

## **Engineers' Soft Skills in the 4th Industrial Revolution: Perspectives of Employers in Morocco**

### **Les compétences générales des ingénieurs dans la 4e révolution industrielle : perspectives des employeurs au Maroc**

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### **Abstract:**

During the last few decades and especially in the late 21st century, the world has witnessed significant changes in different domains of life, including higher education and the job market. This perennially fast-changing world necessitates tertiary education institutions to swiftly calibrate up-to-date strategies and promote students' skills, notably soft skills. As a result, there is an urgent need to expand and bring diversity to the STEM (Science, Technology, Engineering and Mathematics) workforce in Morocco and to the needs of society. The objective of this paper is to identify the overall evaluation and satisfaction with the performance of engineers at the level of soft skills. Against this backdrop, the study opted for a mixed-method approach for data collection and data analysis. The main research instruments used are the questionnaire and semi-structured interviews. The target population of this study comprised 20 employers. Their views were essential for the needs analysis research because they could mirror their experiences in the job market. The findings of the study strongly endorse that there is a mismatch between engineering students' skills and those required in the workplace. Many challenges have been faced during the different phases of conducting this research. One would mention the acute shortage of references about soft skills in Morocco and the fact that it required much time and energy to build literature.

**Keywords:** Soft skills, Graduate skills gap, 4<sup>th</sup> industrial revolution, Employability

**JEL Classification:** L51, L60, O15

**Paper type:** Empirical research

### **Resumé:**

Au cours des dernières décennies et surtout à la fin du XXI<sup>e</sup> siècle, le monde a connu des changements importants dans différents domaines de la vie, notamment l'enseignement supérieur et le marché du travail. Ce monde en perpétuel changement rapide oblige les établissements d'enseignement supérieur à calibrer rapidement des stratégies actualisées et à promouvoir les compétences des étudiants, notamment les compétences non techniques. En conséquence, il est urgent d'élargir et d'apporter de la diversité à la main-d'œuvre STEM (Science, Technologie, Ingénierie et Mathématiques) au Maroc et aux besoins de la société. L'objectif de cet article est d'identifier l'évaluation globale et la satisfaction à l'égard de la performance des ingénieurs au niveau des compétences générales. Dans ce contexte, l'étude a opté pour une approche mixte pour la collecte et l'analyse des données. Les principaux instruments de recherche utilisés sont le questionnaire et les entretiens semi-directifs. La population cible de cette étude comprenait 20 employeurs. Leurs points de vue étaient essentiels pour la recherche sur l'analyse des besoins, car ils pouvaient refléter leurs expériences sur le marché du travail. Les conclusions de l'étude confirment fortement qu'il existe un décalage entre les compétences des étudiants en ingénierie et celles requises sur le lieu de travail. De nombreux défis ont été relevés au cours des différentes phases de réalisation de cette recherche. On citera le manque criant de références sur les soft skills au Maroc et le fait qu'il a fallu beaucoup de temps et d'énergie pour construire la littérature.

**Keywords:** Soft skills, déficit de compétences des diplômés, 4<sup>e</sup> révolution industrielle, employabilité

**JEL Classification:** L51, L60, O15

**Paper type:** Recherche empirique

## 1. Introduction:

The higher education system in Morocco is starting off with a considerable change to the structure of the undergraduate level. The 2023-2024 academic year will be exceptional because the Ministry of Higher Education, Scientific Research, and Innovation has announced plans to do away with the graduation research module from the bachelor's degree course for students. This decision is part of the new pedagogical strategy, which intends to enhance the degree program in Moroccan universities. Furthermore, courses will be designed to enhance students' digital and self-advocacy skills. It is believed that this new system will equip students with soft skills and reinforce their learning of foreign languages and information technology in order to increase the rate of employment by launching vocational training programs. The Moroccan Ministry of Higher Education has already settled for a curriculum developed by the USAID Morocco Career (CC) as the groundwork for the three years of study. Moreover, the strategic vision of reform 2015-2030 is perceived as a comprehensive work plan for refining the quality of the Moroccan national system of education and scientific research. It puts emphasis on the integration and the teaching of foreign languages as well as the creation of a link between education and the requirements of the job market. It also highlights the role of education in accomplishing equity for all students regardless of their race, gender, or social class.

The universities' job of extending knowledge among young graduates indicates that, in the modern world, they should also serve the needs of society overall. Degrees are no longer perceived as the ultimate standard of graduates' professional intellectuality as they used to be. The emergence of the Fourth Industrial Revolution has led to a change in the labor market, and job knowledge skills are now recognized as the backbone of economic expansion and productivity. The acquisition of soft skills is a compulsory academic task that must begin at the primary stage because nowadays it is hard to prognosticate what the working world will be in the future; only short-term projection can be done. In developing countries, including Morocco, the issue of integrating soft skills into the curriculum taught to engineering students in vocational institutions has gathered speed in the last few years. Despite the fact that they seem to be challenging to teach and even harder to evaluate in the classroom, it is of high priority to understand the ESP curriculum of soft skills (if there is one) in order to guarantee instant employment opportunities.

Previous studies in the discipline of engineering revealed that the English language is of the utmost importance in the academic and professional careers of engineering students (Basturkmen, 2006; Pritchard & Nasr, 2004; Joesba & Ardeo, 2005; Sidek et al., 2006; Venkatraman & Prema, 2007). There was so much criticism directed at university graduates claiming that they lack some fundamental skills and, as a consequence, they are not well equipped for the job market. In addition to this, including soft skills in the engineering curricula is perceived as a challenge for the majority of professors since their own education was focused almost completely on knowledge-based materials. In view of this situation, the challenge lies in determining ways of presenting soft skills to engineering students. To prepare engineers for the work environment, Chamorro-Premuzic et al (2010) argued that it is of huge importance to put into practice "a set of non-academic attributes, such as the ability to cooperate, communicate and solve problems, often referred to as generic or soft skills in higher education" (p.221). Furthermore, based on a study conducted on soft skills in Higher Education, Chamorro-Premuzic et al (2010) asserted that "unlike academic or disciplinary knowledge, which is subject-based, content-specific and formally assessed, soft skills comprise a range of competencies that are independent of, albeit often developed by, formal curricula and rarely assessed explicitly" (p.222). One can deduce from the above quote that although soft skills are perceived as crucial, they are regarded as lacking by prospective

engineers. What is more, they are seldom incorporated into the curriculum, and they cannot be evaluated within the summative assessment.

Therefore, the lack of knowledge of English for Specific Purposes and the increasing internationalization of global labor markets leads to many difficulties at the corporate level. In this respect, choosing the most appropriate methodological approach is of great importance to investigate the existing gap between practice and theory and to enhance graduates' chances for success in the working environment. In the Moroccan context, despite the fact that English is widely taught in Morocco, few studies have been conducted in the field of soft skills in English for Specific Purposes and more specifically to design a curriculum that can meet the English language needs of those students in professional settings except one book entitled *Current Concerns in Higher Education Pedagogies: Soft Skills for Effective Citizenship and Employability* (2020) written by Moroccan scholars Moubtassime Mohamed, Belfakir Latifa, El Karfa Abderrahim, Sadik Madani Alaoui, Sbahi Mohamed and some others. Based on the above, this study tries to answer the following research question: "Which skills do employers consider important when recruiting engineers?" More precisely, the principal goal of this study is to evaluate the availability and the importance of soft skills which may be influential in the retention of new professional engineers. The outline of the article is organized as follows: Section 2 presents the theoretical framework, the literature review, and the development of the research hypotheses. Section 3 presents the methodology adopted. Section 4 is devoted to descriptive statistics and analysis. Section 5 presents a discussion of the results. Section 6 concludes this research work by emphasizing its contributions, limitations and implications for future research.

## **2. Literature review and development of hypotheses**

### **2.1. Background to Soft Skills**

The label "soft skills" was seldom employed until 1980 based on its usage in the data scanned by Google. Until the 1980s, the growth was steady and rapid. Different synonyms have been presented for soft skills by several organizations and institutions. In fact, there are several denominations of soft skills. They are referred to as life skills, transversal skills, generic skills, future work skills, and transferable skills. Some international research centers prefer to call them "21st-century skills, whereas the Organization for Economic Co-operation and Development (OECD) employs the term "key competencies for a successful life and a well-functioning society" (2003) and, more recently, "skills for social progress" (2015). Also, André (2013) identified soft skills with a person's "EQ" (emotional Intelligence quotient). He described them as a "package" of skills related to personal growth that incorporates life skills, language skills, interpersonal/intrapersonal skills, empathy, self-awareness, and determination that facilitate communication with other people. The same idea is confirmed by Heckman (2003) who defined soft skills as « personality traits, goals, motivations, and preferences that are valued in the labor market, in school, and in many other domains » (p. 452).

In the same track, The Educational Testing Service (ETS) asserted that soft skills are "the ability to a) collect or retrieve information, b) organize and manage information, c) evaluate the quality, relevance, and usefulness of information, and d) generate accurate information through the use of existing resources" (cited in Pacific Policy Research Center, 2010, p. 1). This implies that developing soft skills is chiefly based on the amalgamation of hard skills, personal skills, and cognitive skills. Yadav and Pachauri (2014) investigated soft skills through communication, presentation, and teamwork firmly stressing the idea that soft skills should be integrated at the tertiary level. The key factor for developing them is their effect on their employment pursuit, making pertinent decisions, and taking part in effective

communication situations, highlighting the tense interconnection between soft skills and the main functions of language. A compelling contribution to the analysis of soft skills is provided by Ramesh and Ramesh (2010) who stressed that soft skills are not the same as adequate mastery of language and lexis, which stands in stark opposition to communication skills.

In a further examination of soft skills, Fastnacht (2006) as cited in Kic-Drgas (2018) also examined the main features of soft skills and defined them as human prospects, which evolved in a task-oriented environment. The model pivots on the division of the functions of soft skills, which delineates the three main aspects of research on the subject matter: cognitive, behavioral, and motivational. The cognitive feature is the brain-based skill that we need to collect and process information in order to analyze a certain situation and carry out tasks from the simplest to the most intricate ones usually referred to as emotional intelligence. The behavioral dimension includes social and emotional skills that people use to engage effectively with others in the workplace. Finally, the motivational aspect punctuates the actions and strategies that help individuals to move further (for instance the ability to construct an interpersonal challenge in a communicative situation). ((Fastnacht, 2006, as cited in Kic-Drgas, 2018). In the same track, Robles (2012) hardly believed that soft skills are “character traits, attitudes, and behaviors rather than technical aptitude or knowledge. Soft skills are the intangible, non-technical, personality-specific skills that determine one’s strengths as a leader, facilitator, mediator, and negotiator” (p. 457). As mentioned earlier, the denotation of this concept gives rise to a debate between scholars to the extent that these skills were described as ‘wicked competencies’<sup>1</sup>. Based on the fact that a lot of authors enumerated various skills and ranged them in different ways builds up to the complexity of this notion. There are other soft skills that could be added to the list depending on whom you ask. As explained by Moubtassime (2020), any skills that cannot be taught in a classroom today can be considered as a potential soft skill. In an attempt to understand the current and future impact of soft skills on employment levels, the World Economic Report “The Future of Jobs” conducted a study in which they listed the development of the skill sets (between 2015 and 2020) needed to prosper in the new work-life world. Without regard to the complexity of explaining the concept of soft skills, it is crucial to highlight the importance of soft skills in Higher Education as well as grasp which skills will be indispensable in the future. In the present study, the researcher will try to analyze 11 soft skills since it would be difficult to go over all the skills.

## 2.2. Soft Skills According to Engineering Accreditation Bodies

The American Engineers' Council for Professional Development, the predecessor institution of the Accreditation Board of Engineering and Technology (ABET) described engineering as “the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind” (p. 1). In other words, it is a scientific field that involves the application of the knowledge of pure sciences in order to design and develop infrastructure and services for industry and society. Accreditation is the process of officially granting credit by an authoritative body of the competence to carry out specific activities (mainly in educational institutions that perpetuate pertinent standards).

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<sup>1</sup> Peter Knight & Anna Page (2007). *The Assessment of “Wicked Competences”*. Report to the Practice Based Professional Learning Centre.

[http://www.open.ac.uk/opencetl/sites/www.open.ac.uk.opencetl/files/files/ecms/web-content/knight-and-page-\(2007\)-The-assessment-of-wicked-competences.pdf](http://www.open.ac.uk/opencetl/sites/www.open.ac.uk.opencetl/files/files/ecms/web-content/knight-and-page-(2007)-The-assessment-of-wicked-competences.pdf).

It aims to improve the quality standards of engineering education all over the world. Engineering Accreditation Bodies' role is to inspect the status of university engineering programs to guarantee relevance. In the present work, the researcher tried to collect an example of accreditation bodies that are summarily explained in table 1.

**Table 1** *Engineering Accreditation Bodies (Self-Collected)*

<b>Accreditation Bodies</b>	<b>Description</b>	<b>Mission</b>
CEAB	Canadian Engineering Accreditation Board	It accredits undergraduate engineering programs. Its aim is to ensure Canada's engineering education system remains amongst the best in the world as well as to provide expertise and efficiency in evaluating engineering education on behalf of the provincial and territorial engineering regulatory bodies.
ABET	The Accreditation Board for Engineering and Technology	It accredits post-secondary education programs in applied and natural sciences, computing, engineering and engineering technology.
ANAEE	European Network for Engineering Education of Korea	It fosters quality engineering education so that engineering graduates are fully equipped to deal with situations that are demanded by modern engineering projects.
ABEEK	Accreditation Board for Engineering Education of Korea	To assure the quality of educational programs in engineering and related disciplines, and to ameliorate the professional competence of the graduates in Korea.
EA	Engineers Australia	To assess the tertiary engineering programs to determine whether they produce graduates who meet international benchmarks to practice.
JABEE	Japan Accreditation Board for Engineering Education	It accredits an educational program that provides students with education to acquire international traits such as specialized knowledge of science and technology, engineering design ability, communication skills, ability to work in a team and professional ethics.
NSPE	National Society of Professional Engineers	It promotes engineering licensure and ethics, advocating and protecting professional engineers' legal rights at the national and state levels.
ECSA	Engineering Council of South Africa	It ensures that engineering programs offered by tertiary institutions in South Africa meet the necessary quality standards

*Source: author*

In Morocco, in 2010 new legislation (blueprinted in 2007) instigated a new system of quality assurance in higher education, the accreditation process. Although accreditation is a long and arduous path that is granted for a fixed period term, to guarantee the quality of training that is to be provided, the proposed courses must be produced on the basis of certain standards beforehand by the Ministry following the decision of the opinion of the National Commission for the Coordination of Higher Education (CNCES). CNCES is a regulatory body that provides an advisory opinion on all educational and organizational issues of interest to Higher Education institutions outside of university created by Law 01-00 (Article 81). In their article

**Skills for Employability: Identification of the Soft Skills Required in Engineering Education,** Chaibate, et al (2017) attempted to investigate the soft skills developed by Moroccan Engineering programs. They reported that those syllabuses seek to develop various kinds of skills and knowledge, such as self-coaching skills, time management, leadership, argumentation, negotiation, and conflict management.

Having regard to the above, it is indisputable that universities should take into consideration students' soft skills to meet upcoming professional challenges in the job market. Using English for Specific Purposes is closely related to the working environment. Students are interested in ESP not only because of the importance of the English language but also because of the need to fulfill certain tasks by using the language. As a result, training programs should try to review potential upcoming scenarios to equip engineering students with the right tools to find a job, but this is not straightforward since the future is not part of the course. In the same line of argument, Grygiel (2015) reported that "language is a dynamic system and as, such it evolves along three basic directions – in time (historically), in space (geographically) and in stratification (socially)" (p.3).

### **2.3. Empirical studies and hypotheses**

Today's fast-changing world and the switch from a manufacturing economy to Information Technology (IT) have had an esoteric influence on the competencies required of future graduates and employees in the Moroccan workforce, giving prominence to soft skills. As a matter of fact, it is no longer enough for newly minted graduates to know only technical (hard) skills, but also soft skills that are important to achieve employability in many professions. Soft skills as defined in scholarly literature are employed to stipulate individual diagonal competencies such as communication skills, social aptitudes, teamwork, and other personality attributes that distinguish people. Soft skills are conventionally considered interdependent with hard skills, which are the specific abilities and knowledge required to perform a certain task. In the same line of thought, Professor A. Ferrati from Mohammed V University in Rabat explained in an interview with Morocco World News (2020) "hard skills are the knowledge and the technical expertise needed for a certain job. They are usually job-specific and are learned at schools or colleges" (p. 1). Engineering students need to develop their employability by acquiring core work skills, knowledge, and industry-based and professional competencies that facilitate their transition into the working environment.

The engineering industry in Morocco is considered a crucial zone of the economy which has a substantial part in the improvement of the country. Thus, one way to train engineering students for future jobs is by making sure that they are competent in English. Specific requirements associated with the type and levels of English are now constructed by companies. Therefore, universities are required to realize these demands and assure that the items that are taught mirror these real-world needs. Currently, all private and public universities must provide English preparatory courses in line with regulations and these courses offer students language skills in reliance on vocabulary, grammar, writing, and reading. After reviewing a sum of literature related to the field of English for Specific Purposes in Morocco, studies about the needs of engineering students, in particular, are extremely scarce. For instance, in his research work *ESP in Moroccan Universities: Prospects and Employability*, Saad Eddine Akhjam (2019) stressed that the present syllabus framework of English programs has not been designed with the consideration of professional English and as a result, these English courses were not discipline-specific, and they did not lay the ground for English communication at the place of work.

In recent engineering research, there is an extensive discussion of the concept of a T-shaped engineer which was first introduced in a London newspaper editorial. Other terms are also used, such as "T-professional", "Generalizing Specialist" (Appelo, 2010), "Hybrids" (Palmer,

1990), and “Versatilist” (Diane, 2005). It comprises both content knowledge and multidisciplinary skills. The “T” represents a metaphor to give a description of the profundity and the extent to which ‘ideal’ engineers master certain skills and competencies. Therefore, the vertical line on the ‘T’ refers to the knowledge acquired in a certain field, whereas the horizontal line reflects one’s ability to think creatively and apply skills in domains other than their source field.

Grasso & Burkins (2010) advocated that “the exciting future of engineering is beyond technological labels (e.g., mechanical engineer, electrical engineer, and chemical engineer) where isolated training falls to a more powerful profession of broadly educated “holistic engineers” (p. 1). In order to achieve this goal, “professionals should be cultivated to be able to take on the most complex technological, social, environmental, and economic challenges facing today’s societies” (ibid, p. 2). A well-prepared engineering workforce is in need of young professionals who possess T-shaped skills. In other words, engineers who have extensive knowledge of one discipline and broad knowledge in juxtaposed fields of study. Be that as it may, this profile cannot be forged by only formal education, but also through interaction with the area of expertise and with entrepreneurs. One can infer that Moroccan Higher Education institutions have to take the initiative of raising students’ awareness about the importance of acquiring potential outside their academic comfort zone.

Engineering graduates must have certain skills beyond the scope of their technical knowledge. These skills are referred to as generic skills and are also labeled employability skills. Others described them as skills that can be transferable (Yorke, 2006) and teachable (Lorraine & Peter, 2007). A widely accepted definition of employability is presented by Shafie and Nayan (2010) who defined them as “those basic skills necessary for getting, keeping, and doing well on a job” (p.119). Generally, the term employability touches on the skills needed to acquire and hold on to employment. Employability upon graduation is a prime concern for the majority of engineering students. According to Kubler & Forbes (2004), an engineering graduate with technical knowledge, a friendly personality, and good communication skills was the best alternative for any company. In 2015, Morocco’s Millennium challenge corporation (MCC) funded the project ‘Education and Training for Employability’ with a budget of 220\$ million. It targets three main sectors, namely secondary education, vocational training, and employment. Its main goal is to help job seekers boost their employment chances through training. In 2019, Morocco’s Minister of Education Said Amzazi acknowledged the scarcity in the job market, stating that more than 600 engineers go abroad to look for favorable working conditions.

In the same line of argument, numerous studies question the digitization of organizations and its impact on the organization (Burke and Ng, 2006; Brynjolfsson and McAfee, 2012, 2014; Autor, 2015), with widely varying focuses of concern, whether it's Industry 4.0 (Drath and Horch, 2014), "world of work 4.0" (Dengler and Matthes, 2015), disruption of business models (Bürmeister et al., 2016), renewal of managerial activity and leadership (Payre and Scouarnec, 2015), etc. As far as the Human Resources (HR) function is concerned, national and international prospective studies on its future consider the evolution of information and communication technologies (ICT) as a major factor in future changes to working practices (Enlart and Charbonnier, 2013; Barabel et al., 2014; Deloitte, 2014; BCG, 2015). The impact of digital has become a key issue for the HR function (Silva, 2014; Stone et al., 2015).

Hence, this study specifically aims to answer the following objective which is to identify the overall evaluation and satisfaction with the performance of engineers at the level of soft skills. This research question will confirm or disconfirm the research hypothesis which claims that employers are not satisfied with the performance of engineers at the level of soft skills.



### **3. Methodology**

#### **3.1. Settings and Participants**

Adopting a specific methodological process is an essential step in doing research. In fact, to answer research questions, and to test the validity of the study under investigation, knowledge of respondents and institutions is very crucial. The target population of this study comprised 20 employers. Employers were chosen because they have knowledge, experience, and correlation with the employees. The choice of the sampling technique is based on the nature of the target population, and the resources available in terms of time and money (Dawson, 2002). Having said this, this study opts for convenience sampling of the quantitative and qualitative data collection and analysis. With this in mind, employers were asked to fill out a questionnaire, and semi-structured interviews were conducted with a subsample of participants so as to crosscheck the quantitative and qualitative data. The views of the employers were essential for this needs analysis research because they could indicate the language used and the urgent need for soft skills in real-world situations. The results could be employed to compare what the students already knew with what the students needed to master before they started working at similar jobs. The sampling done for the employers was snowball sampling (also referred to as chain referral sampling). It is widely opted for in qualitative research. It is a non-probability sampling technique in which the researcher starts with a few participants and then expands the sample by asking those first interviewees to identify others that can take part in the study. Once the data was collected, the researcher coded the answers and then categorized them into themes to address the research questions. Data coding is the process of organizing the collected information into a set of meaningful themes and ideas (Creswell, 2003). 6 companies were chosen across a range of private enterprises and all of which recruit engineers in various engineering fields. They are national and multinational companies.

#### **3.2. Instruments of Research**

##### **3.2.1. Employers' Questionnaire**

After the literature review was done, a questionnaire was administered. Qualitative research was opted for in order to gain a deeper understanding of the most important soft skills for employers in the working environment. In part 1, the demographic data were collected: age, gender, current occupation in the company, and years of managerial experience. Part 2 included the 11 soft skills, namely, 1) oral communication, 2) written communication, 3) general ethics, 4) diversity, 5) time management, 6) teamwork, 7) critical thinking, 8) organization, 9) leadership, 10) reliability, 11) adaptability. The respondents were required to indicate the level of importance of each skill for successful performance on the job as well as their satisfaction with their employees' qualities. A five-point Likert type scaling was employed to rate the importance (5= Extremely important, 4= Very important, 3= Somewhat important, 2= Not very important, 1= Not at all), and the satisfaction (5= Extremely important, 4= Very important, 3= Somewhat important, 2= Not very important, 1= Not at all). The questionnaire was also translated into the French language so that participants can easily understand the questions and avoid ambiguity. The data were coded and entered into SPSS 25 (the Statistical Package for the Social Sciences). Each participant was given a unique identification number for confidentiality and anonymity. The data file in the SPSS was checked to make sure that each variable value is within its potential range, and that no outliers existed. Upon completion of the data review, descriptive statistics were employed to make a summary and categorize data.

### 3.2.2. Employers' Interviews

One of the predominant methods of collecting qualitative data for the current study was to interview employers. The rationale behind selecting such a method depends on the researcher's purpose to attain in-depth data about English teachers' perceptions, experiences, and thoughts. Their contribution was expected to mirror their experience in the job market. A total number of 6 participants were selected through a snowball sampling to collect more interviews to investigate the applicability of soft skills within industrial organizations. The number of respondents was small, especially among employers. Despite the fact that the researcher contacted as many employers and human resource professionals as possible, only six participants accepted to take part in the study, and the majority kept rescheduling the meeting. The questions of this semi-structured interview were formulated as a pilot study which was conducted three months before the administration of the interview so that the researcher can develop an extensive questionnaire for investigating the applicability of soft skills within industrial organizations. The participants involved in the survey were notified that they were in a pre-stage test and that their comments and suggestions would be beneficial in experimenting with the feasibility of the questions.

Immediately after collecting the data, it was decoded and divided into major themes to address the research questions. The researcher presented the results in a narrative format. The use of the narrative method permitted the integration of quotes when writing about the respondents' perceptions (Creswell, 2005). Each interview lasted 30 min and the arrangements for the interview were made in advance according to the availability of each respondent. To assure that the participants were providing significant data, the researcher asked them to mention real-life situation examples or anecdotal descriptions so as to better support their answers and avoid ambiguous statements. The interviews were audio-recorded, and notes were taken as well. The following chart presents the information about the interviewees:

*Table 2 Qualitative Study Sample Description*

Participant	Gender	Position	Industry Tenure	Industry	Interview Length
1	Male	Director	14 years	Electronic Engineering and Industrial Automation <b>EIA TECH (Tangier)</b>	30 minutes
2	Male	Human Resources	9 years	Construction materials <b>LAFARGE (Casablanca)</b>	30 minutes
3	Male	Director	13years	Topographic and Land Engineering <b>SITOF (Tangier)</b>	30 minutes
4	Male	Human Resources	7 years	Security systems and metal constructions <b>ELTEN (Casablanca)</b>	30 minutes
5	Male	Human Resources	4 years	Innovation service design <b>CIS MED (Tangier)</b>	30 minutes
6	Male	Human Resources	7 years	Communication Systems and Control <b>IFM ELECTRONIC (Casablanca)</b>	30 minutes

*Source: Author*

## 4. Results and Discussion

### 4.1. Employers' Questionnaire

Assuming that soft skills are universal leads to much frustration. Competitiveness in an internationalized labor market necessitates that prospective engineers are to be equipped with soft skills and competencies that could pave their way easily to employment units. Therefore, as today's soft skills shift stepped up, it is essential to ask employers about the overall satisfaction of their employees. Based on the data analysis, 60% of employers are not satisfied with their current engineering graduate skills. This corroborates the results of other studies revealing that the soft skills of fresh engineers are limited.

The means of the respondents' answers were computed and employed to rank the importance of soft skills from the highest to the least important. As it was expected, oral communication was the soft skill that received the highest rate (M=4,55, SD 0,510), followed by written communication (M= 4,45, SD= 0,510). For the third soft skill, the results (M=4, 40, SD= 0,503) display that the majority of employers perceive time management as a crucial skill in ameliorating engineers' performance. The fourth and the fifth rated items are organization and critical thinking (M=4,15, SD=0,745) and (M=4,10, SD=0,447). In fact, critical thinking is an important skill for quality professional work. There is no doubt that life in the Internet era has surrounded us with a wealth of information. Thus, it is crucial to be able to question, separate truth from false facts, analyze information, and draw conclusions since our behaviors are largely determined by the information we receive. Critical thinking skills not only help an employer to identify creative ideas but also to get organized and solve problems effectively. Also, when asked if there are any other soft skills competencies they seek in the candidates, general ethics (M=4,05, SD= 0,510) and teamwork (M=3,85, SD=0,587) were also recommended. It is worth noticing that the soft skills of reliability and diversity got on the same level. They rated (M= 3,65, SD= 0,875) and M= 3,65, SD= 0,675). Finally, the two least important soft skills are leadership and adaptability. The overall mean scores registered by the respondents are (M= 3,60, SD= 0,681) and (M=3,35, SD= 0,489). The results are displayed in table 3.

*Table 3 Descriptive Statistics for the Importance of Soft Skills for Successful Performance*

Soft Skills	Mean	SD
Oral Communication	4,55	0,510
Written Communication	4,45	0,510
General Ethics	4,05	0,510
Diversity	3,65	0,671
Time Management	4,40	0,503
Teamwork	3,85	0,587
Critical Thinking	4,10	0,447
Organization	4,15	0,745
Leadership	3,60	0,681
Reliability	3,65	0,875
Adaptability	3,35	0,489

*Source: author*

Table 4 below reflects employers' views on eleven soft skills which they deemed most disparaging so that graduate engineers can become superior performers. Of the 11 soft skills, item 3 "general ethics" is the first soft skill that employers are satisfied with (M=3,30, SD= 0,865). The soft skill of general ethics differentiates civilized individuals from animals. A workplace being a social setting requires people with good morals. This is followed by the

second and the third rated items, adaptability with a mean score of (M=3,10, SD= 0,641) and teamwork (M=2,65, SD= 0,875). Without working as part of a team, no employee can achieve much in an organization. Moreover, it is worth noting that critical thinking and written communication in the present study are equally significant with a rate of (M=2,55, SD= 1,099) and (M=2,55, SD=0,826). In contrast, employers are somewhat satisfied with engineers' soft skills of diversity and time management with the same mean of (M=2,50, SD= 1,433) and (M=2,50, SD=1, 192). The results also showed that employers are on average "satisfied" with the organization skills (M= 2,35, SD= 0,933). Additionally, Moroccan employers are less satisfied with three soft skills, notably oral communication (M= 2,20, SD= 1,105), leadership (M=2,10, SD= 0,912), and reliability (M= 1,80, SD= 0,894). The findings illustrate that the soft skills categories that are both top priorities for employers and most lacking in entry-level job applicants are communication, leadership, and reliability. It is prudent to note that the underestimation of these three soft skills by engineers could turn around the fortunes of a company.

**Table 4 Descriptive Statistics for the Satisfaction of Employers with Engineers' Qualities**

Soft Skills	Mean	SD
Oral Communication	2,20	1,105
Written Communication	2,55	0,826
General Ethics	3,30	0,865
Diversity	2,50	1,433
Time Management	2,50	1,192
Teamwork	2,65	0,875
Critical Thinking	2,55	1,099
Organization	2,35	0,933
Leadership	2,10	0,912
Reliability	1,80	0,894
Adaptability	3,10	0,641

*Source: author*

#### **4.2. Employers' Semi-Structured Interview**

Among the aims of this article, apart from defining the concept of soft skills, presenting a concise summary of the pertinent literature, and suggesting paradigms of how to integrate soft skills in the ESP context, is to scrutinize the significance of soft skills in various industrial organizations. The data collection proceeded through a semi-structured interview of 8 questions. Once the data were transcribed and coded, three themes emerged: (a) soft skills definition, (b) lack of soft skills, and (c) training of soft skills. The main aim of sorting the data by themes was to provide substantial information on answering the research questions of the study. All the themes that popped up from the data analysis are described below.

When employers were asked to define soft skills, they had a range of answers. Their definition was in the form of a list of soft skills that were perceived very pertinent for the industry in which they worked. Based on the collected data, it appears that the most important soft skill for any employee entering the labor market is communication. Interviewee 2 stated: "communication is the most important skill to have. It is indispensable to communicate what to do in certain situations to handle any issues". Sony and Mekoth (2016) echoed the same thoughts. They shared that employees who possess interpersonal skills have the potential to affect the business's profit. A job description document from interviewee 6 includes: "perfect oral and written communication skills in the English language". Interviewee 1 stated that soft skills are the skills you learn from your everyday experiences. Another human resource

manager defined soft skills as “things you learn as you get old. It is the ability to be self-dependent to take the next step without waiting for someone’s help. Being cognizant of the existing resources and making every attempt to use them”. Another Interviewee shared a similar response and explained that “soft skills are really hard to train especially for new graduates”. As a whole, most of the participants believed that soft skills are learned and applied not only at the university but in the working environment as well. Three of the participants did not expand in detail on the definition of soft skills but rather listed some examples of skills such as time management, organization, communication, flexibility, etc.

The reactions of these respondents to this question showed that employers are aware of the importance of soft skills since they facilitate job integrity. They are crucial because they are often the benchmarks that we employers rely on to decide whether to keep or upgrade an employee. If engineers want to succeed in the workplace, they are obliged to have a good relationship with the people they interact with, including customers, co-workers, managers, and anyone else they communicate with while on the job. In other words, as the advanced 21<sup>st</sup>-century workplace continues to propagate, it is essential to ensure that engineers possess the required skills to be able to retain a job and make a significant contribution to the

It has been noted in this study that soft skills play a crucial role in shaping engineers’ personalities and that they complement technical skills. In fact, the collected data from ESP teachers’ responses are directly in line with the ideas expressed by employers in the current study. By way of illustration, Interviewee 5 exposed that there is a mismatch between the theoretical and practical application of soft skills. She added, “young employees want instant results. It is difficult for this generation to grasp the notion of a promotion. Some think they have a God-given right to get a certain job”. Moreover, Interviewee 2 remarked that the global labor market in the modern world economy expects engineers to not only have a degree level and discipline competencies but also a set of soft skills that encompass communication, leadership, reliability, problem-solving, etc. In his opinion, universities and companies should collaborate in order to train graduates as required by industries. This cooperation will minimize the discrepancy between what the job market needs and what the university can teach. Interviewee 3 asserted that the issue of soft skills lacking in today’s employees is not only a problem in our company, but it seems to be noticed on a national level. One respondent brought up “gateway skills” or “entry skills” with respect to the application process, meaning those skills that job seekers need to possess and demonstrate during the recruitment process. He said that “college graduates are not equipped with the soft skills needed to work in industrial organizations”. Interviewee 4 agreed with this thought, and he believed that there is a considerable disconnect between theoretical and practical implementation in universities. He clarified that “universities talk about soft skills but are given little chance to develop them”. P6 also commented on the lack of soft skills by putting the blame on the disintegration of these skills into the curriculum. They are just stated on paper to meet the requirements of the ministry. Interviewee 2 shared the same opinion but put a little different spin on the topic by saying: “ESP teachers should integrate and apply soft skills in their syllabus as well as conduct their obligations ethically”. Interviewee 1 concluded that experienced engineers have the most soft skills while newly minted graduates struggle with the most soft skills. He echoed: “fresh graduates have a lot of weaknesses. They tend to be choosy, demand high salaries, have no job preparation, and lack motivation in seeking employment. As a consequence, we prefer to recruit experienced engineers rather than young graduates”. Employers were further questioned on the nature of the knowledge they thought would promote the chance of engineering students in the job market. Based on the collected data, all six participants indicated that communication and work ethics are compulsory for anyone in the job market, but more importantly for newly minted engineers who are entering the workforce because they leave a long-term good impression on the employer. These employers

mentioned the importance of general ethics, due to the confidential nature of the information that is processed in their companies. Four of the participants indicated that time management was the top second skill to possess among engineers. Furthermore, three of the participants named organization and critical thinking as the third set of skills that are needed in the job market. Last but not least, two of the participants added leadership as a process by which employees motivate their co-workers and mobilize resources to achieve the company's goals. Given the overall importance of these skills, the researcher was also interested in investigating the ways in which employers recruit and select the right employees. It is important to note that different jobs have different requirements in terms of hard skills and soft skills. Concerning the assessment instruments that human resource professionals use in the recruitment process, face-to-face interviews were the most common tools opted for during the selection process to assess engineers' skills. While live-streaming interviews do not seem to be replacing them at the moment because there is no one-to-one conversation so it would be difficult to evaluate a candidate's personality traits. Interviewee 1 clarified, "the application form or the resumé is generally the first contact between the employer and an applicant, but face-to-face interviews are the main vehicle for discovering their personality". In the same way, interviewee 3 said, "it is all about who looks right and feels right. I can tell if someone has got soft skills in the first two seconds". These responses imply that there is still much subjectivity in the selection process. Furthermore, two employers mentioned case studies, observations, and probationary periods as a means to test soft skills. Interviewee 5 explained, "we often look at leisure and non-work activities. They are perceived as a hint of a rounded personality and as creating opportunities to apply soft skills".

When investigating the potential soft skills gap between engineers and the job market, all six (100%) participants agreed that there is a huge gap between the educational setting and the workforce. Participants were further asked to share their perspectives as to what could be contributing to the development of soft skills. The training of soft skills was one of the topics that participants discussed during the interviews. Two questions were devoted to this theme. The first one was concerned with what can be done to promote soft skills in higher education. The second question was about what companies do to develop the soft skills of engineers. Interviewee 1 responded to the first question by advising higher education institutions to create a business milieu in which future engineers can perform professional tasks and use common sense when approaching problems. The educational experience should not only be restricted to lectures and books but also to providing workshops, creating partnerships with engineering companies, staying up to date with the latest labor market information, designing innovative task-based learning opportunities, and providing resources for employability to students. It would be more beneficial to learn transferable skills early at the university because the older they get, the harder it is to develop those skills. As Interviewee 3 put it, "you can't lecture on soft skills, they need to be practiced as early as possible". Thus, soft skills are influenced by prior schooling and the family setting.

Interviewee 2 also encouraged transformational teaching by creating experiences in their classrooms and making their students care about the learning process. He said that "if we engage students in developing knowledge and soft skills, they will be successful and will learn to overcome failure." This ties to Moubtassime's idea (2020) of educating the whole child in order to transform them into leaders. Furthermore, these ideas by employers are also linked with John Dewey's holistic education of our children. We must educate the whole child, not just charge their brains with technical skills. This type of teaching encourages the integration of technical skills along with soft skills to build a successful person as interviewee 2 noted. He added, "it is not an easy task to accomplish transformational teaching without grasping and implementing constructivist pedagogy-smoothing the way for hands-on experiences. Interviewee 3 offered an interesting perspective on what universities should

teach soft skills. He echoed that “we are currently teaching in a digital era and the learners are digital natives. As a result, it is high time we started thinking of new creative learning environments. For instance, teachers could provide students with assignments to be done online since technology is a book room at their fingertips”. On the other hand, interviewee 5 had a different opinion. She expounded the idea by stating: “the excessive use of technology is engendering a scarcity of social skills which destroy human interaction”. She explained that it is harming critical thinking and problem-solving. If students don’t understand something they just google it. Interviewee 4 raised an excellent point about the issue of technology. He asserted that technology is a double-edged sword. It empowers students with information and at the same time hampers the acquisition of soft skills because it discards face-to-face communication. Interviewee 6 also stated that the teaching of soft skills needs to happen at home first. He expressed that the main factor behind the hindrance in soft skills development is the lack of parental support. He claimed that “parents do not train their kids to solve real-life situations and deal with problems using their skills; they are convinced that it is the responsibility of teachers and even employers”. In the same line of reasoning, interviewee 1 shared the same belief by stating that “there is undoubtedly a soft skills gap because every individual’s life experiences are quite different. We may come across a young employee who has involved parents and then we can have some parents who are absent and not involved at all. Universities cannot teach everything, and if engineers are not well trained, then they will lack certain soft skills that are important for workforce success”.

Concerning the second question about the availability of soft skills training in companies, interviewee 1 responded to the second question by stating that their industrial organization has no budget to provide training on soft skills and that all funds are devoted to the training of technical skills. Yet, he spoke briefly about a training initiative in which some people in leadership volunteered to carry through customer service training to all employees to equip them with the right skills that would help them understand people’s way of behaving and learn to have a more positive impact within the organization. Similarly, interviewee 6 noted that the training of soft skills is not on the company’s list of priorities. He also said that it is difficult to assess the efficiency of those training sessions since employees have different learning styles and preferences. In the same vein, interviewee 3 confirmed that their organization allots an important amount of money as tuition reimbursement to the employees as a way to support their professional growth. He thinks that “most prospective engineers sit for the interview believing that they deserve the job; they have never failed a subject at the university, and they expect the job to be given to them as a reward despite the fact that they still have many gaps in terms of soft skills”. Interviewee 4 and Interviewee 5 indicated that they offer some activities to their employees (i.e., coaching, mentorship activities, and performance management and appraisal sessions). This implies that there is a scarcity of offers devoted to soft skills development, despite their significant importance for the job market.

## 5. Discussion

Based on the qualitative responses of the six participants of the study, they show that employers consider the mastery of English as a crucial selling point for engineering graduates. Strictly speaking, human resource professionals prefer to recruit engineers who are equipped with soft skills such as communication, critical thinking, the ability to work in teams, good work ethics, etc. The interview also indicates that the level of skills demanded in the job market has increased, essentially because of (1) advanced levels of technology integration, (2) intensifying competition in the global economy, and (3) increasing concern about improving and maintaining quality performance. The findings also reveal that there is a significant soft

skills gap among engineers. Some of the contributing factors that are expressed during the study include lack of parental help and limited partnerships with organizations. The participants agree to further think about the possibility of designing a curriculum specific to training soft skills.

As students get ready to join the job market, most employers have noticed certain shortcomings among college graduates and give genuine instances of the lack of skills in entry-level job applicants, which employers link to deficiencies in the education system. Hence, the training and apprenticeship of competent engineers are not the only issues that employers are facing. There is a great concern among the workforce that newly-minted graduates do not have the soft skills needed to be successful in the workplace. The lack of professional experience, irrational expectations, and mediocre communication skills are considered the most common weak points. Accordingly, teachers play a multifaceted role in teaching and training prospective employees. The lack of satisfaction of employers towards engineering graduates' soft skills confirms that a substantial share of graduating engineers does not satisfy employers' requirements. Even if employers request unrealistically high skills from graduates, there is a considerable quality gap between educational institutions and the working environment. This quality gap needs to be addressed since soft skills intrinsically exert an influence on a company's overall productivity and are unavoidable for engineers regardless of their level of knowledge and experience. Generally, the results obtained from the interview reinforce the results obtained in the questionnaires.

To overcome the above-mentioned problems, the upgrading of ESP teaching and learning environment should go hand in hand with the appropriate monitoring of the teaching, learning and assessment of soft skills. Public and private higher education institutions have to hold to the same standards of quality education. Furthermore, higher education institutions should blend the teaching of technical skills with soft skills training by introducing a soft skill-hard skill continuum as proposed by Moubtassime (2020). There is a growing awareness that technical skills alone are not enough for professional success, especially in the rapidly changing technological, demographic, and economic conditions. Hence, soft skills must be taught in primary school and even before within the family. In the same vein, Willmot and Colman (2016) advocated that the responsibility for developing soft skills is not only in universities but also by industry and family. Heckman's (2003) research also supported the latter idea. He argued that early childhood schools are the most critical institutions to address soft skills in a trial to gain considerable changes in job-related outcomes in the future. Partnerships between universities and companies need to be built in order to design a curriculum that satisfies the needs of both students and the expectations of the industry.

To harmonize with the requirements of the labor market and to make future graduates job-ready, an exclusive curriculum of soft skills should be implemented. In the same context, partnerships between universities and companies should be established so that curriculum reform is pertinent to the skills needs and expectations of the industry. As a result, awareness campaigns should be purposefully launched to sensitize both students and ESP teachers on the importance of soft skills and consequently escalate their interest in teaching, learning, and acquiring soft skills. Also, the continuous training of ESP teachers is the most crucial aspect of quality education at the tertiary level. To this effect, the present ESP teachers' training program should be re-examined to integrate the teaching and the assessment of soft skills in order to raise their awareness. In fact, the amelioration of the educational realm ought to go in tandem with constant supervision of the teaching, learning and assessment processes. Both public and private higher education institutions have to comply with homogenous standards of quality education. Professional training should be highly recommended, and in-service training programs need to be carried out periodically to enlighten ESP teachers about the updated dynamics of the job market.



## 6. Conclusion

This research is conducted with the intention of bridging the gap between Moroccan engineering students' needs and job market requirements. To put it succinctly, the main objective of this research is to figure out the needed competencies that Moroccan engineers should possess based on their needs analysis and course evaluation as well as to evaluate the importance and availability of soft skills which may be influential in the retention of new professional engineers. Based on the analysis of the findings, which has been discussed, generally, it was found that the majority of the respondents were not satisfied with the performance of engineers. Findings show that soft skills are as important as technical skills for Moroccan graduates before being transferred to the job market. Literature suggests that these soft skills are requisite in order to establish successful employment with any hiring company. Yet, the training for these soft skills was a necessity to prepare the prospective engineers who lack the soft skills. The study reveals that there is little to no training available for the 11 soft skills. Accordingly, specialists should develop and implement pedagogical interventions shaped to address each of these soft skills by educating engineers with an in-depth and extensive set of skills that are marketable would be of stupendous importance for the employability of engineers and for the country's economic growth.

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