower end of the scale.

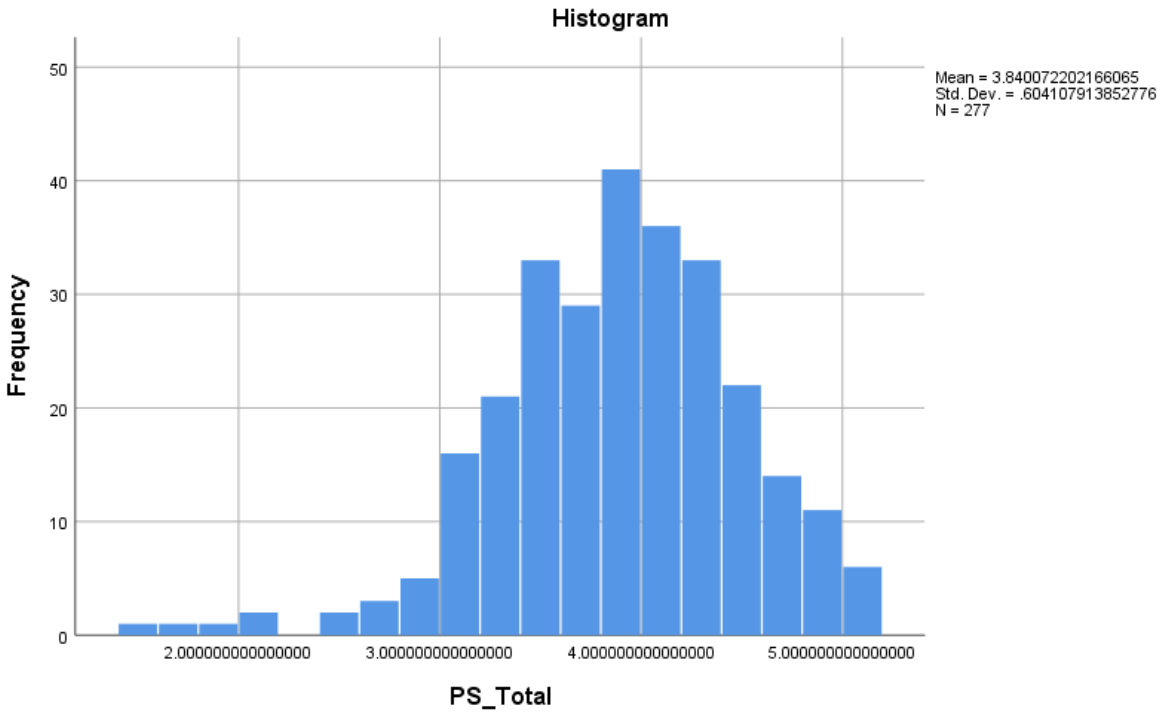

***Figure 7**: Histogram of Frequency Distribution for Perceived Soft Skills (PS)*

The Normal Q-Q plot in **Figure 8** evaluates the normality of the PS Total variable by plotting the observed values against the expected values from a normal distribution. The plot indicates that the majority of data points align closely with the 45-degree reference line, suggesting that the distribution of PS Total is approximately normal. However, there are minor deviations from the line at the lower and upper tails, hinting at some skewness or kurtosis in the distribution. Furthermore, a few points at the extreme ends of the distribution deviate noticeably from the line, indicating the presence of outliers. These outliers could potentially impact the overall distribution and contribute to the observed deviations. In summary, the Normal Q-Q plot confirms that the PS_Total variable is approximately normally distributed, with minor deviations at the tails and a few outliers, which is consistent with the histogram's indication of a nearly normal distribution with slight skewness.

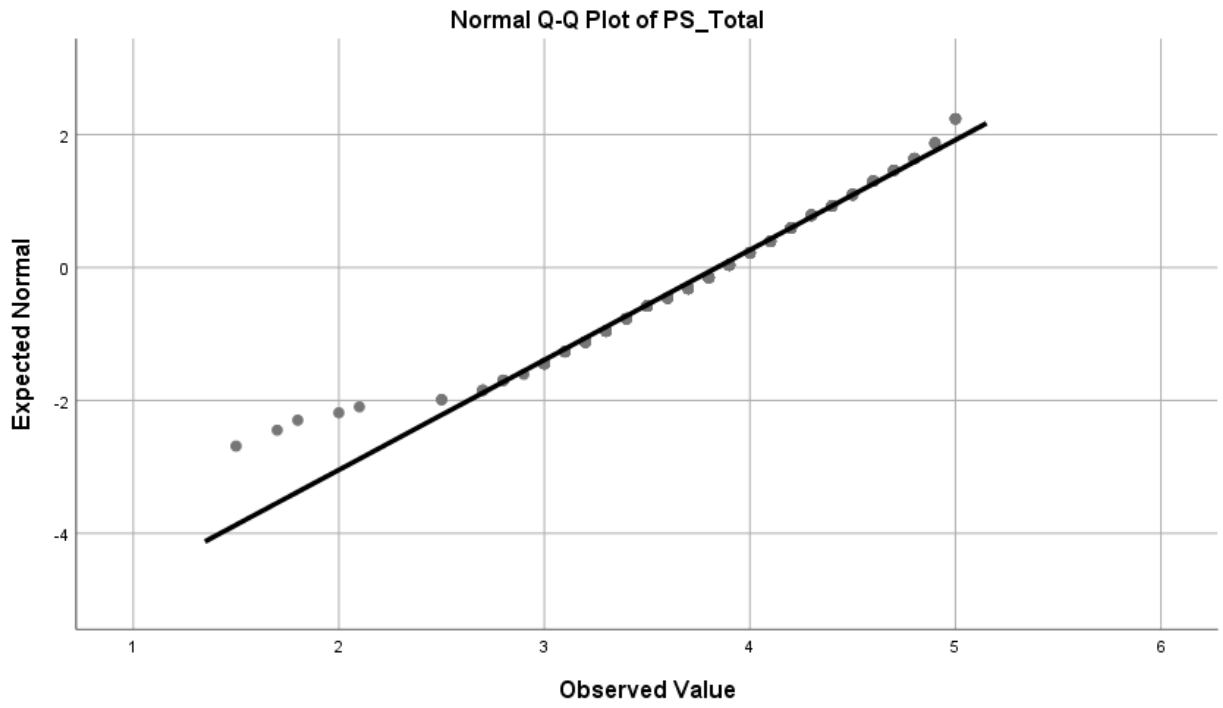

***Figure 8**: Normal Q-Q plot for Perceived Soft Skills (PS)*

The box plot depicted in **Figure 9** offers a comprehensive overview of the PS Total variable's distribution. This visual representation highlights key statistics such as the median, quartiles, and potential outliers within the dataset. The median value, denoted by the thick line inside the box, is approximately 4, indicating an equal split of data points above and below this value. The box spans from the first quartile (Q1) to the third quartile (Q3), encompassing the middle 50% of the data. The interquartile range (IQR) is approximately 3.5 to 4.5, indicating the concentration of the central half of the data within this range. The lower whisker extends to the minimum data point that is not considered an outlier, approximately at 2.5, while the upper whisker extends to the maximum data point that is not considered an outlier, approximately at 5. The box plot identifies several outliers below the lower whisker, around values of 2 or lower, specifically at data points 37, 14, 59, 400, and 41. These outliers fall outside the range of the whiskers, signifying their significantly lower values compared to the rest of the data.

The box plot reveals that the PS_Total variable exhibits a slightly skewed distribution with a concentration of data around the median value of 4. The data shows moderate spread, with the central 50% of values falling between 3.5 and 4.5. The presence of several lower outliers indicates

values significantly lower than the main cluster, which could potentially impact the overall dataset analysis. The box plot reaffirms the observations from previous histograms and Q-Q plots, demonstrating a nearly normal distribution with a slight left skew and several lower outliers.

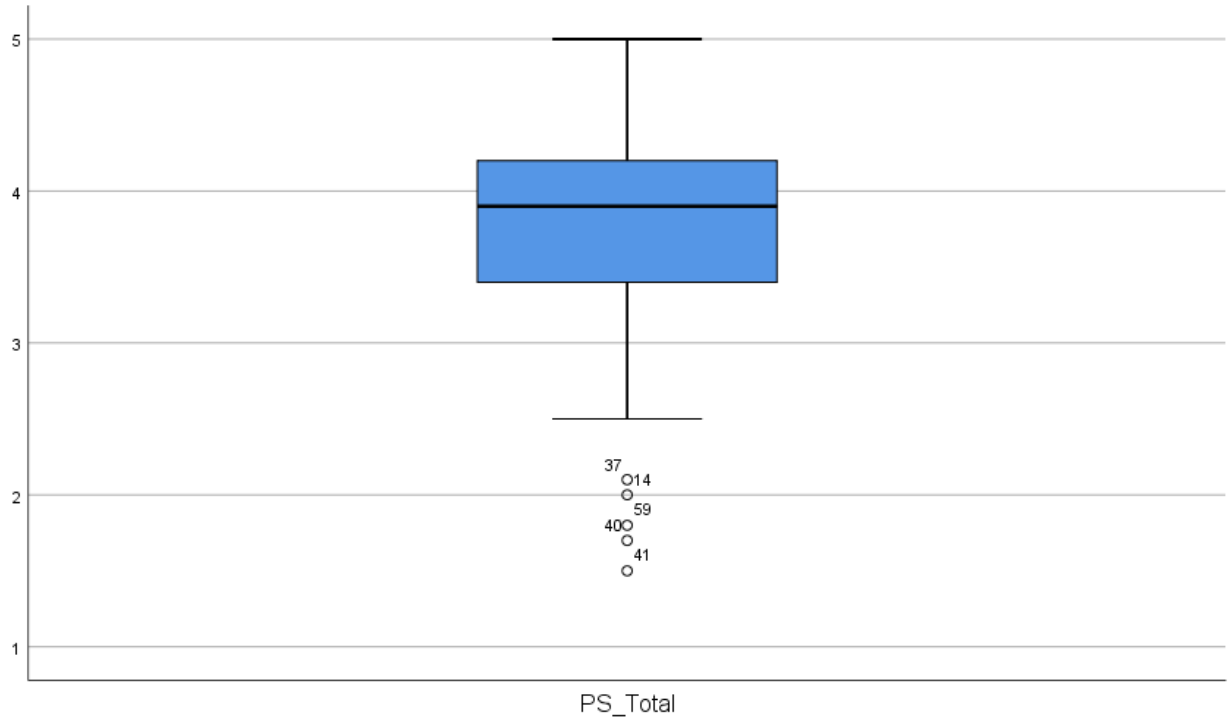

***Figure 9**: Box plot for perceived Soft Skills (PS)*

5.1.4.2.2 Interpretation of Histograms, Normal Q-Q Plot, and Box Plots for Self-Efficacy (SE)

The histogram in **Figure 10** provides a visual representation of the frequency distribution of the SE Total variable. Upon analysis, the distribution is observed to be slightly right-skewed, indicating that the majority of data points are concentrated between the values of 3 and 4.5. The mean value of 3.737 falls close to the center of this cluster, suggesting a relatively symmetrical distribution. With a standard deviation of 0.672, we can infer that there is a moderate spread of data points around the mean.

Notably, there are a few data points on the lower end, specifically around the values of 1 and 2, which exhibit characteristics of outliers. This suggests that there is some variability in the data. The concentration of SE Total data between 3 and 4.5, coupled with the slight skew towards higher

values, further emphasizes the distribution pattern. The presence of outliers at the lower end serves to underscore the variability and potential asymmetry in the dataset.

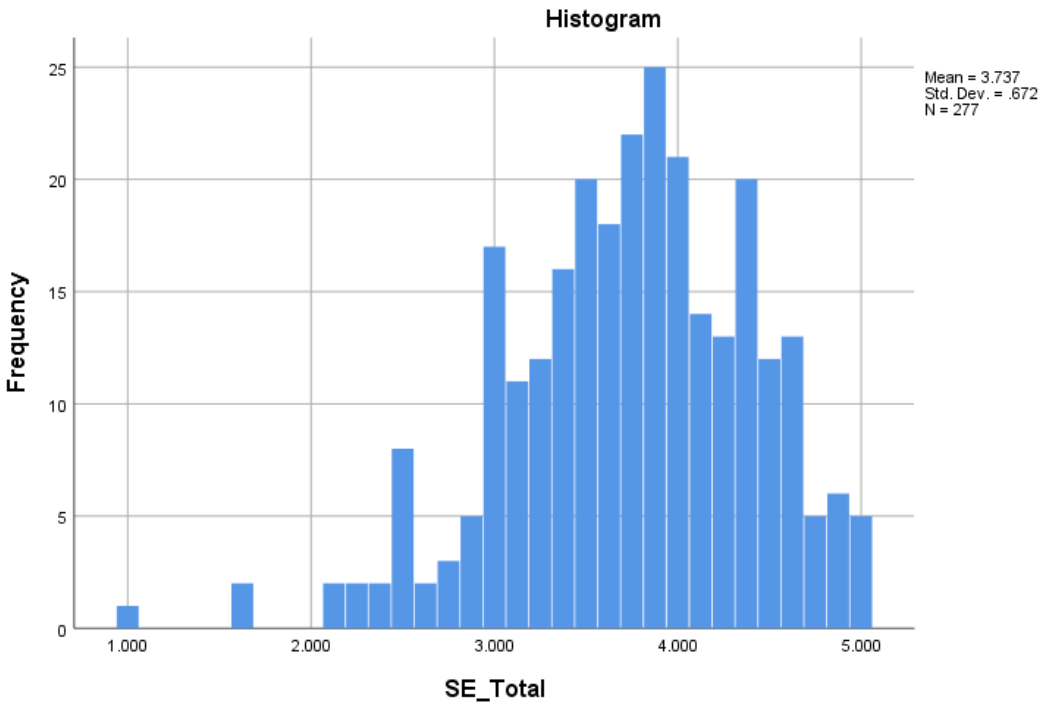

***Figure 10**: Histogram of Frequency Distribution for Self-Efficacy (SE)*

Upon analyzing the Q-Q plot in **Figure 11**, we can observe that the majority of data points closely align with the 45-degree reference line, indicating that the SE Total distribution approximates a normal distribution. However, there are minor deviations present at the lower and upper tails, suggesting a slight skewness in the data. Notably, some data points, particularly those below 2 and above 5, deviate significantly from the reference line, indicating the presence of outliers. In summary, the Q-Q plot confirms that the SE Total data exhibits approximate normality with slight deviations at the tails, and it also highlights the presence of outliers, particularly at the lower end of the distribution.

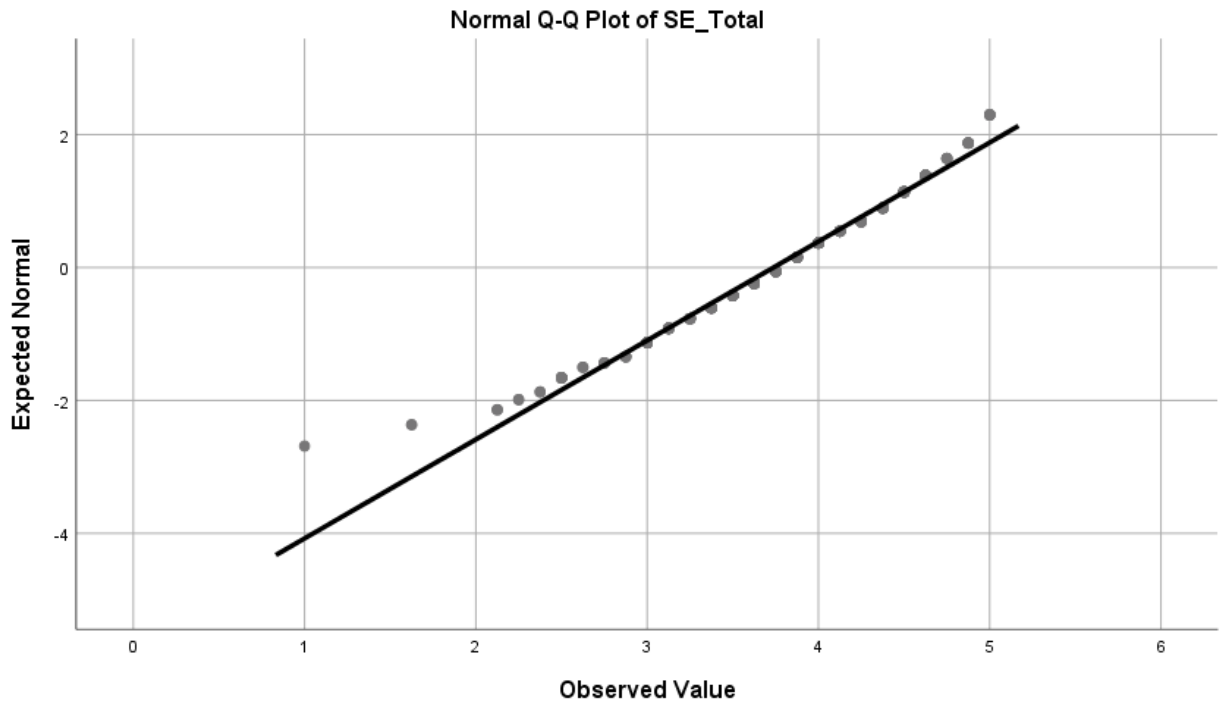

***Figure 11**: Normal Q-Q plot for Self-Efficacy (SE)*

The box plot offers a comprehensive overview of the distribution of the SE Total variable (See **Figure 12**). The median value is approximately 4, and the interquartile range (IQR) spans from about 3.5 to 4.25. The lower whisker stretches to around 2.5, while the upper whisker extends to approximately 5. In addition, a few outliers are noticeable below the lower whisker, specifically at values around 1 and 2, corresponding to data points 14, 59, and 231. The box plot reveals a slightly right-skewed distribution, with a median value of 4. The presence of lower outliers indicates the existence of some extreme values that are significantly lower than the majority of the data.

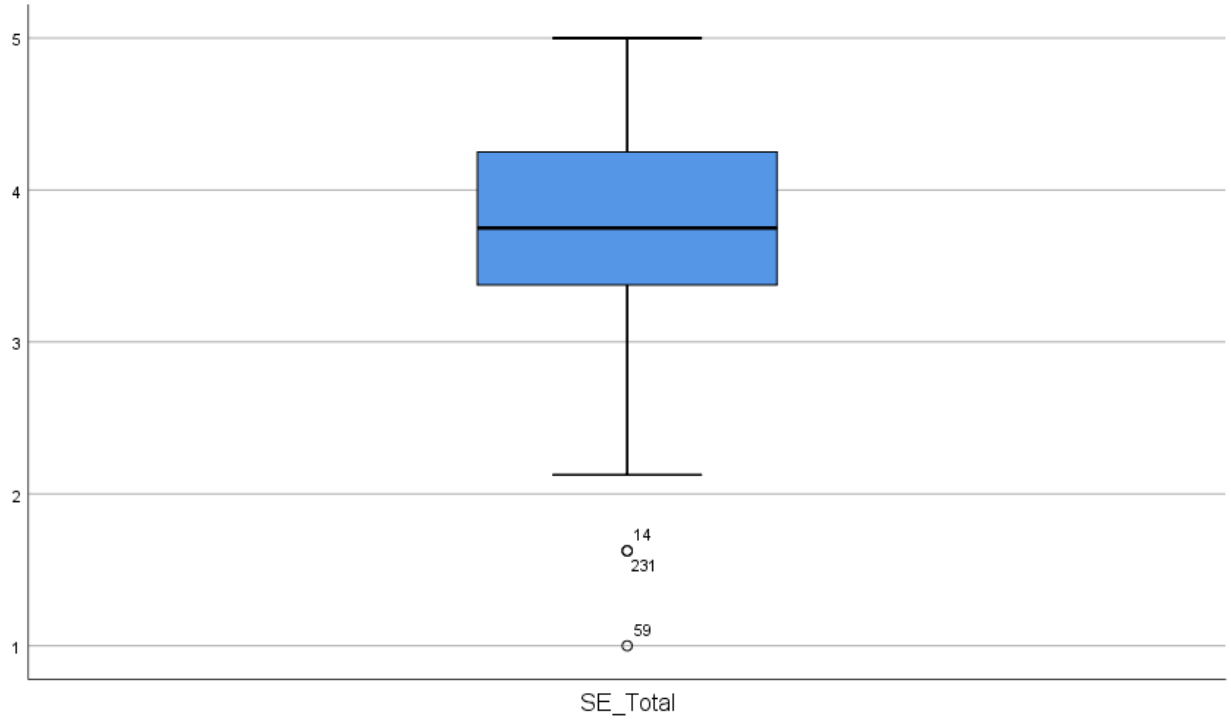

***Figure 12**: Box plot for Self-Efficacy (SE)*

5.1.4.2.3 Interpretation of Histograms, Normal Q-Q Plot, and Box Plots for Perceived Outcome Expectations (OE)

The histogram in **Figure 13** provides a visual representation of the frequency distribution of the variable OE Total. The distribution is visibly skewed to the right, with a noticeable peak around the range of 4.5 to 5. This indicates that the majority of the data is concentrated towards the higher end of the scale. The mean value of 4.26 further supports this observation. Additionally, the standard deviation of 0.685 suggests a moderate amount of variability around the mean.

It's worth noting that there are a few data points falling below 2, which could be considered outliers. This suggests that there are some values in the dataset that deviate significantly from the majority of the data. The histogram illustrates a right-skewed distribution for the variable OE Total, with the majority of values clustering between 4 and 5. The right tail of the distribution indicates a concentration of higher values, while the presence of lower outliers suggests some degree of variability in the dataset.

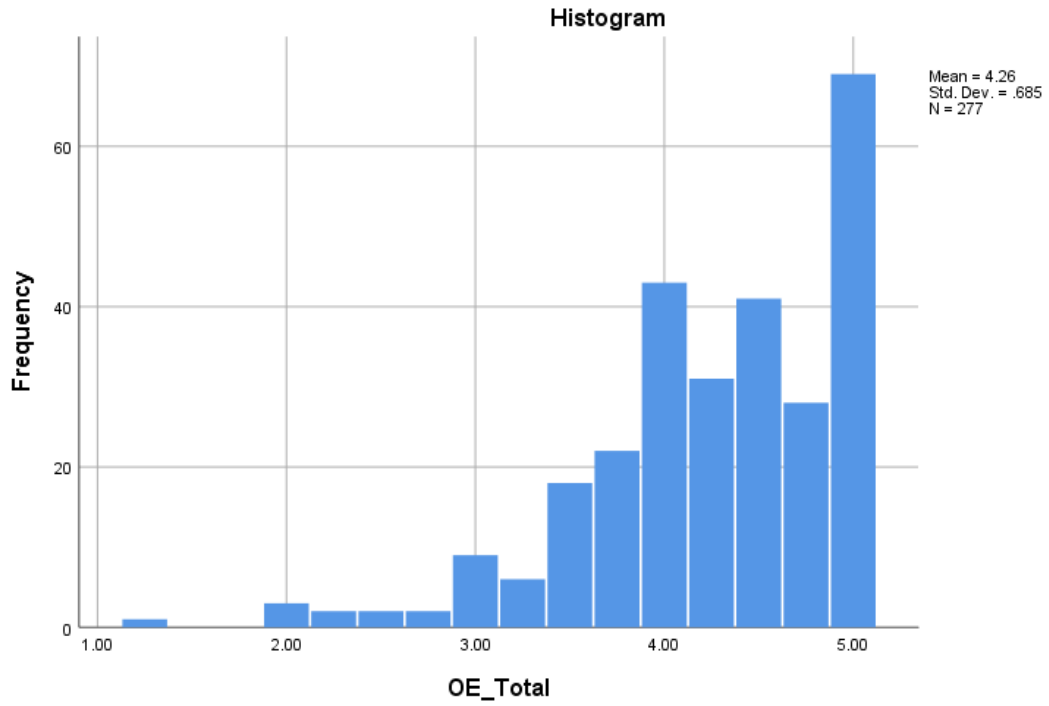

***Figure 13**: Histogram of Frequency Distribution for Self-Efficacy (SE)*

Upon examining the Q-Q plot in **Figure 14**, it is evident that the distribution of the OE Total variable is being assessed for normality. The majority of data points closely align with the 45-degree reference line, which suggests that the distribution approximately follows a normal distribution. It is worth noting that noticeable deviations are observed at both the lower end (below 3) and upper end (above 4.5) of the plot, indicating potential skewness in the data. Additionally, there are points that significantly deviate from the reference line, particularly below 2, which suggests the presence of outliers. The findings from the Q-Q plot align with the right skewness observed in the histogram. These deviations at the tails and the presence of outliers collectively indicate that the OE Total variable is not perfectly normally distributed.

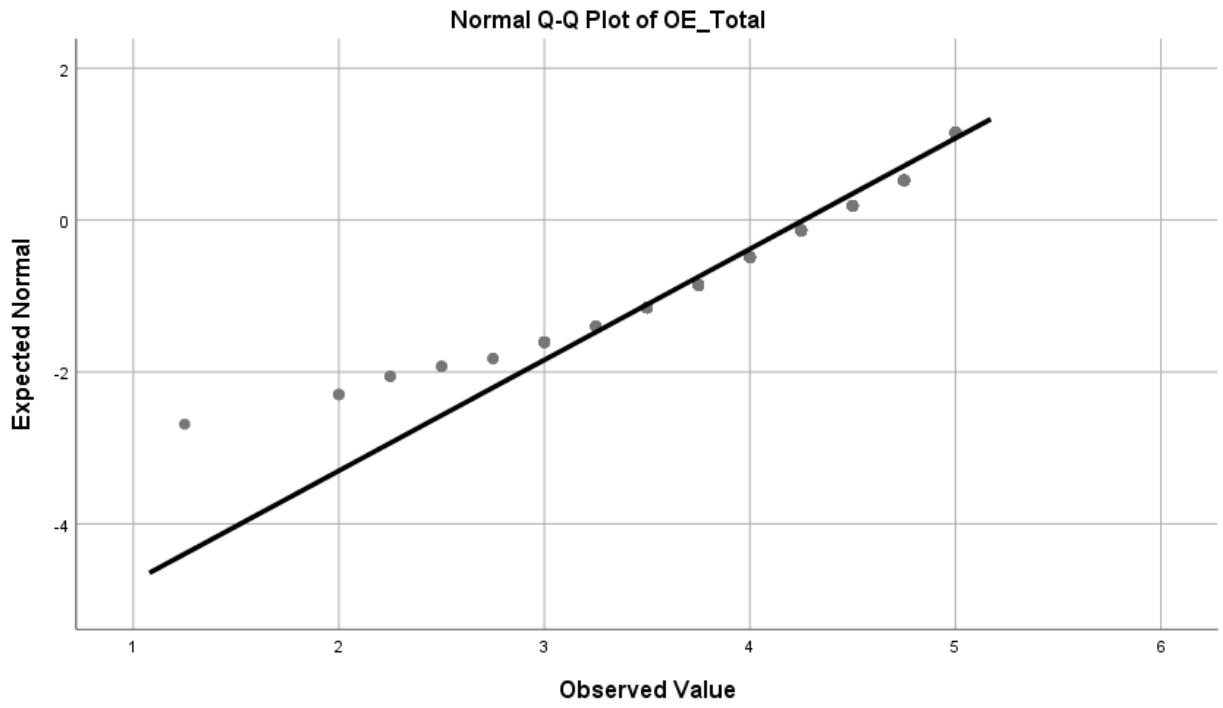

***Figure 14**: Normal Q-Q plot for Outcome Expectations (OE)*

The box plot visually summarizes the distribution of the OE Total variable in **Figure 15**. The median value is approximately 4.5, and the interquartile range (IQR) spans from around 4 to 5. The lower whisker extends to about 3, while the upper whisker extends to around 5. Notably, several outliers are observed below the lower whisker, specifically at values around 1 and 2 (data points 37, 14, 40, 54, 56, 60, and 108). This suggests the presence of data points that are significantly lower than the rest of the distribution. The box plot indicates a right-skewed distribution, with a median of 4.5. The presence of multiple lower outliers suggests substantial variability at the lower end of the data distribution, potentially indicating the presence of unusual data points or measurement errors.

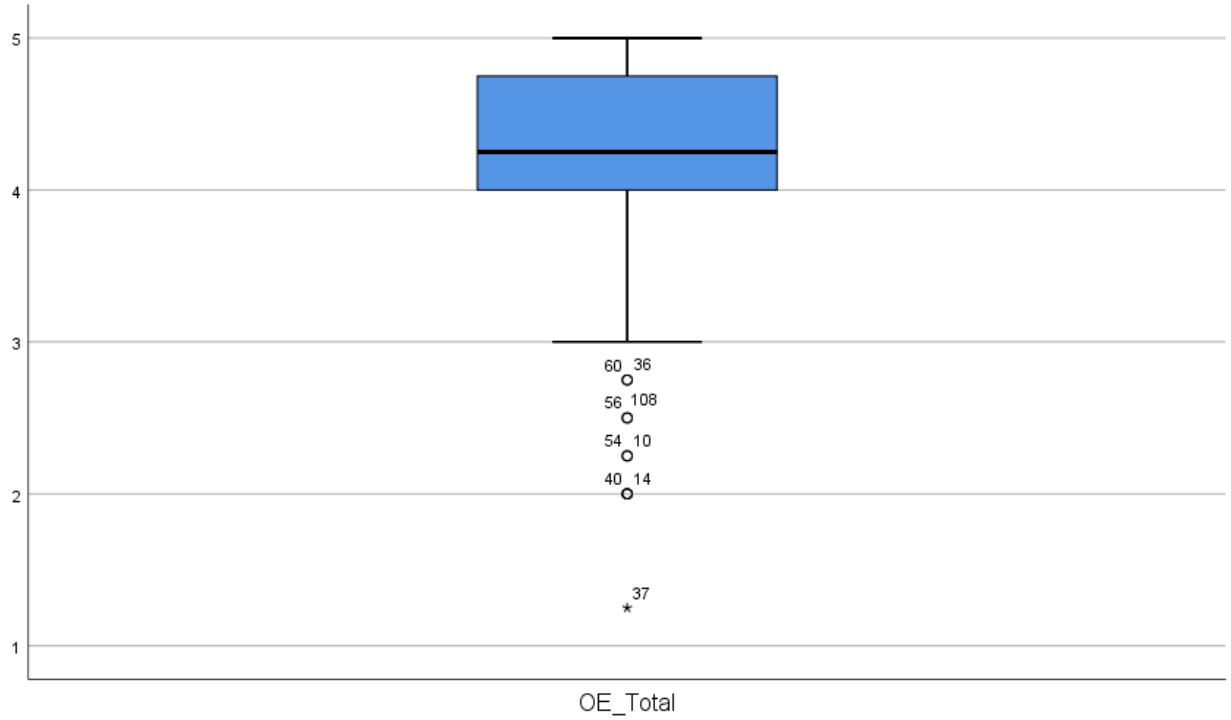

***Figure 15**: Box plot for Outcome Expectation (OE)*

5.1.4.2.4 Interpretation of Histograms, Normal Q-Q Plot, and Box Plots for Interest and Goals (IG)

The histogram in **Figure 16** offers a visual depiction of the frequency distribution of the IG_Total variable. Upon analysis, it is apparent that the distribution is slightly skewed to the right, with a prominent peak occurring within the 3.5 to 4 range. The mean value of 3.80 further indicates that the majority of the data is centered around this value. Moreover, the standard deviation of 0.696 suggests a moderate level of variability around the mean. It is worth noting that there are a few data points falling below 2, which could potentially be considered as outliers. In summary, the histogram illustrates a slightly right-skewed distribution for IG_Total, with most values clustering between 3 and 4.5. The existence of a right tail and lower outliers underscores the skewness and variability within the data.

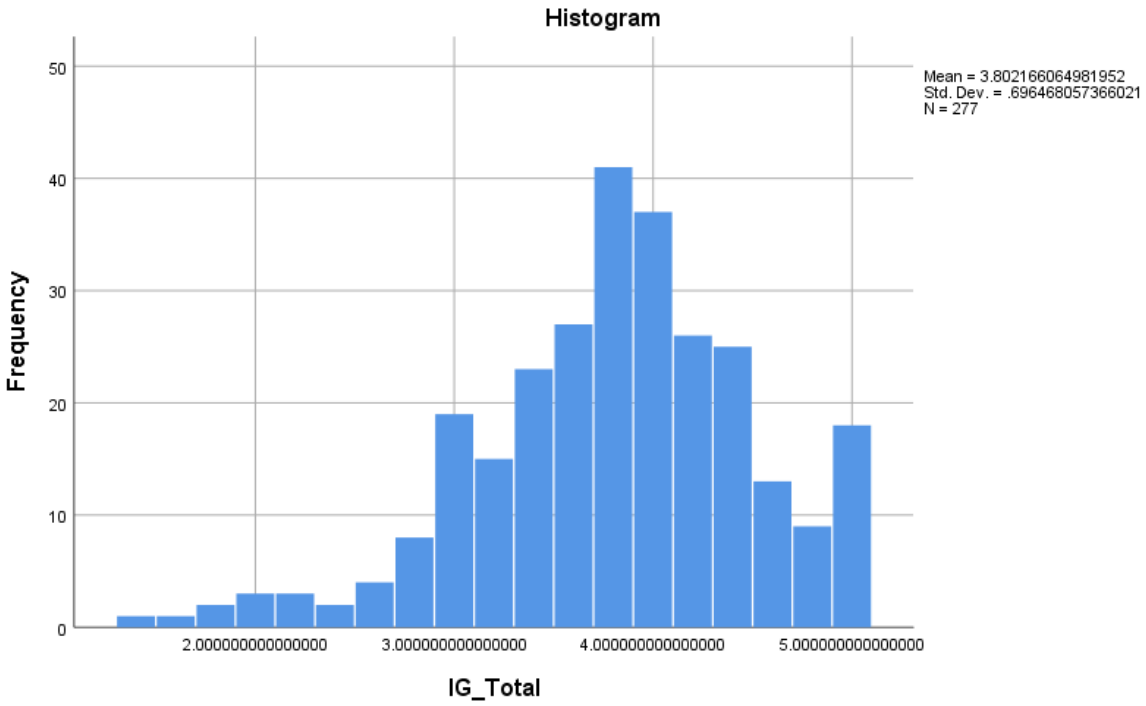

***Figure 16**: Histogram of Frequency Distribution for Interest and Goals (IG)*

Upon reviewing the Q-Q plot of the IG Total distribution (See **Figure 17**), it is evident that the majority of data points closely align with the 45-degree reference line, hinting at an approximate normal distribution. However, notable deviations are observed at both the lower end (below 3) and upper end (above 4.5), indicating the presence of skewness. Furthermore, points exhibit significant deviation from the line, particularly below 2, suggesting the existence of outliers. Therefore, it can be concluded that the Q-Q plot affirms the slight right skewness noted in the histogram. The deviations at the tails and the presence of outliers collectively imply that the IG Total variable does not conform perfectly to a normal distribution.

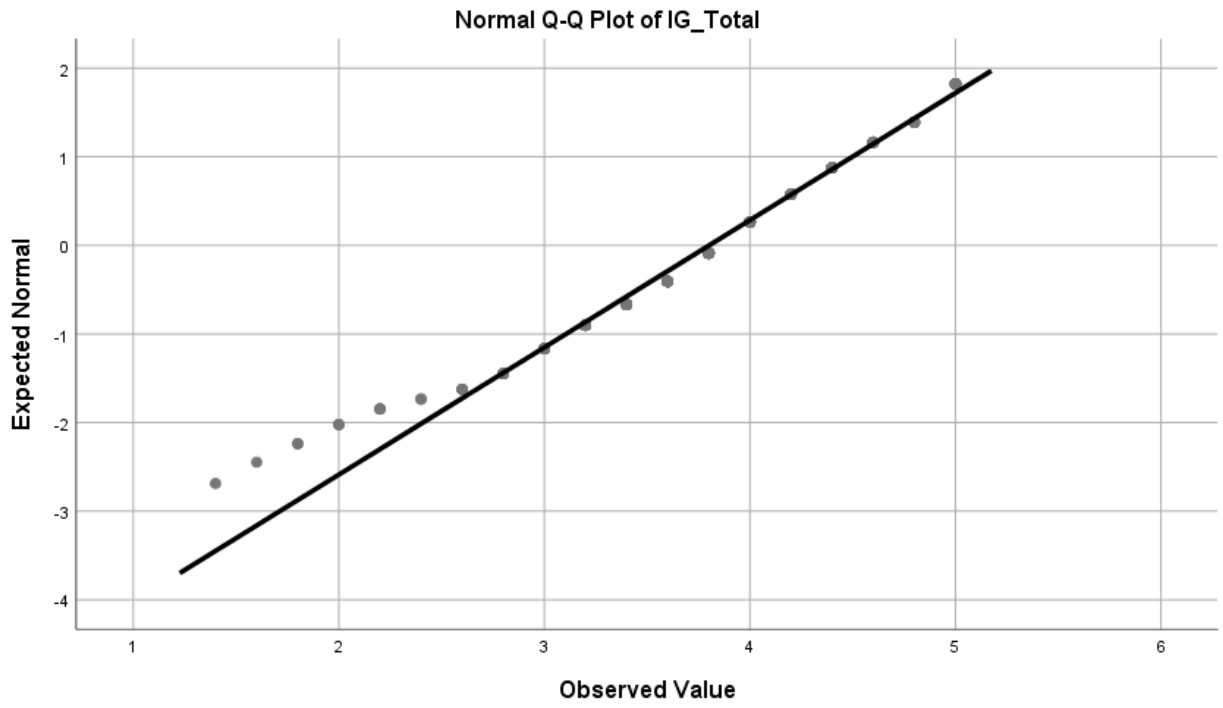

***Figure 17**: Normal Q-Q plot for Interest and Gooals (IG)*

The box plot in **Figure 18** illustrates a comprehensive overview of the distribution of the IG Total variable. The median value is approximately 4, with the interquartile range (IQR) spanning from around 3.5 to 4.5. The lower whisker extends to about 2, while the upper whisker extends to around 5. Notably, several outliers are evident below the lower whisker, specifically at values around 1 and 2. These outliers are identified as data points 16, 20, 37, 108, 110, 125, 137, and 220. The box plot indicates a slightly right-skewed distribution, with a median of 4. The presence of multiple lower outliers suggests considerable variability at the lower end of the data distribution.

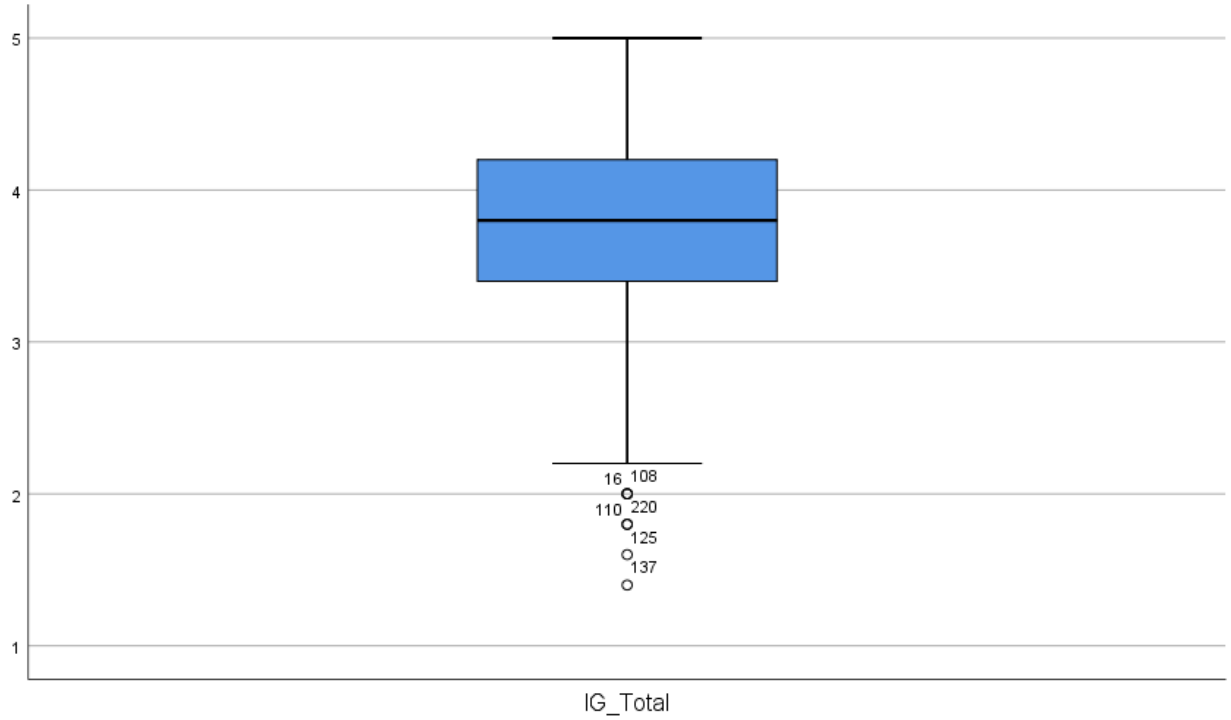

***Figure 18**: Box plot for Interest and Goals (IG)*

5.1.4.2.5 Interpretation of Histograms, Normal Q-Q Plot, and Box Plots for Soft Skills Satisfaction (SS)

The histogram of the SS Total variable (**Figure 19**) vividly illustrates the frequency distribution of the dataset. Upon close examination, it becomes evident that the histogram displays a distribution that is moderately skewed, with a noticeable tendency towards a normal distribution. The distribution encompasses values ranging from approximately 1.0 to 5.0, with a mean value of 3.20 and a standard deviation of 0.983. Notably, the highest frequency is observed around the value of 4.0, which suggests that a significant proportion of the data points are concentrated in proximity to this value.

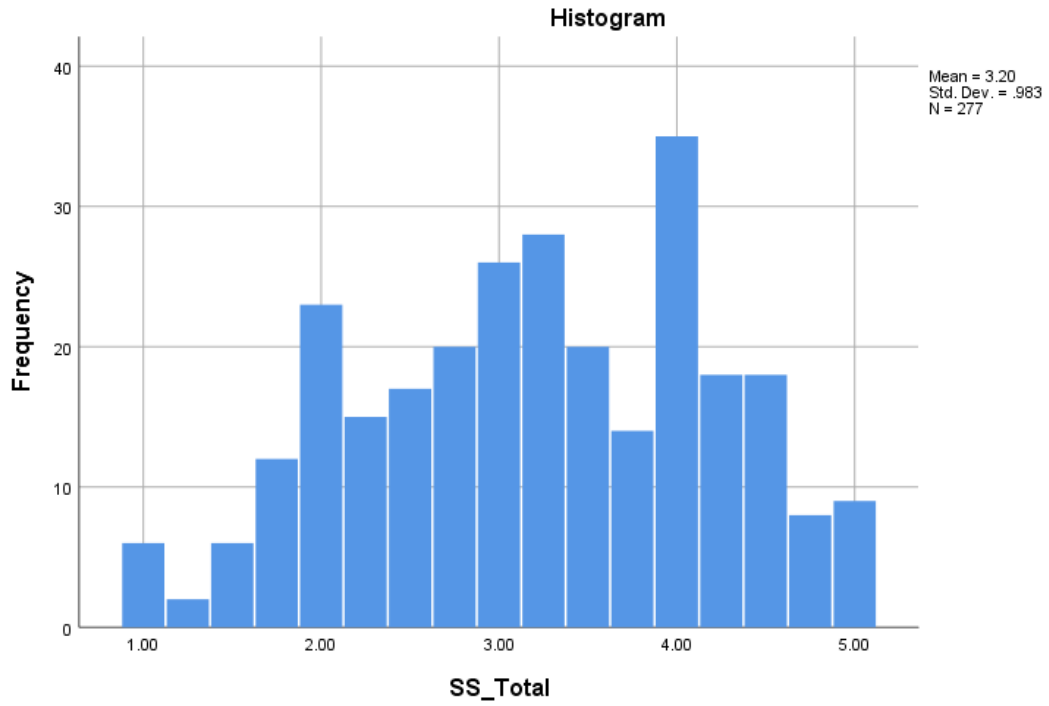

***Figure 19**: Histogram of Frequency Distribution for Soft Skills Satisfaction (SS)*

In the Normal Q-Q Plot (**Figure 20**), we are assessing the normality of the SS Total distribution. When data points fall along the diagonal line, it suggests that the data follows a normal distribution. Upon reviewing the plot, it becomes evident that most data points closely align with the line, indicating that the SS Total variable approximates a normal distribution. However, we also observe minor deviations at the lower and upper extremes, indicating slight departures from perfect normality. These deviations are common in empirical data and are typical due to various factors.

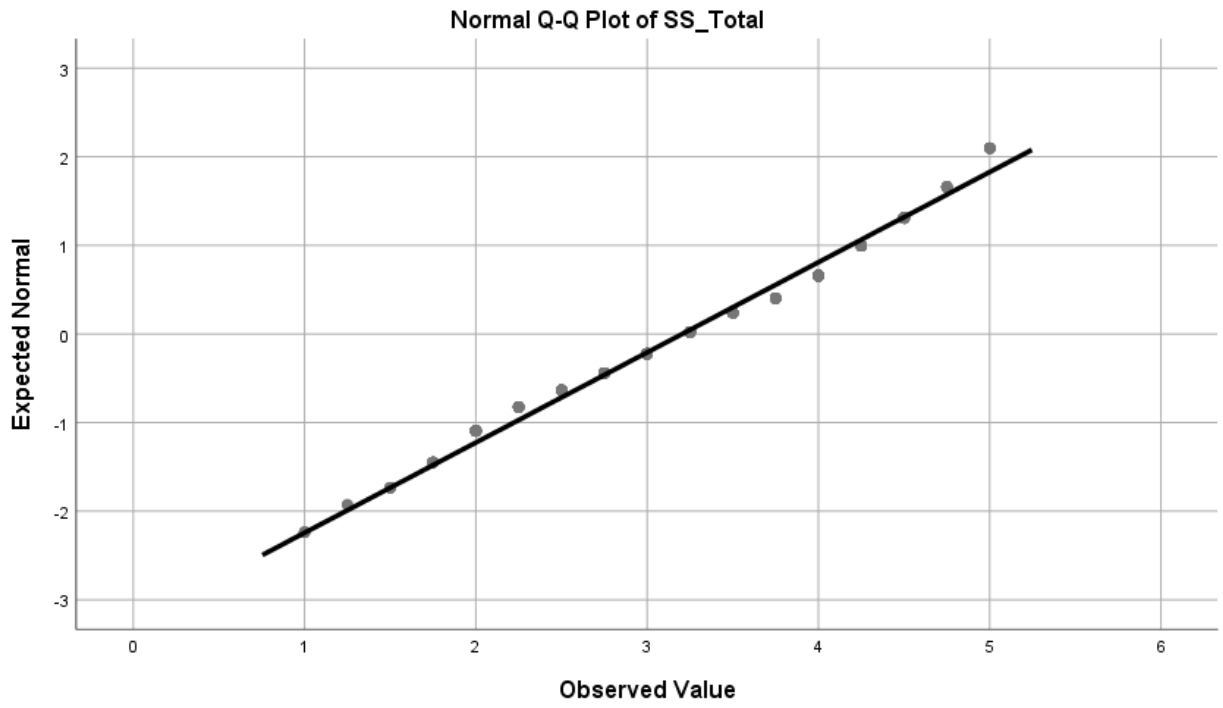

***Figure 20**: Normal Q-Q plot for Soft Skills Satisfaction (SS)*

The box plot of SS Total, depicted in **Figure 21**, offers a comprehensive overview of the data distribution, presenting key statistics such as the median, quartiles, and potential outliers. The median SS Total value is approximately 3.0, positioned close to the center of the interquartile range (IQR). The IQR, spanning from 2.5 to 4.0, signifies the central 50% of the dataset. The whiskers of the box plot extend to the minimum and maximum values, which are approximately 1.0 and 5.0, respectively. Notably, no outliers are indicated within this distribution. Overall, the box plot suggests a relatively symmetrical spread around the median, with no presence of extreme outliers.

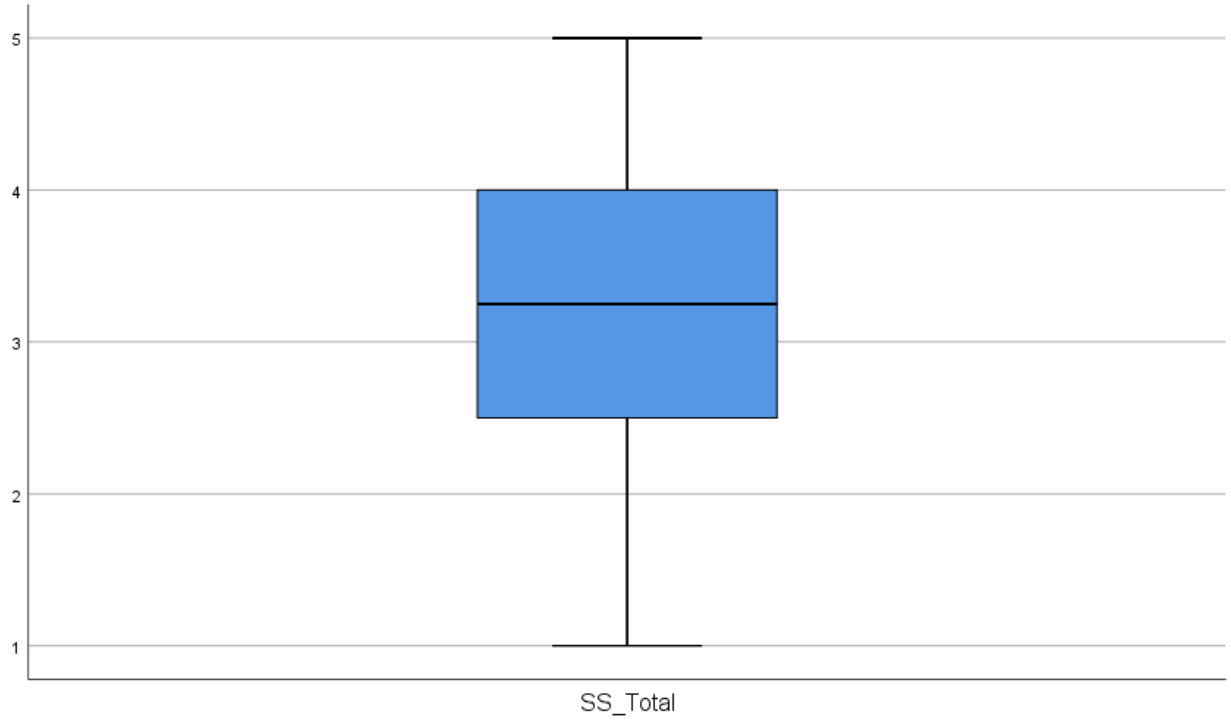

***Figure 21**: Box plot for Soft Skills Satisfaction (SS)*

5.1.4.3 Conclusion.

After analyzing the variables PS Total, SE Total, OE Total, IG Total, and SS Total, it is clear that the data supports further analysis. All five variables show distributions similar to a normal distribution, with their central tendencies around their means. Although there are some minor deviations from normality and a few outliers, these anomalies do not significantly affect the overall quality of the data.

The data distributions exhibit a relatively symmetrical pattern, with most of the data concentrated around central values. The observed deviations fall within acceptable limits for many statistical analyses, indicating a moderate level of variability within the dataset. Based on these characteristics, it is advisable to proceed with further data analysis. The data's general adherence to normality assumptions, along with the manageable level of outliers, suggests that it is suitable for a wide range of statistical techniques, including parametric tests.

However, it is important to note that if specific analyses are highly sensitive to normality assumptions, it is recommended to consider applying appropriate transformations or robust statistical methods to ensure the validity of the results. These steps can help address any potential issues related to non-normality and enhance the reliability of statistical analyses.

5.2 Data Analysis with Structural Equation Modelling (SEM)

5.2.1 What is SEM?

Structural Equation Modelling (SEM) is a statistical technique that allows researchers to evaluate causal hypotheses on intercorrelated nonexperimental data (Bentler & Stein, 1992). It is particularly useful in modelling complex relationships between observed and latent variables, gaining popularity in analysing complex genetic traits, and recently extended for the analysis of general pedigrees. SEM provides a scientific basis for evaluating the influence of different entities in a relationship model, making it a valuable tool in fields such as management science. By modelling the mean and covariance structures of the observed variables, SEM tests the influences of variable sets on other variables, including both observed and latent variables (Hayashi et al., 2007). SEM is a versatile and powerful statistical framework that is increasingly being used across a wide range of fields to model complex relationships and evaluate causal hypotheses.

Structural Model Evaluation (SEM) is a complex process that is used to test and refine theoretical models in order to accurately reflect the relationships among various variables. The process involves several key steps, starting with the specification of a theoretical model that is then tested for identification and fitness of the model. This is done by estimating the model's parameters and evaluating its fit to the data, using various statistical measures to determine the degree of fit. If the initial model does not fit well, modifications can be made and the model re-evaluated. This is an iterative process that continues until a satisfactory level of model fit is achieved. The goal is to create a model that accurately reflects the relationships among the variables, which can then be used to make predictions or test hypotheses. In addition to model specification and fit, various data considerations are also important in the SEM process. For example, sample size can have a significant impact on the reliability and validity of the model, and the degree of multivariate normality in the data can also affect the results. Outliers and missing data can also be problematic, and various techniques are used to address these issues (Crawford & Lamarre Jean, 2021; Hayashi et al., 2007). SEM is a rigorous and complex process that requires careful attention to detail and a

thorough understanding of statistical methods. Researchers and analysts who use SEM must be well-versed in these techniques and be able to apply them effectively in order to produce accurate and reliable models.

5.2.2 SEM Approaches: CB vs PLS

Structural Equation Modeling (SEM) is a powerful method that analyzes complex relationships between observable and hidden variables. It has been widely utilized in various fields such as transportation planning (Ismael & Duleba, 2022), medical research (Bentler & Stein, 1992), and social and behavioural research . The popularity of SEM has increased significantly in recent years, especially in the evaluation of public transportation service quality (Ismael & Duleba, 2022). This approach is considered superior to other multivariate analytical techniques due to its ability to handle intricate models (Maiyaki & Mokhtar, 2012). However, it is crucial to utilize SEM prudently and ensure that the model fits the data accurately (Bentler & Stein, 1992).

Structural Equation Modelling (SEM) is a statistical approach that can be used to test hypotheses about the interrelationships between variables. SEM encompasses various types, including covariance-based SEM (CB-SEM), and variance or component-based SEM (VB-SEM) (J. F. Hair et al., 2021). The process of SEM involves several steps, including model specification, identification, estimation, evaluation of model fit, model modification, and reporting of results (Crawford & Lamarre Jean, 2021). One of the interesting topics related to SEM is the use of Partial Least Squares (PLS) in Structural Equation Modelling. PLS is a method that can be used to estimate the relationships between latent variables and observed variables. Hair et al.(2011) discuss the application of PLS in SEM. Monecke & Leisch (2012) highlights its suitability for non-normally distributed data, while J. F. Hair et al. (2021) emphasize its potential as a "silver bullet" for estimating causal models. (Romo-González et al., 2018) further supports this, presenting PLS-SEM as a methodology for validating theoretical models.

Comparing the CB-SEM (covariance-based structural equation modeling) and PLS-SEM (partial least squares structural equation modeling) methods in different research contexts reveals some noteworthy differences. As per Dash & Paul (2021) research, PLS-SEM usually yields higher item loadings, better construct reliability, and validity, and is more suitable for composite-based models. Conversely, CB-SEM provides better model fit indices, particularly for validating measurement models. However, Astrachan et al.(2014) found that the results of both methods are

often similar, noting the advantages of PLS-SEM in certain situations. These findings indicate that the choice between CB-SEM and PLS-SEM should be made according to the specific research context and objectives. Therefore, researchers should carefully consider the strengths and weaknesses of both methods before deciding which one to use.

5.2.3 Advantages and Limitations of SEM analysis

Structural Equation Modeling (SEM) is a statistical technique that provides several benefits for researchers in the social and natural sciences (Dilalla, 2000). One of the key advantages of SEM is its ability to simultaneously assess several types of relationships among variables and compare groups, making it a valuable tool for studying complex phenomena. SEM is particularly useful in marketing research, where it can help marketers prioritize resources and examine relationships among variables to develop effective marketing strategies. However, it is important to be cautious about interpreting results, especially when attempting to establish causality, as SEM is not designed to prove causation (Dilalla, 2000). The technique's flexibility and ability to test the fit of a model against data are also key strengths, as they allow researchers to refine their models and better understand the underlying relationships among variables (Norris et al., 2015). Therefore, SEM is a powerful tool that can provide valuable insights into complex phenomena, but researchers need to use it with caution and interpret results carefully to avoid misinterpretation.

5.2.4 Reason for Choosing PLS-SEM

Two notable studies conducted by Reinartz et al. (2009) have shed light on the comparative performance of covariance-based SEM (CBSEM) and partial least squares (PLS) in the realm of structural equation modeling. According to their large-scale Monte-Carlo simulations, CBSEM surpasses PLS in terms of parameter consistency and accuracy when dealing with a sample size of over 250 observations. However, PLS is deemed more powerful when it comes to prediction and theory development. This is an important consideration, as argued by Avkiran (2018), as the choice between PLS and CBSEM should be made based on data characteristics, sample size, and the nature of the underlying theory. Additionally, Hair et al. (2011) has voiced his support for PLS-SEM, stating that it has the potential to be a "silver bullet" in estimating causal models in theoretical and empirical research.

5.2.5 SmartPLS

SmartPLS is a comprehensive software tool that facilitates statistical analysis and modeling of data. It is particularly useful for Partial Least Squares Structural Equation Modeling (PLS-SEM) and is known for its user-friendly interface and advanced reporting features (Wong, 2013). The software has gained popularity among academics and researchers owing to its ability to perform complex analyses with ease (Saidu & Al Mamun, 2022). SmartPLS has been extensively used in a variety of fields, including information technology, marketing, and human resources. It is particularly useful for small sample sizes, as it can test the robustness and value of statistical evaluation (J. F. Hair et al., 2011; Sander & Lee, 2014). With its intuitive and flexible features, SmartPLS enables researchers to explore, visualize, and interpret complex data sets, and derive meaningful insights from them.

SmartPLS is an innovative tool that is designed to aid in research data processing and analysis. It is particularly useful for researchers who seek to test the validity and reliability of their data, as well as to evaluate the intervening model hypothesis and moderating model hypothesis. SmartPLS is an effective solution for enhancing research skills significantly for participants and provides a comprehensive platform for conducting complex data analysis.

One of the most powerful features of SmartPLS is its Multigroup Analysis (MGA) capability, which is particularly useful in business research. This tool is designed to aid in evaluating moderation effects across different groups using partial least squares path modeling (PLSPM) (Selangor, et al., 2020). The MGA function of SmartPLS is particularly useful in analyzing data with multiple groups, such as comparing the performance of different departments within an organization or analyzing customer behavior across different regions. With its intuitive interface and advanced analytical features, SmartPLS is an ideal tool for any researcher looking to gain a deeper understanding of their data and produce more accurate and insightful results.

5.2.6 Data analysis technique and procedure with SEM

Structural Equation Modeling (SEM) is a statistical technique that has gained popularity due to its ability to examine complex relationships between latent and observed variables (J. F. Hair et al., 2011). The technique combines factor analysis and path analysis to achieve this. SEM has been particularly useful in the social sciences, where it can be used to reduce data dimensionality in machine learning problems. The data analysis process with SEM involves several steps, including

theoretical model development, flow chart drawing, equation conversion, and model modification (Hair et al., 2011). The technique is commonly applied in the social sciences, with various computer programs available for its implementation.

One of the key steps in the SEM analysis is exploratory factor analysis, which involves examining the underlying structure of the data. Confirmatory factor analysis is another important step, which involves testing a pre-specified model against the data. Model fit assessment is also crucial, as it helps to determine whether the model adequately represents the data. There are several fit indices that can be used for model fit assessment, including the chi-square test, the goodness-of-fit index, and the comparative fit index.

Therefore, SEM is a powerful statistical technique that allows for the examination of complex relationships between latent and observed variables. It has become increasingly popular in the social sciences due to its ability to reduce data dimensionality in machine learning problems. The analysis process involves several key steps, including exploratory and confirmatory factor analysis, as well as model fit assessment.

5.2.7 Evaluation of the Measurement Model

The measurement model is a statistical model that tests how well the items used in the study reflect the hypothetical construct that is being measured. In this study, the reflective and formative constructs were analysed separately. Specifically, the model contained nine reflective operationalized constructs and one formative operationalized construct. To evaluate the reflective constructs, the study used several methods, including internal consistency reliability, convergence validity, and discriminant validity. Internal consistency reliability is a measure of how consistently the items in a construct measure the same underlying concept. Convergence validity, on the other hand, is a measure of how well the construct correlates with other constructs that measure similar concepts. Discriminant validity is a measure of how well the construct correlates with constructs that measure different concepts.

The formative construct, on the other hand, was evaluated based on multicollinearity and content validity, as described in section 4.3.1 of the report. Multicollinearity is a measure of how much the independent variables in a model are correlated with each other. Content validity, on the other hand, is a measure of how well the items used to measure the construct represent the entire range of the construct. To account for static significances, the study applied bootstrapping as a

nonparametric procedure in SmartPLS. Bootstrapping involves drawing random subsamples from the dataset to ensure the stability of the results. In this study, a total of 5,000 subsamples were chosen for the analysis. The bias-corrected and accelerated (BCa) bootstrap was chosen to correct for bias and skewness in the bootstrap distribution and to result in narrow intervals (Efron, 1987). Finally, a two-sided significance test with a significance level of 0.1 was chosen to determine the statistical significance of the results.

5.2.8 Quality assessment of reflective operationalized constructs

The findings indicate that there were certain issues with the PS items when analysed in the context of outer loadings. In the analysis attempt, the result revealed that only one item, PS3, had an outer loading higher than 0.7 for the PS construct. As a result, an attempt was made to remove items PS1, PS2, PS4, PS5, and PS10, which in turn helped to improve the overall loadings of all the constructs. **Table 11** illustrates the improvements made after the removal of the aforementioned items.

From **Table 11**, it can be observed that all the items have an outer loading greater than 0.7, except for PS3, SE6, SE7, and SE8, which have an outer loading ranging from 0.647 to 0.695. Every item was individually tested to determine whether its removal resulted in an improvement in the reliability of the internal consistency and convergent validity, as per the guidelines provided by(J. F. Hair et al. (2021). However, it was found that the deletion of these items did not enhance either of the aforementioned parameters and hence, they were retained in the model.

***Table 12**: Content validity of constructs: outer loadings and significances after deletion.*

Constructs	Items	Loading	Standard. dev	T statistics	P values
Interest and Goals (IG)	IG1	0.768	0.035	21.917	<0.001
	IG2	0.735	0.045	16.226	<0.001
	IG3	0.824	0.024	34.236	<0.001
	IG4	0.79	0.029	27.182	<0.001
Outcome Expectation (OG)	OE1	0.818	0.029	27.745	<0.001
	OE2	0.818	0.029	28.498	<0.001
	OE3	0.753	0.04	18.594	<0.001
	OE4	0.789	0.033	23.637	<0.001
Perceived Soft Skills (PS)	PS3	0.678	0.044	15.548	<0.001
	PS6	0.721	0.039	18.494	<0.001
	PS7	0.791	0.027	28.986	<0.001

	PS8	0.705	0.039	18.263	<0.001
	PS9	0.702	0.048	14.602	<0.001
Self-Efficacy (SE)	SE1	0.73	0.033	21.985	<0.001
	SE2	0.761	0.031	24.754	<0.001
	SE3	0.755	0.032	23.653	<0.001
	SE4	0.755	0.034	22.258	<0.001
	SE5	0.764	0.028	27.673	<0.001
	SE6	0.695	0.042	16.359	<0.001
	SE7	0.664	0.046	14.57	<0.001
	SE8	0.647	0.044	14.584	<0.001
Soft Skills Satisfaction (SS)	SS1	0.751	0.044	17.216	<0.001
	SS2	0.912	0.011	84.526	<0.001
	SS3	0.896	0.015	59.232	<0.001
	SS4	0.893	0.018	50.275	<0.001

Table 12 presents the findings of the internal consistency reliability, which is a crucial aspect of any study. Three criteria were used to evaluate internal consistency reliability: Cronbach's α, CR value, and rhoA, which are widely accepted and used in research (J. F. Hair et al., 2021). It was found that all the values were above the minimum acceptable levels, which indicates that the internal consistency of the constructs was adequate.

Specifically, the values of Cronbach's α ranged from 0.768 to 0.888, which is sufficient to establish internal consistency. Similarly, the composite reliability CR (rho_a) ranged from 0.768 to 0.918, which is considered acceptable (J. F. Hair et al., 2021). Additionally, the composite reliability CR (rho_c) ranged from 0.843 to 0.922, which further confirms the internal consistency of our constructs.

We also conducted tests to evaluate the convergent validity of our study. To do so, we used the AVE criterion, which is widely used and accepted in research (J. Hair & Alamer, 2022). Based on our findings presented in **Table 12**, we can confirm that the AVE criterion was also met, with values ranging from 0.519 to 0.749. This indicates that our study demonstrated sufficient convergent validity (J. F. Hair et al., 2011).

***Table 13**: Internal consistency reliability and convergent validity*

Constructs	Cronbach's α	CR (rho_a)	CR (rho_c)	AVE
Interest and Goals (IG)	0.786	0.795	0.861	0.609
Outcome Expectation (OG)	0.806	0.81	0.873	0.632
Perceived Soft Skills (PS)	0.768	0.768	0.843	0.519
Self-Efficacy (SE)	0.869	0.871	0.897	0.522
Soft Skills Satisfaction (SS)	0.888	0.918	0.922	0.749

According to Radomir & Moisescu (2019), in empirical applications, the Fornell-Larcker criterion is not always a reliable method for identifying discriminant validity problems. Therefore, it is recommended to avoid using this criterion. However, the understanding that many researchers are familiar with this criterion, so we have included it in our discussion (J. F. Hair et al., 2021). It is important to note that there are other methods available for identifying discriminant validity problems, such as the heterotrait-monotrait ratio of correlations (HTMT) criterion, which has been shown to perform better than the Fornell-Larcker criterion in some cases..

To check for discriminant validity, the cross-loadings of the items were analyzed, and the Fornell-Lacker criterion and the HTMT correlation ratio were calculated. The results of the analysis showed that the correlation of the items with the assigned constructs was higher than with the other latent constructs, indicating that the items were measuring the intended constructs and not other unrelated constructs. In other words, the analysis confirmed that the items were valid and accurately reflected the construct they were intended to measure. According to the findings presented in **Table 13**, the correlations observed between the latent variables were lower in magnitude compared to the square root of the Average Variance Extracted (AVE) values. This suggests that the latent variables are measuring distinct constructs or dimensions and that they are not highly interrelated with each other.

***Table 14**: Fornell-Larcker criterion*

	Constructs				
Constructs	**IG**	**OE**	**PS**	**SE**	**SS**
IG	**0.78**				
OE	0.539	**0.795**			
PS	0.404	0.437	**0.72**		
SE	0.443	0.471	0.637	**0.723**	
SS	0.361	0.238	0.333	0.499	**0.865**

According to the analysis presented in **Table 14**, it can be observed that the HTMT (Heterotrait-Monotrait Ratio of Correlations) values for the constructs did not surpass the recommended threshold level of 0.85. This indicates that the constructs were conceptually distinct from one another. As a result, it can be concluded that the study met the requirement of discriminant validity, as stated by J. F. Hair et al. (2021). In simple terms, this means that each of the constructs measured what it was intended to measure and was not influenced by any other construct.

***Table 15**: Heterotrait-monotrait ratio*

	Construct				
Constructs	IG	OE	PS	SE	SS
IG					
OE	0.67				
PS	0.511	0.55			
SE	0.529	0.559	0.773		
SS	0.421	0.263	0.383	0.551	

Upon careful examination, it was found that all of the reflective constructs met the rigorous quality criteria that were established for the study. Furthermore, they were deemed to be sufficiently valid and reliable, indicating that the data obtained from them can be confidently used for further analysis and interpretation (J. F. Hair et al., 2021). This provides a strong foundation for the study's findings and conclusions.

5.2.9 Evaluation of the structure model

To assess the quality of a structural model, it is essential to first examine it for possible collinearity problems. Collinearity refers to the high intercorrelations among the indicators, which can lead to unreliable and inconsistent results. The variance inflation factor (VIF) is a standard metric used to assess indicator collinearity. VIF values indicate the level of collinearity, with higher values indicating greater levels of collinearity. In general, VIF values of 5 or above indicate significant collinearity problems that researchers should take adequate measures to reduce. Such measures may include eliminating or merging indicators or establishing a higher-order construct as suggested in J. F. Hair et al. (2021) work.

However, it is worth noting that collinearity issues can also occur at lower VIF values of 3, as highlighted by Becker et al. (2015). Therefore, researchers should be cautious and take appropriate steps to address collinearity issues in their structural models, regardless of the magnitude of VIF

values. By doing so, they can increase the validity and reliability of their research findings and ensure that their results accurately reflect the underlying constructs.

As part of the analysis, the inner variance inflation factors (VIFs) to assess the presence of multicollinearity among the predictor variables in this research model were calculated. This provided the VIF values in **Table 15** for your reference. It is a pleasure to narrate that none of the VIF values exceeded the commonly used cutoff value of 5, nor the more stringent cutoff of 3 (J. F. Hair et al., 2019). The highest VIF value observed in the model was 1.872, which is well below either of the cutoff values and indicates that multicollinearity is not a major concern in this analysis.

***Table 16**: Inner variance inflation factors*

	Construct				
Constructs	IG	OE	PS	SE	SS
IG					1.523
OE	1.339				1.588
PS	1.754	1		1	1.773
SE	1.822				1.872
SS					

In structural equation modeling, the path coefficients play a crucial role in understanding the relationships between different variables in the model. The path coefficients represent the strength and direction of the causal influence of one variable on another (J. F. Hair et al., 2011). To evaluate the significance and relevance of these path coefficients, various methods are used. One such method involves assessing the significance of the path coefficients using bootstrapping standard errors. This involves resampling the data multiple times and calculating the standard errors of the path coefficients based on these resamples. These standard errors can then be used to calculate the t-values of the path coefficients or confidence intervals.

The assessment of the significance of the path coefficients is important because it helps to determine whether the relationships between the variables in the model are statistically significant or not. If the path coefficients are statistically significant, then it indicates that the relationships between the variables are not due to chance and are likely to hold true in the population. On the

other hand, if the path coefficients are not statistically significant, then it suggests that the relationships between the variables may not be meaningful or may be due to chance.

After conducting a thorough analysis, the researchers evaluated the height and significance of the path coefficients, which are used to measure the strength of the relationship between variables. This was done by using a bootstrapping procedure, which is a statistical technique that involves resampling data to estimate the properties of an unknown probability distribution. To determine the significance of the path coefficients, a two-sided significance test was performed with a significance level of 10%.

Upon evaluating the results (See **Table 16**), it was found that the path coefficients from **OE → SS** and from **PS → SS** were not significant. On the other hand, the path coefficients from **IG → SS**, **PS → IG**, and **SE → IG** were all found to be significant. However, it is worth noting that their influence was relatively small, with values less than 0.1, according to Hair et al. (2011).

***Table 17**: Path coefficients and significances*

Constructs	Hypothesis	Coefficient Path	Standard Deviation	T statistics	P values	H: Supported/Not supported
Interest and Goals (IG)						
IG -> SS	H9	0.21	0.076	2.77	0.006	Supported
Outcome Expectations (OE)						
OE -> IG	H7	0.405	0.064	6.301	0	Supported
OE -> SS	H10	-0.088	0.072	1.22	0.222	Not supported
Perceived Soft Skills (PS)						
PS -> IG	H5	0.112	0.067	1.681	0.093	Not supported
PS -> OE	H8	0.437	0.056	7.778	0	Supported
PS -> SE	H2	0.637	0.053	11.929	0	Supported
PS -> SS	H1	0.001	0.071	0.013	0.989	Not supported
Self-Efficacy (SE)						
SE -> IG	H6	0.181	0.074	2.457	0.014	Not supported
SE -> SS	H11	0.444	0.085	5.231	0	Supported

Based on the analysis presented in **Table 17**, it can be observed that the path **PS → OE → SS** and **PS → IG → SS** do not have a significant relationship. Hence, these paths cannot be considered as mediators in the relationship. However, the remaining paths have shown significant path coefficients with a small influence. In particular, the path coefficients of **PS → OE → IG**, **PS → SE → SS**, and **PS → SE → IG → SS** were found to be above 0.1, indicating that these paths act as full mediators in their respective relationships. Therefore, these mediating paths can be

considered as important factors in explaining the relationships between the variables under investigation.

In the analysis conducted, it was found that all the hypothesized direct relationships had significant path coefficients, as outlined in **Table 16**. Additionally, significant path coefficients were also observed in indirect relationships, as indicated in **Table 17**. This implies that for all relationships, a partial mediation by the indirect relations was present. However, it is worth noting that the path coefficients for most of the relationships were less than 0.1, indicating a low level of mediation. The exceptions to this were the relationships between **PS → OE → IG**, **PS → SE → SS**, and **PS → SE → IG**.

***Table 18**: Specific indirect effects*

Path	Path Coefficient	Standard Deviation	T statistics	P values	Mediation
PS → OE → IG	0.177	0.036	4.912	0	Full
PS → SE → SS	0.282	0.056	5.063	0	Full
OE → IG → SS	0.085	0.039	2.199	0.028	Partial
PS → OE → SS	-0.038	0.033	1.162	0.245	None
PS → IG → SS	0.024	0.016	1.467	0.142	None
SE → IG → SS	0.038	0.018	2.172	0.03	Partial
PS → SE → IG → SS	0.024	0.011	2.135	0.033	Full
PS → OE → IG → SS	0.037	0.017	2.157	0.031	Partial
PS → SE → IG	0.115	0.047	2.467	0.014	Partial

To evaluate the significance of a path coefficient, it is important to analyze the total effects, which is the sum of all the indirect and direct effects. By doing so, we can gain a much more comprehensive understanding of the relationships present in the structural model (J. F. Hair et al., 2021). This step is crucial in determining the overall impact that a particular variable has on the outcome or dependent variable in the model. By considering both direct and indirect effects, we can obtain a more accurate assessment of the relationship between the variables and the overall structural model.

The statistical analysis presented in **Table 18** reveals that the overall impact of the variables under consideration was statistically significant, except for the impact of **OE** on **SS**. However, all the other variables had a significant positive impact, with **PS** having the strongest impact on **SE**, as evidenced by a value of 0.37. These results suggest that the variables in question play an important

role in determining the outcome of the study and should be carefully considered in any future research.

***Table 19**: Total effects*

Paths	Hypothesis	Path Coefficient	Standard deviation	T statistics	P values
IG → SS	H9	0.21	0.076	2.77	0.006
OE → IG	H7	0.405	0.064	6.301	0.000
OE → SS	H10	-0.003	0.078	0.032	0.974
PS → IG	H5	0.404	0.063	6.412	0.000
PS → OE	H8	0.437	0.056	7.778	0.000
PS → SE	H2	0.637	0.053	11.929	0.000
PS → SS	H1	0.33	0.065	5.073	0.000
SE → IG	H6	0.181	0.074	2.457	0.014
SE → SS	H11	0.482	0.085	5.69	0.000

The evaluation of the structural model relationships was done by carefully analyzing their relevance and significance. After that, the explanatory power of the model was examined. This was done by assessing the coefficient of determination R^2 of the endogenous constructs, which is an important measure of how well the model explains the variables under consideration (J. F. Hair et al., 2011). The R^2 values of the endogenous constructs, **OE** and **SS** were found to be weak, which means that these constructs have very little ability to explain the variations in the variables being studied (J. F. Hair et al., 2021). On the other hand, the R^2 values of IG and SE were moderate, indicating that they have some explanatory power, but still not enough to provide a comprehensive understanding of the variables. The R^2adj, which is a measure of how well the model explains the variables while taking into account the number of parameters (J. F. Hair et al., 2019), supported this result as seen in **Table 19**.

***Table 20**: Coefficient of determination (R^2)*

Constructs	R-square	R-square adjusted
Interest and Goals (IG)	0.343	0.336
Outcomes Expectation (OE)	0.191	0.188
Self-Efficacy (SE)	0.405	0.403
Soft Skills Satisfaction (SS)	0.275	0.265

As per the analysis, the effect sizes (f^2) of the exogenous constructs were evaluated and the results were recorded in **Table 20**. It was observed that **OE → SS**, **PS → IG**, and **PS → SS** had no

significant effect. However, the rest of the constructs displayed some impact, with **IG → SS**, **SE → IG**, and **SE → SS** showing a moderate effect, whereas the rest had a small effect. This finding suggests that some of the constructs have a noteworthy impact on the outcome, which can be leveraged to improve the overall performance of the system.

***Table 21**: Effect size (f^2)*

	Exogenous construct				
Constructs	IG	OE	PS	SE	SS
IG					0.04
OE	0.186				0.007
PS	0.011	0.236		0.682	0
SE	0.027				0.145
SS					

In the analysis, the predictive relevance Q^2 was calculated for all endogenous constructs, and the results are presented in **Table 21**. It was observed that all the endogenous constructs had a predicted relevance, which was found to be either small or medium. This suggests that these constructs have the potential to influence the outcome of the study to a certain extent. The predictive relevance Q^2 is a statistical measure that indicates the proportion of the variation in the dependent variable that is explained by the independent variables (J. F. Hair et al., 2021). In this case, the small and medium predict relevancies imply that the endogenous constructs have a moderate impact on the dependent variable, but other factors may also play a role in determining the outcome of the study.

***Table 22**: Prediction relevance (Q^2)*

Constructs	Q^2predict	RMSE	MAE
Interests and Goals (IG)	0.15	0.931	0.724
Outcomes Expectations (OE)	0.179	0.917	0.73
Self-Efficacy (SE)	0.389	0.788	0.588
Soft Skills Satisfaction (SS)	0.095	0.957	0.779

The out-of-sample prediction was performed using the PLSpredict procedure. To ensure robustness, a k-fold cross-validation approach with three subgroups (k) and 10 repeats were employed. All Q2predict values obtained were greater than 0, indicating a superior predictive performance compared to a naive benchmark as shown in **Table 22**. Notably, the majority of the

RMSE values derived from the PLS-SEM model were found to be lower than the RMSE values obtained from the LM, suggesting an intermediate level of predictive power for the model (J. F. Hair et al., 2021).

***Table 23**: Out-of-sample predictive power*

Constructs	PLS-SEM		LM
Items	Q^2predict	RMSE	RMSE
Interests and Goals (IG)	0.15		
IG1	0.074	0.907	0.914
IG2	0.06	0.966	0.968
IG3	0.124	0.832	0.838
IG4	0.102	0.844	0.859
Outcomes Expectations	0.179		
OE1	0.135	0.771	0.778
OE2	0.126	0.759	0.769
OE3	0.099	0.9	0.911
OE4	0.086	0.831	0.829
Self-Efficacy	0.389		
SE1	0.213	0.864	0.866
SE2	0.163	0.822	0.83
SE3	0.252	0.774	0.778
SE4	0.216	0.837	0.844
SE5	0.175	0.817	0.818
SE6	0.254	0.777	0.782
SE7	0.143	0.9	0.914
SE8	0.187	0.889	0.896
Soft Skills Satisfaction	0.095		
SS1	0.01	1.189	1.195
SS2	0.094	1.036	1.043
SS3	0.1	1.086	1.084
SS4	0.073	1.086	1.088

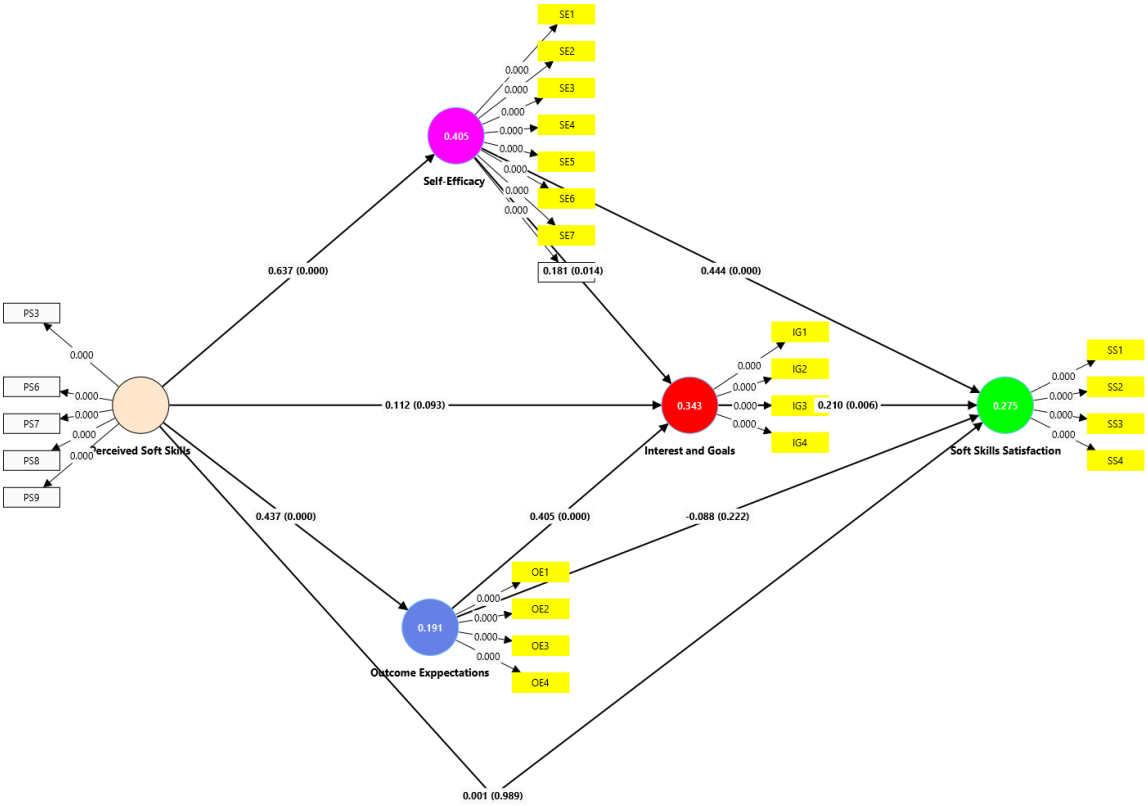

***Figure 22**: PLSEM Algorithm of the constructs.*

5.2.9.1 Moderation effects

The multigroup analysis involved comparing the structural path coefficients between male and female students. The differences in the path coefficients and their statistical significance, including both 1-tailed and 2-tailed p-values, were presented in **Table 23**. The analysis revealed that there were no statistically significant gender differences in any of the paths examined at the conventional significance levels.

***Table 24**: Multigroup Analysis for Gender Difference*

Paths	Hypothesis	Difference (Male - Female)	1-tailed (Male vs Female) p value	2-tailed (Male vs Female) p value	H: Support/ Not support
IG -> SS		-0.113	0.764	0.472	
OE -> IG		-0.045	0.613	0.775	
OE -> SS		0.197	0.098	0.197	
PS -> IG		-0.115	0.827	0.347	
PS -> OE		-0.211	0.94	0.12	
PS -> SE	H3	-0.139	0.951	0.098	Not supported
PS -> SS	H4	0.027	0.439	0.879	Not supported
SE -> IG		0.172	0.215	0.43	
SE -> SS		-0.245	0.901	0.198	

Chapter 6: **Discussions**

6.1 Introduction

The aim of this study is to analyze and evaluate the role of soft skills on the level of career self-efficacy and career satisfaction among students pursuing engineering studies. By investigating the relevance and influence of soft skills on the career aspirations of engineering students, this study aims to provide insights into the importance of developing soft skills alongside technical expertise in the field of engineering. The research will involve an in-depth analysis of various factors that could influence the relationship between soft skills, career self-efficacy, and satisfaction among engineering students.

To achieve this objective, three research questions have been formulated to guide this study. Firstly, we seek to explore the relationship between student's perceived soft skills and career self-efficacy. Secondly, we aim to understand how perceived soft skills influence career satisfaction. Lastly, we aim to investigate to what extent potential gender differences can influence students perceived soft skills, career self-efficacy, and satisfaction.

This chapter consists of four main parts. Firstly, the results obtained from the analysis are interpreted and discussed in the light of theory and past research, by research questions. Secondly, the practical implications of the research findings are highlighted. Thirdly, the study's limitations are emphasized and their impact on the interpretation of the research results is discussed. Finally, some recommendations for future research are included at the end of the chapter.

6.2 Interpretation and discussion of the findings related to Research Questions (RQs)

In this section, we will delve into the analysis and discourse of the research findings, organized following the sequential progression of the research objectives. The primary research objective aims to scrutinize the correlation between students perceived soft skills and their career self-efficacy. The second objective is to evaluate the effects of acquiring and being content with soft skills on career advancement. Lastly, the third objective endeavors to uncover potential gender-based disparities that influence students perceived soft skills, career self-efficacy, and satisfaction. To address these objectives, three research questions with a total of 11 hypotheses were formulated, and their implications will be thoroughly examined in the subsequent sections.

6.2.1 RQ1: What is the relationship between engineering students perceived soft skills and their career self-efficacy?

According to the hypothesis, we believe that perceived soft skills (PS) have a positive influence on Self-Efficacy (SE). Research in the field suggests that the perceived importance of soft skills, such as communication, teamwork, and problem-solving, plays a significant role in shaping career self-efficacy (Aryani et al., 2021; Majid et al., 2012; Ngo, 2024). Individuals, including students and employees, who acknowledge and value these skills tend to exhibit higher levels of self-efficacy, which ultimately leads to greater engagement in their careers (Aryani et al., 2021).

The analysis conducted suggests that PS, which stands for a particular variable, has a significant impact on SE, another variable. The regression coefficient (β) for PS was found to be 0.637, which is statistically significant as indicated by p-value being less than 0.001. Moreover, the effect size measure (f^2) for PS was 0.682, which indicates that it explains a considerable amount of variance in SE. Therefore, this finding highlights the importance of PS in shaping different aspects of student perception and efficacy.

6.2.2 RQ2: What roles do the perceived soft skills play in engineering students' satisfaction with their career development?

Research has consistently demonstrated the significant impact of perceived soft skills on overall job satisfaction. In a study conducted by (Dabke, 2015), it was revealed that the soft skills of management interns were strongly correlated with the effectiveness of their internships and their subsequent permanent placement opportunities. This finding is further supported by Palumbo (2013), who emphasized the direct influence of soft skills on overall job satisfaction.

From **Table 17** the analysis shows that PS → OE → IG → SS (Full Mediation) with path coefficient: 0.177 ($p < 0.001$), there is a significant positive indirect effect of perceived soft skills on student satisfaction, which is fully mediated by the sequential influence of outcome expectations, interests, and goals. The path coefficient value for this mediated effect is 0.177, with a p-value of less than 0.001, indicating a high level of statistical significance. This suggests that the perceived soft skills of instructors have a significant impact on students' satisfaction levels, with outcome expectations, interests, and goals playing an important role in mediating this relationship.

Similarly, PS → SE → SS (Full Mediation) with Path Coefficient: 0.282 ($p < 0.001$) shows that there is a significant positive indirect effect of perceived soft skills on student satisfaction. This effect is observed through the full mediation of self-efficacy, which means that the impact of soft skills on satisfaction is entirely explained by the effect of soft skills on self-efficacy and the subsequent effect of self-efficacy on satisfaction. The path coefficient for this indirect effect is 0.282, and it is statistically significant at $p < 0.001$, indicating a strong relationship. These findings suggest that developing soft skills in students can have a significant impact on their self-efficacy and ultimately their satisfaction with their educational experience.

Likewise, the PS → OE → IG → SS (Partial Mediation) with path coefficient: 0.037 ($p = 0.031$). The analysis has revealed that there is a partial mediation between perceived soft skills of a teacher and student satisfaction. This mediation is carried out through the outcome expectations and interests and goals that students have towards their education. The path coefficient for this mediation is 0.037, which is statistically significant with a p-value of 0.031. This means that the indirect effect of perceived soft skills on student satisfaction is positive and significant, which indicates that when teachers are perceived to have good soft skills, students tend to have higher outcome expectations and more interest and goals towards their studies, ultimately leading to higher levels of satisfaction.

Finally, the analysis conducted suggests that PS has a considerable positive impact on SS as shown in **Table 18**, which is statistically significant ($\beta = 0.33$, $p < 0.001$). This finding indicates that an increase in PS leads to a significant improvement in SS. The result provides valuable insights into the relationship between PS and SS and highlights the importance of focusing on PS to enhance SS.

6.2.3 RQ3: What gender differences exist in engineering students' perception of soft skills, career self-efficacy, and satisfaction?

Numerous studies have shown that gender plays a crucial role in shaping students' perceptions and achievements. While research suggests that gender may not be a determining factor in assessing soft skills, it has been found that specific soft skills carry varying degrees of importance for the hiring outcomes of male and female individuals (Papyrina et al., 2021). Furthermore, it has been observed that young males often display higher levels of self-efficacy compared to their female counterparts, and this self-efficacy has a significant impact on the overall quality of life for both

genders (Hirsch, 2017). Moreover, disparities based on gender have been noted in areas such as career decision-making efficacy, with male students achieving higher scores than female students, as well as in measures of satisfaction with chosen majors and the maturity of career attitudes (Hong, 2011). Luzzo (1995) shows that female students consistently outperform male students on various measures of career maturity. Career maturity encompasses the ability to make well-informed career decisions and effectively navigate career-related challenges. Soft skills like critical thinking, decision-making, and resilience play a key role in fostering career maturity. Through the development of these skills, female students are equipped to enter the workforce, make sound career choices, and adapt to evolving job markets. This preparation can result in higher career satisfaction and a smoother transition from education to employment.

Numerous research studies have consistently indicated that gender differences have a significant impact on students' perceptions of their soft skills, career self-efficacy, and overall satisfaction. Matsui's research in (1994) highlighted that female students reported higher self-efficacy for occupations that are typically dominated by females. Additionally, Papyrina (2021) revealed that female students exhibited greater confidence in interpersonal skills, a friendly/outgoing personality, and organizational ability. Building on this, Gnilka's findings in (2017) showed that career search self-efficacy played a mediating role in the relationship between perfectionism and career barriers, with distinct differences observed between male and female students. However, Kelly's work in (1993) emphasized that while gender does influence these factors, academic achievement emerges as a more powerful predictor of career self-efficacy. These collective findings underscore the intricacies involved in understanding how gender, self-efficacy, and career development intersect.

The paper in question delves into the subject of gender as a moderating factor. To examine the moderating effect, the study employed the methodology outlined by J. F. Hair et al. (2021). Based on this approach, only the perceived soft skills, self-efficacy, and soft skills satisfaction components of the model (i.e., PS, SE, and SS) were multiplied by gender. This multiplication led to the establishment of moderator constructs. Specifically, the gender and perceived soft skills interaction were multiplied to produce two moderator constructs.

The multigroup analysis involved comparing the structural path coefficients between male and female students. The results, including the differences in path coefficients and their statistical

significance (both 1-tailed and 2-tailed p-values), are presented in **Table 23**. Upon conducting the multigroup analysis, it was found that there are no statistically significant gender differences in any of the examined paths at the conventional significance levels.

Although marginal differences were observed in some paths (e.g., PS -> SE and OE -> SS), these differences did not reach the threshold to be considered significant. These findings suggest that the influence of perceived soft skills, outcome expectations, self-efficacy, and interests and goals on soft skills satisfaction is relatively consistent across genders among the surveyed engineering students. The results imply that both male and female students similarly perceive and are influenced by these factors in relation to their career development and satisfaction.

6.3 Implications

The study's findings have provided valuable theoretical and practical insights. One significant contribution of the research is the development of key concepts, which is an essential step in generating new insights in any field. This process is particularly important for introducing debate questions and addressing concerns related to terms that have been vaguely or inadequately defined in scholarly discourse. The discussions and studies surrounding the impact of soft skills on career satisfaction and self-efficacy in engineering students are expected to contribute to future progress in the understanding of this topic.

6.3.1 Theoretical implications

The research findings confirm the core principle of Social Cognitive Career Theory (SCCT), which suggests that an individual's belief in their ability to achieve their career goals, known as career self-efficacy, is influenced by various factors, including their perception of soft skills. The strong link between students' perception of their soft skills and their career self-efficacy underscores the importance of integrating programs aimed at developing soft skills into engineering education. By enhancing students' soft skills, educators and policymakers can significantly contribute to fostering greater confidence and competence in navigating their chosen career paths.

The findings mentioned in the text support the Social Cognitive Career Theory's focus on how environmental and contextual factors, such as acquiring and being content with one's skills, impact individuals' career decisions, paths, and satisfaction levels. It suggests that engineering students who believe they possess and effectively use soft skills are more likely to experience higher levels

of satisfaction in their careers. This underscores the significance of not only acquiring soft skills but also finding satisfaction in applying them within the context of engineering professions.

The study explores potential differences in how male and female students perceive soft skills, their confidence in their career prospects, and their levels of satisfaction. While the study identified some gender-based differences in these areas, further investigation is required to gain a deeper understanding of how gender interacts with career-related concepts within the SCCT framework. These findings provide valuable insights into the ongoing discussions about gender gaps in STEM fields and underscore the importance of addressing the unique challenges and opportunities that different genders encounter in engineering education and career development programs.

The research findings underscore the importance of Social Cognitive Career Theory in understanding the complex nature of career development in engineering students. The study delves into the relationship between perceived soft skills, career self-efficacy, and career satisfaction, offering valuable insights for educators, policymakers, and practitioners aiming to enhance career development initiatives within engineering education. Furthermore, the examination of potential gender disparities emphasizes the need to implement inclusive and equitable strategies to promote career fulfillment and success for all students pursuing careers in engineering.

6.3.2 Practical implications

Educators and academic institutions should prioritize integrating soft skills development programs within engineering curricula. These programs should focus on enhancing students' communication, teamwork, problem-solving, and leadership skills, as these are critical for success in engineering careers. By providing structured opportunities for students to develop and practice soft skills in real-world engineering projects and internships, institutions can better prepare students for the demands of the professional workforce and enhance their career self-efficacy.

Career counselors play a crucial role in supporting engineering students' career development journey. They should utilize SCCT (Social Cognitive Career Theory) principles to help students identify their career interests, set realistic career goals, and develop action plans to achieve them. Counseling sessions can also focus on building students' confidence in their ability to pursue and succeed in their chosen career paths, thereby enhancing their career self-efficacy.

Engineering institutions should adopt gender-inclusive practices to address potential disparities in perceived soft skills, career self-efficacy, and career satisfaction among male and female students. This includes promoting equitable access to resources, opportunities, and support networks for all students. By creating an inclusive and supportive learning environment that values diversity and fosters collaboration, institutions can empower students of all genders to thrive in their engineering education and future careers.

Organizing professional development workshops and networking events can provide engineering students with opportunities to enhance their soft skills, expand their professional networks, and gain exposure to diverse career pathways within the field. These events can also serve as platforms for students to learn from industry professionals, alumni, and peers, further enhancing their career self-efficacy and career satisfaction.

Institutions should implement continuous evaluation and feedback mechanisms to assess the effectiveness of existing career development initiatives and tailor interventions to meet the evolving needs of engineering students. Regular surveys, focus groups, and exit interviews can provide valuable insights into students' perceptions of their soft skills development, career self-efficacy, and overall career satisfaction, guiding future programmatic decisions.

6.4 Limitations and Future Research Directions

The current study, like other empirical studies, has certain limitations that should be addressed in future research. Firstly, because this study was cross-sectional, we cannot draw conclusions about causation between the variables examined or determine if there was a specific point in time when any given associations existed. Cross-sectional mediation can provide valuable insights into the relationship of variables if it is grounded in theory and partially supported by empirical evidence, but such studies cannot identify any shifts in these relationships over time.

Secondly, while the sample size was sufficient for the analysis, subsequent research endeavors may consider testing the model utilizing a more extensive data set to enhance its reliability and validity. This would help in drawing more accurate conclusions about the relationship between the variables under scrutiny.

Thirdly, we used self-reported measures, which could lead to users being overwhelmed without realizing it. Future research should investigate the point at which users reach a tipping point and

begin to experience academic burnout. To ascertain potential alterations in the character of the examined relationships over a period of time and determine the causal relationship between the variables, subsequent investigations may employ both longitudinal and experimental methodologies.

Furthermore, qualitative research designs can identify additional antecedents and consequences of the impact of soft skills on engineering students' satisfaction and career self-efficacy. Such research designs have the potential to offer a more comprehensive understanding of the variables under scrutiny and their potential impact on individuals.

6.5 Conclusions

In summary, this thesis has thoroughly examined the impact of soft skills on the career satisfaction and self-efficacy of engineering students, within the framework of Social Cognitive Career Theory (SCCT). In essence, this research has highlighted the crucial role of acquiring soft skills and finding satisfaction in shaping engineering students' perceptions of their career paths and their confidence in their ability to succeed. Upon reflection, this study has uncovered significant positive connections between perceived soft skills, career self-efficacy, and career satisfaction among engineering students. An empirical analysis has shed light on how the development of soft skills contributes to students' career-related beliefs and attitudes, ultimately influencing their career outcomes.

In terms of significance, the findings have important implications for both academia and industry. Educators can leverage this research to enhance curriculum development and career counseling strategies, with the aim of fostering comprehensive skill development and improving students' readiness for their careers. Employers, on the other hand, can use these insights to recognize and appreciate the importance of soft skills in recruiting and retaining engineering talent, ultimately contributing to the long-term success and satisfaction of engineering professionals in the workforce. This thesis adds to the ongoing conversation about career development and skill acquisition in engineering education, offering valuable insights into the interplay between soft skills, career self-efficacy, and career satisfaction. Looking ahead, it will be crucial to continue prioritizing and enhancing soft skills development to prepare engineering students for successful and fulfilling careers in the 21st century.

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Appendix A: Survey Instrument

In Table 25, the 5 constructs from the theoretical framework intended for study, as well as the original questions from other researchers' sources have been compiled.

***Table 25**: Survey Instrument*

Constructs	Adopted Items	Source
Perceived Soft skills	1. I can engage in building and maintaining relationships. 2. I can work with others. 3. I can communicate effectively both orally and in writing. 4. I can identify, analyze, and solve engineering problems. 5. I can think critically and independently. 6. I can self-reflect, organize things, and manage time. 7. I can understand professionalism in terms of professional conduct, ethics, and responsibility. 8. I can be flexible and keep an open mind when facing unexpected situations and problems. 9. I can search, identify, and manage information. 10. I can play multiple roles as a leader in a team.	(Chan et al., 2017)
Self-Efficacy	1. I will be able to achieve most of the goals that I have set for myself. 2. When facing difficult tasks, I am certain that I will accomplish them. 3. In general, I think that I can obtain outcomes that are important to me. 4. I believe I can succeed at most any endeavor to which I set my mind. 5. I will be able to successfully overcome many challenges. 6. I am confident that I can perform effectively on many different tasks. 7. Compared to other people, I can do most tasks very well. 8. Even when things are tough, I can perform quite well	(Schwarzer & Jerusalem, 1993) (G. Chen et al., 2001)
Expected outcomes	1. If I learn more about different soft skills, I will be a better decision maker. 2. If I know my interests and abilities, then I will be able to choose a good career. 3. If I know about the education I need for different soft skills, I will make a better employee. 4. If I spend enough time gathering information about soft skills, I can learn what I need to know to make a good decision.	(Betz & Voyten, 1997)
Interest and Goals	1. I intend to spend more time learning about soft skills than I have been 2. I plan to talk to lots of people about soft skills 3. I am committed to learning more about my abilities and interests 4. I intend to get all the soft skills I need for my career choice 5. I plan to talk to advisers or counselors in my college about soft skills for different majors	(Betz & Voyten, 1997)

Soft Skills satisfaction	1. I am satisfied with the success I have achieving towards my career. 2. I am satisfied with the progress I am making toward meeting my overall career Goals. 3. I am satisfied with the progress I am making toward meeting my goals for income. 4. I am satisfied with the progress I am making toward meeting my goals for advancement. 5. I am satisfied with the progress I am making toward meeting my goals for the development of new skills.	(Greenhaus et al., 1990)

Appendix B: Expert Validation Form

Dear Expert,

I am a final year Master's student at the Islamic University of Technology and I am currently conducting research on "The Role of Soft Skills in Shaping Engineering Students' Career Self-Efficacy and Satisfaction: A Social Cognitive Career Theory Analysis." This survey comprises of five (5) constructs (Perceived Soft Skills, Self-Efficacy, Expected Outcomes, Interests and Goals, Soft Skills Satisfaction) with several items in each construct, totaling 31 items.

I kindly request your expert assessment regarding the degree of relevance and clarity of each item in relation to the measured domains. Your expertise in this area is vital in ensuring the quality and accuracy of our research instrument.

Please use the following rating scales as a guide:

Degree of Relevance:

1: The item is not relevant to the measured domain.
2: The item is somewhat relevant to the measured domain.
3: The item is quite relevant to the measured domain.
4: The item is highly relevant to the measured domain.

Degree of Clarity:

1: The item is not clear.
2: The item needs some revision.
3: The item is clear but requires minor revision.
4: The item is very clear.

Your feedback is of great importance to me. It will help me refine my questionnaire, ensuring its effectiveness in capturing the necessary data for our study.

Thank you for your valuable time and expertise. Your contribution to our research is sincerely appreciated.

Respectfully yours,

Abu Bakarr Sillah
abubakarr@iut-dhaka.edu

The Role of Soft Skills in Shaping Engineering Students' Career Self-Efficacy and Satisfaction: A Social Cognitive Career Theory Analysis.

Instructions: Below are questions included in the prepared draft of the questionnaire guide for the study on "*The Role of Soft Skills in Shaping Engineering Students' Career Self-Efficacy and Satisfaction: A Social Cognitive Career Theory Analysis*." The study aims to investigate the influence of soft skills on the self-efficacy and overall soft skills satisfaction of engineering students.

Discuss how the experts rate the questionnaire-

Degree of Relevance:

1: The item is not relevant to the measured domain.
2: The item is somewhat relevant to the measured domain.
3: The item is quite relevant to the measured domain.
4: The item is highly relevant to the measured domain.

Degree of Clarity:

1: The item is not clear.
2: The item needs some revision.
3: The item is clear but requires minor revision.
4: The item is very clear.

Table 26: Expert Content Validation Form Yusoff, M. S. B. (2019)

Constructs and Items	**Relevancy**				**Clarity**				**Comments**
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	
Construct 1: Perceived Soft Skills									
I can engage in building and maintaining relationships.									
I can work with others.									
I can communicate effectively both orally and in writing.									
I can identify, analyze, and solve engineering problems.									
I can think critically and independently.									
I can self-reflect, organize things, and manage time.									
I can understand professionalism in terms of professional conduct, ethics, and responsibility.									
I can be flexible and keep an open mind when facing unexpected situations and problems.									
I can search, identify, and manage information.									
I can act as a leader in a team.									
Construct 2: Self-Efficacy(G. Chen et al., 2001)									
I can achieve most of the goals that I have set for myself.									
When facing difficult tasks, I am certain that I can accomplish them.									
I think that I can obtain goals that are important to me.									
I believe I can succeed in my attempts to which I set my mind.									
I believe I can successfully overcome challenges in my career.									
I am confident that I can perform effectively on many different tasks.									
I can do most tasks very well compared to other people.									

I can perform quite well even when things are tough.									
Construct 3: Expected Outcomes(Betz & Voyten, 1997)									
If I learn more about different soft skills, I will make a better career decision.									
If I know my interests and abilities, then I will be able to choose a good career.									
If I know about the education I need for different soft skills, I will make a better career decision.									
If I spend enough time gathering information about soft skills, I can learn what I need to know to make a good decision.									
Construct 4: Interest and Goals(Betz & Voyten, 1997)									
I intend to spend more time learning about soft skills than I have been.									
I plan to talk to lots of people about soft skills									
I am committed to learning more about my abilities and interests									
I intend to get all the soft skills I need for my career choice									
I plan to talk to advisers or counselors in my institution about different career opportunities.									
Construct 5: Soft Skills Satisfaction(Greenhaus et al., 1990)									
I am satisfied with the soft skills that I have achieved.									
I am satisfied with the progress I am making with my skills to achieve career Goals.									
I am satisfied with the progress I am making with my skills for advancement in higher studies.									
I am satisfied with the progress I am making toward meeting my goals for the development of new skills.									

General Comments/Suggestions/Recommendation:

Validated by:

Affiliation and Designation:
Signature of the Validator:
Date of Validation:

Appendix C: Consent Form and Survey Instrument

ANALYSING THE IMPACT OF SOFT SKILLS ON ENGINEERING STUDENTS' SATISFACTION AND CAREER SELF-EFFICACY.

by

Abu Bakarr Sillah (211031202), MSc.TE

Supervisor

Prof. Dr. Abdullah Al Mamun

Department of Technical and Vocational Education (TVE)

Islamic University of Technology (IUT)

Assalamualaikum Dear Respondents,

I am Abu Bakarr Sillah from the Sierra Leone, a final year Master's student at the **Islamic University of Technology**. As part of my master's degree requirements, I need to conduct a research study to write a thesis.

Purpose of this Survey

This survey aims to investigate the impact of soft skills on engineering students' satisfaction and career self-efficacy.

Data Collection and Participation

The questionnaire can be completed in about 5 minutes. No personal data will be collected and thus your participation is completely anonymous in this survey. The data collected from this survey will be used for research purpose only. Your participation is voluntary, and we highly appreciate if you manage your time to complete this survey.

Thank you.

1. Age

2. Status

(Select only one.) ☐☐Domestic Student ☐☐International Student

3. Your Gender

(Select only one.) ☐☐Female ☐☐Male

4. Current Program

(Select only one.) ☐☐PhD ☐☐Master ☐☐Bachelor ☐☐Diploma

5. **Survey questionnaire**

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Perceived Soft Skills					
I can engage in building and maintaining relationships.					
I can work with others.					
I can communicate effectively.					
I can solve engineering problems.					
I can think critically and independently.					
I can organize things timely.					
I can understand what professionalism is.					
I can be flexible when facing unexpected situations.					
I can search and manage information.					
I can act as a leader in a team.					
Self-Efficacy					
I can achieve most of the goals that I have set for myself.					
When facing difficult tasks, I am certain that I can accomplish them.					
I think that I can obtain goals that are important to me.					
I believe I can succeed in achieving my goals.					
I believe I can successfully overcome challenges in my career.					
I am confident that I can perform effectively on many different tasks.					
I can do most tasks very well compared to other people.					
I can perform quite well even when things are tough.					
Expected Outcomes					
If I learn more about different soft skills, I will make a better career decision.					
If I know my interests and abilities, then I will be able to choose a good career.					
If I get the proper education, I will make a better career decision.					
If I spend enough time to attain soft skills, I can make a good career decision.					
Interest and Goals					
I intend to spend more time learning about soft skills than I have been					
I plan to talk to lots of people about soft skills					
I am committed to learning more about my abilities and interests					
I intend to get all the soft skills I need for my career choice					
I plan to talk to advisers or counselors in my institution about different career opportunities.					
Soft Skills Satisfaction					
I am satisfied with what I have achieved using my soft skills.					

I am satisfied with the progress I am making with my skills to achieve career Goals.					
I am satisfied with the progress I am making with my skills for advancement in higher studies.					
I am satisfied with the progress I am making toward meeting my goals for the development of new skills.					
Thank you for your Response					