

The Quality of Civil Engineering Graduates: Case of Jordan

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Abstract: In this research we study the skills set and knowledge gap in civil engineering graduates and the market needs. Civil engineering is considered one of the most important engineering sectors in the world, and its effect directly impacts both GDP and employment; to keep and develop this field in Jordan, especially during the pandemic where students missed skills during the lockdown. In addition to, studying the changes in the market needs and building a new infrastructure depending on the increasing growth in population, then find a new method to introduce these skills and knowledge in the Jordanian universities. Moreover, find a way to improve the academic background in Jordanian universities to reduce the unemployment rates. This study was conducted mainly in Jordan, with some expertise being consulted from the region in six hypotheses.

Keywords: Civil engineering, skills, unemployment, mismatch, market needs.

1 Introduction

It is becoming more apparent that the market needs are changing from what they used to be, the increasing growth in population is requiring new infrastructure to be built or maintained. Countries' commitments to the sustainable development goals and agenda 2030 will lead them to shift to green infrastructure. Companies will start investing more in RD and innovation to be more resilient when facing natural abnormalities or disease outbreaks. The rapid change in technology in addition to all the previously mentioned factors will drive communities to lean towards building smart cities. Hence, the skills set and knowledge base that universities in Jordan are currently providing may not be sufficient for the new evolving market. The unemployment rates are significantly increasing, bachelor's degree graduates are said to be lacking the new skills set and knowledge to be employed and secure a decent job within their academic background. Such a gap, between the market needs and the available capacities will limit the community including companies and countries to keep up with the global rapid development and might cause negative consequences affecting origination's, individuals, society, and the economy. We believe that acquiring new global skills and lowering the market needs gap would aid new graduates and even organizations in meeting their objectives and increase their competency among other individuals and companies. Therefore, the research will investigate more on how to bridge the needs gap through more detailed research questions, desk review and key informants' interviews, to serve the aim of analysis, reducing unemployment, and the risks of developing substantial skills gaps that might impede the economic growth and productivity

1.1. Study Objectives

- It may provide building a new infrastructure to meet the demands of the growing population should be studied.
- Study and develop innovative techniques for establishing Jordanian universities' skills and expertise.
- The unemployment rate in Jordan may be reduced if academic standards at the country's institutions were improved.
- For the purpose of analyzing, lowering unemployment, and closing the gap, do a thorough desk review and key informant interviews.

1.2. Hypotheses

- H1. The mismatch between civil engineering graduates' skills set and the market needs is leading to unemployment in the Jordanian civil market.
- H2. The skills gap increased due to COVID-19, and new skills set are now required due to the pandemic.
- H3. Competences and skills are a combination of professional knowledge, personal abilities, and attitudes. In the case

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of students, universities teach just professional information, implying that the competence mix is incomplete. As a result, new graduates are lacking in "workplace skills" such as collaboration, creative-critical thinking, communication and putting the needs of the enterprise in the center of attention.

- H4. There is a need to review the university curricula plan and the materials included and customized the outputs of university education based on requirements of the labor market.
- H5. Focusing on practical training programs during the academic period helps graduates to integrate in the labor market and reduces unemployment.
- H6. Making changes to university curricula and programs in addition to maintaining and building on existing connections can contribute to bridging the needs gap in the civil engineering market.

2 Methodology

The study used a descriptive and analytical research approach. A complete evaluation and literary analysis of the Jordanian civil engineering industry was undertaken to gather the most relevant data on unemployment and market demands, and saturation status while reviewing the global emerging trends due to COVID-19. Accordingly, data was supplied, along with a thorough analysis and identification of survey and interview questions. Also, surveying graduates and civil engineering firms was completed, as well as interviewing important informants to verify data correctness. In addition to encouraging key informants to offer extra information that assisted in meeting the study's objectives. As part of the third phase, you'll compile everything you've learned so far into one final report that includes everything you've learned so far, as well as all of the recommendations you've come up with [14].

2.1. Study Sample.

The study used the purposive sampling technique, two sets of questionnaires were titled in regard to the study subject to collect the data which will utilize the research and provide the relevant information required. The size sample included civil engineers in Jordan, recruiters, CEO's, undergraduate students, companies, experts, universities, and managers. The two surveys included around 250 information providers to provide qualitative and quantitative data for analysis.

2.2. Technique of data collection and analysis:

With this approach in mind, the study included both quantitative and qualitative approaches. There was a sample of fresh graduates, or those with 1-2 years of experience, as well as recruiters, CEOs, and experts included in the quantitative survey. It is not necessary to apply the sample to the entire population for the study. In the survey, engineers' talents and skills were examined, as well as essential information gleaned from the literature review for the data collection and data analysis. This survey used a Likert scale for the replies of participants. Qualitative interviews with experts, managers, academics, and business leaders and the researchers got knowledge on market demands, strengths, and shortcomings through these interviews.

2.3. The setting of the study

The study was conducted mainly in Jordan, with some expertise being consulted from the MENA region. Jordan is known for its high density of bachelor's degree holders, especially in engineering. It is believed that there is an engineer for each 50 citizens. This is due to the local mindset where doctors and engineers are the best options to study. Jordan is also known for the lack of mega projects and exporting expertise to gulf countries mainly for the past years.

2.4. Statistical processing methods

The investigator used the SPSS software program [15], to analyze the study data gathered from surveys after cleaning and filling in the missing data, by performing a descriptive analysis, such as frequency calculation, percentage, average, and standard deviation.

3. Literature Review

A systematic assessment of the literature is an attempt to investigate if civil engineering graduates and market demands have different skill sets and levels of knowledge. Cognitive and social abilities are directly correlated to pay in jobs requiring a high level of expertise. Job vacancy data may be utilized to analyze the industry's talent need, according to the researchers. A mismatch in educational achievement, rather than a learning gap, may be meant when individuals talk about a skills gap, and that nothing can't be learned on the job. Due to technology advancements, classroom instruction is becoming less relevant. Because of the rapid pace of technological development, classroom training is no longer necessary,

and on-the-job training may be more effective. This is the underlying principle of the notion. [4] While providing recommendations on how to better equip graduates to engage and adapt to the rapid global changes in the sector. After gathering publications from online journals, a critical evaluation was undertaken. The goal was to gather the most relevant data on un-employment, market demand, and saturation levels while also examining worldwide emerging trends as a result of COVID-19. So, the study hypothesis dictates how the literature review is structured, we break it down into sections:

3.1.COVID-19 Impact on Civil Engineering

As Jordan is one of the countries who forced total lockdown during the pandemic under the defense law, a study was conducted to measure the coping skills of different targeted groups. The study reveals that different educational levels and different employment status impact depression on individuals. Employers are the main category to face high depression and skills coping rates. Employees had to cope with working online, and deal with many uncertainties such as job security and financial instabilities. Although university students also experienced some levels of depression, yet it was much lower than employees [4]. The construction sector has been severely affected during the lockdown. As a result, companies are trying to find new ways to increase their competency and competitiveness through mechanized technologies, robotics, and the industrial internet of things. [11]. Civil engineering has the highest growth rate among other construction sub-sectors. However, this growth is accompanied by rapid changes due to digitization, energy efficiency, climate change and sustainability. Hence, a qualified and competent workforce is required. This could only be achieved by equipping university students with the right knowledge and set of skills. A strategy developed by the European Commission highlights that increasing the competitiveness and innovation within the construction sector will create an enhanced infrastructure that is adaptable to economic and social needs. But this will only happen if companies start to be more flexible in maximizing and investing in their digital innovation. As the importance of digitization is growing, universities are starting to incorporate new digitized tools in their curricula such as (Building information modeling, Artificial intelligence, automation, 3D printing...etc.), to prepare students to real life challenges and situations in their work environment and increase their competency. A market needs analysis is required to understand the skills gap between skills in the current force and the demand of the companies). After the gap is identified the construction or the civil engineering sector must work on introducing new educational programs in addition to specialized training for the purpose of reducing the skills gap in the market. Some of the future skills for the construction sector were identified, including adaptability adapt to change, complex problem solving, continuous learning, critical thinking decision making, advanced literacy, risk management, IoT, Big Data, BIM methodology, use of new measurement systems: drones, 3D Printing, energy efficiency of buildings and infrastructure. Risk management related to climate change, sustainable waste management - Circular Economy use of new measurement systems: drones, and sustainable resources and management [1]. COVID-19 pandemic forced many companies to change their core procedures in one night. Having a more resilient and adaptable working structure is vital now, especially with the rapid change happening in the world. It is now required from leaders to work on reskilling and up-skilling the current and future workforce top change companies' business models to more resilient ones. It is believed that the current situation is ideal for companies to start investing in the knowledge and skills of their workforce. Solutions found during the pandemic such as online virtual meetings, working remotely and many others were eye-opening for companies to start considering more cost-effective approaches. As COVID-19 changed how business work, it also made many changes on people's lifestyles, how they shop, eat, and move. . . etc. This new way of living is making a huge shift in the future that we aim to live in, leading to many changes in the core of the construction sector and the skills needed by its workforce. New business model requires new skills set, companies will need to focus on four (4) kinds of skills that should serve the anticipated change: digital, cognition, social, emotional, adaptability, and resilience [10]. COVID-19 had a high impact on the workplace and workforce in most of the sectors, leading to economic decline, and higher unemployment rates. The construction sector was one of the major sectors impacted by the pandemic projects had to be suspended, people on site had to lose their jobs, and new operating ways started to minimize the losses. But still, these changes led to speeding up some technological transformations such as the teleworking environment. New strategies must be set in place to cope with such pandemic and be more resilient, including redefining safety measures, enhancing use of technology, extending project time sheets, up-skilling, training employees, and conducting risk analysis [7].

3.2.Education quality and skills need in civil engineering

Traditional techniques of instruction are still used in higher education. Theoretically, students are supposed to recall facts and information rather than learn how to apply them to real-world situations. As a result of these teaching strategies, graduates are graduating with a limited awareness of the connections between various subjects, making it difficult for them to connect disparate pieces of knowledge. Even though technical knowledge is the most important talent companies look for, soft skills like decision-making, communication, and interpersonal skills are just as important in order for a job to flourish. Various methods were devised to improve graduates' skills. In addition to the reflecting model, there are several more options. Focused on highlighting the significance of practitioners' expertise, this movement in this setting, several colleges are rethinking how they educate their students, believing that hands-on experience is more powerful than academic

knowledge. Project-based learning may be used to incorporate this transition into the engineering curriculum. Using this method, students are able to apply their knowledge and abilities to real-world problems. Students must be able to adjust, and the tutor must be able to be flexible in order to administer this curriculum. Additionally, Project Based Learning should not be used in place of theoretical education. Although both methodologies are seen as complimentary, civil engineering students and graduates can benefit from both. One of the most difficult aspects of this approach is that it requires both students and teachers to unlearn old habits in order to learn new ones [6]. Employers are no longer just concerned with a candidate's technical abilities. As a result of the rise of soft skills such as communication, management, and creative thinking, they are increasingly seen as essential. Many variables are influencing the markets to provide mismatch, according to the report. The mismatch between market demands and graduate skill sets is a significant factor. The company's quality and production are suffering as a result of a lack of skilled workers. According to the findings, there is a positive relationship between the availability and demand for specialized knowledge. Graduates' (supply) quality of skills drops dramatically when demand for a certain talent rises. For this reason, greater emphasis should be placed on teaching students how to apply what they've learned in the classroom [8]. Employer's value the skills and information that recent graduates have acquired via internships and other hands-on experiences while still in school [5]. The use of an activity-based learning strategy is suggested for enhancing civil engineering graduates' level of proficiency and competency. While the information is still important, this strategy switches the focus to an interactive, student-centered approach. Using this approach, students are encouraged to learn the most up-to-date skill set and information necessary by the market both on and off school [9].

3.3. Unemployment

University unemployment rates for Jordanian university graduates are high because of a mismatch between education and the work market. Some studies have shown that the educational system must be restructured in order to better meet the needs of the contemporary workforce and to decrease skill gaps. Unemployment is also on the rise among "over-educated" students who went on to graduate school without getting any real-world work experience [3]. It has been shown that students and employers have differing ideas about what technical and professional abilities are needed in the market. According to a poll conducted by the author, 55% of recent graduates feel that employers should be responsible for developing major competencies, whereas 32% say that education systems should bear this obligation (university). According to the results of a poll, civil engineering graduates possess a set of talents that make them more marketable. Even while firms are having a hard time recruiting qualified new employees, they aren't interested in getting involved in the development of educational curriculum. They do, however, prefer to instruct pupils on-site. Project management and entrepreneurial spirit came out on top when it came to organizations' lists of most important talents to look for when interviewing job candidates. Even though technical abilities were considered crucial, corporations ranked them as the least important among other talents. Businesses and colleges must work together to reduce unemployment and fill the gap in workforce capabilities [2]. Concerning the skills gap there are two schools of thought. Although some experts claim that there is no such thing as a skills gap, the number of people employed is increasing even though some jobs are becoming outdated. Unemployment is growing as the gap between education and market need widens, according to some experts. Both views have one thing in common: they both describe people as "unemployed". As a result, this conclusion has an underlying cause [4].

4. Data analysis and the results

A descriptive survey design has been used in our research, the samples included fresh graduates' civil engineers from Jordan, civil engineers, employees covering graduation period from 1974 until 2021. We have received 255 inputs (Quantitative) up to date with 237 considered to be valid and we have attached the survey diagrams and the results as an annex. The survey was divided into three sections: Surveyor demographics, skills need gap questions, and finally testing hypothesis. A qualitative questionnaire consisting of the participants in the survey is the second database provided by experts throughout job posts and academic instructors and Heads of civil Eng. dep in various Jordanian universities. The concept plan of the research is to put a parallel correlation between the selected data sets to minimize the gap between the market needs and the required experiences, skills and course training of the fresh graduate and candidates.

4.1. Qualitative Analysis

Several Jordanian universities, including Hashemite, Philadelphia, and the Jordanian University of Science and Technology, investigated the link between formal education and future work demands. Ten percent of the necessary skills are learned at colleges and institutions, according to an expert from JEA Consultant. According to Al Yarmouk University's Civil Department chairman, certain of its academic offerings can be adapted to meet the needs of the workforce. In order to keep up with the rapid advancements in civil engineering science, it is necessary to work continuously via systematic development to create instructional techniques and material content. According to a Mutah University Civil specialist,

quality should take precedence. Formal education is critical from an organizational standpoint because most of the necessary skills cannot be gained solely through experience, according to CEO of OAH contracting, a first-class civil engineering and construction company; on the other hand, Mag Engineering & Contracting Copartner owner recommended having at least six months of training before entering the market, an expert. A JEA Consultants engineer explained that only around 10% of the necessary skills are taught in today's schools and universities, and that many of the courses they teach are out of date.

Students at the Hashemite University Engineering College in Hashemite who were enrolled during the epidemic were required to take additional classes. The civil dean at Philadelphia University concurs with the dean of the engineering college but believes that university employees can give the courses. It is the opinion of civil experts at Mutah University that the best way to teach students once they graduate is to employ the support of enterprises such as Arab Potash and Jordanian Phosphate Mines. The expert from (MAG) noted that his organization had a comprehensive training program for newly graduated civil engineers that included quality, work practices, corporate regulations, and all of those things. Accredited courses including PMP, SAAB, SAFETAB, and PRIVAMERA are also available. Engineers typically lack the ability to work with software. When it comes to designing and planning, Jordanian civil engineering graduates are lacking in technical background/experience, such as the ability to create designs and plans; this must be remedied by universities as soon as possible. Furthermore, the JEA Consultation section emphasized that students should also have a history in design, plan, and even quantity contracts as well. Last but not least, Philadelphia University Civil dean notes that the vast majority of engineers' understanding of the topic is theoretical, which is why practical training is so crucial. A Mutah University Civil expert argues that both public and private universities should follow the same syllabus changes. The Covid-19 crisis has accelerated the change in the market, requirements, and trends, which led the market for new needs and skills to transform to a new business model depending on technological and outsourcing and freelance. And Covid-19 brought up many subjects that were unseen or overseen, it is the time that universities, JEA, private and governmental organizations as well as ministry of higher education should reinforce the efforts with regards to all problems, and work on them altogether to result and come up with a new generation of civil engineers that are truly up to the task and meet all the expectations.

4.2. Quantitative Analysis

94.7 % of the survey participants were civil engineering grads, which gives us a high degree of accuracy because we are focusing on this group in our study. However, the remaining 5.3 % of answers were not discarded in the process of analysis. Due to our presumption that they had appropriate professional expertise, we hired them. The demographics suggest that 70.2 % were male, compared to 29.8 % who were female. Only 1.1 % of them are unemployed, according to the data. This might be a sign that this industry prefers to hire men or that men dominate this major. In the meanwhile, further research is needed to examine this further. A civil engineer's profession relies heavily on a formal education, according to the research. In order to secure a job, however, extra training is a must. Giving the impression that these kinds of training may be viewed as a prerequisite to obtaining a job. Many respondents felt that junior level employees had the greatest lack of abilities, although this was not the case for senior level employees or interns. As agreed unanimously, the COVID-19 pandemic increased the need for reskilling and upskilling in the civil engineering sector. Although most of the employers tend to release employees during the pandemic, almost 50% closed the skills gap by building their staff skills or outsourced some services. When we looked at a set of abilities and compared them to what we learned in school with how important each one is in the job, we found wide disparities in the outcomes. Asserting that university education does not adequately prepare students for the job market. In the following part, we'll get into the term stability. Of those who responded, 50% said that the skills gap between civil engineering graduates and market demands is to blame for their unemployment. Over 70% of those who responded agree or strongly agree that university courses should be reevaluated in light of current job market demands. They also say that curriculum adjustments will help fill the vacuum in the market.

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4.4. Skills Quality Group Deficiency

Table 1: Skills Quality Group Deficiency

Ranking	Skills Quality Group Deficiency	Percentage (%)	
3	Graduate/ Intern	35%	1
1	Junior	46%	2
2	Mid Management	39%	3
4	Senior	33%	4

In **Table.1** most of the respondents in this sample think that the junior group is most skill-deficient, meaning that they lack the necessary university education to fulfill market demand. Mid-level managers are next, followed by recent college grads and interns, and finally by those in their last years of study. Insinuating that the senior level group may have acquired the essential abilities via practice.

4.5. Resource Deficiency handling

Table 2: Resource Deficiency handling

Ranking	Resource Deficiency handling	Percentage (%)	
3	Building Staff Skills	37%	1
2	Hiring	11%	2
1	Releasing employees	59%	3
4	Contracting / Outsourcing	9%	4

In **Table .2** releasing employees is the most popular method of dealing with a lack of resources, accounting for 59% of all decisions made. There is a clear preference for letting people go rather than investing in their education and development.

4.6. The skills and the improvement that the universities in Jordan need to change

Table 3: The conclusion of the best answers for the skills and the improvement that the universities in Jordan need to change

Ranking	The skills, the improvement the universities in Jordan need to change	Percentage (%)	
Neutral	formal education helped you in meeting the demands of your current job	30%	1
Agree	Feeling the need for reskilling/upskilling during and after the pandemic-	31%	2
Agree	Did COVID-19 require you to gain additional skills	33%	3
Strongly Agree	To what extent COVID-19 will change the required skills in the market	33%	4
Strongly Agree	The need for taking additional skills trainings to get employed	52%	5
Strongly Agree	The skills mismatch between civil engineering graduates' and market needs leading to unemployment	46%	6
Strongly Agree	The skills gap increased due to COVID-19, and new skills set are now required due to the pandemic	40%	7
Strongly Agree	There is a need to review university curricula based on requirements of the labor market	60%	8
Strongly Agree	Making changes to university curricula and programs and building connections between employers and the educational system. can contribute to bridging the needs gap in the civil engineering market	63%	9
Strongly Agree	Focusing on practical training programs during the academic period helps graduates to integrate in the labor market and reduces unemployment	67%	10

As we can see from the **Table. 3** above, the replies indicate that 30% are neutral and cannot indicate if it helped them or not, while only 14% strongly agree with this statement and 16% strongly disagree with this statement. Although the results are slightly skewed to the agreeing side with a mean of 3.04. We notice that 52% of the sample strongly agrees with this

statement, indicating that university education was not able to provide the necessary skills for graduates to compete in the market. In this figure, we can see that the majority of the sample agree that the skills mismatch is causing unemployment rates to increase, with 26% of the sample agreeing and 46% strongly agreeing. Here we find there is a huge consensus that university curricula should be reviewed, with 60% of the sample strongly agreeing, and 26% agreeing, totaling in 86% total agreement. Also here, there is another big consensus that the curricula need to be changed, but also with the help of the employers. Finally, we find here that the sample agrees that there is a need for more practical training programs, rather than only theoretical with limited practical, to enable the graduate to gain skills that can only be gained through practice, thus reducing the unemployment rate.

4.7. Ranking the type of the skills

Table 4: Type of the skills

Ranking	Type of the skills	Percentage (%)	
3	Administrative Skills	18%	1
4	Communication skills	17%	2
1	Management Skills	20%	3
2	Technical Skills	19%	4
5	Research Skills	16%	5
6	Other Skills	10%	6

In **Table 4** we separate all of the skills into 6 different categories depending on the importance of each one of them and these categories are:

- Management skills: include the capacity for analysis and synthesis, planning and time management, capacity to adopt the new situation, decision making and leadership.
- Technical skills: include computing skills, problem solving and project design.
- Administrative skills: include the capacity for applying knowledge in practice and capacity to learn.
- Communication skills: include Oral and written communication, Knowledge of a second language, Teamwork, Ability to communicate with non-experts and Ability to work in an international context.
- Research skills: which include research skills and capacity for generating new ideas.
- Other skills: include understanding of cultures and customs of other countries and ethical commitment.

There is a lack of management and technical skills among the graduates of the civil engineering program. 20% of respondents who said they required new abilities for their present position said they need to improve their management knowledge (ability to manage people). Second in importance by 19% responses was their technical knowledge. It's not only a lack of education that's to blame for the skills gap. Even if learning is critical for a person's future employment prospects, respondents to our poll were clear that the skills they obtained in school are not the same as those they will need on the job. When asked if their college education has helped them achieve professionally, just 33% of those polled said yes. As many as 67% said they need to acquire new skills for their existing position. Those new abilities were learned in a variety of methods, online courses, and interactive learning through teammates and other sources, according to respondents.

4.8. Correlation

According to our findings, there are strong correlations between the two sections dealing with skills and hypotheses. The most significant correlation was found between problem solving and decision making, and leadership and the capacity to interact with non-experts in the development of abilities. As a last hypothesis, it has been suggested that universities should reassess their programs in light of the changing job market. Changing university syllabuses and programs and establishing ties between the educational system and companies are both important. can help close the gap in the market for civil engineering products. On the other hand, learning ability and familiarity with various cultures and customs had the weakest link in the value of skills. The least correlation was also seen in the area of development. Unemployment and underemployment in the civil engineering industry are the least correlated hypotheses. improving university programs and curriculums, as well as forging ties between academic institutions and industry. can help close the gap in the market for civil engineering products.

5. Discussion

All research methods confirmed that the mismatch between graduate's skills and market needs contributes to increasing the

levels of unemployment. The literatures focused on increasing the practical education in civil engineering, in addition to introducing new courses. The quantitative interviews showed that some academia experts believe that the current curricula is sufficient, but they suggested to recommending additional voluntary courses through the Engineers association, or private companies for example. As the quantitative research shows what are the most important skills to the market, it is worth investigating in future studies how could these skills be bridged through education, or any other mean. On the other hand, the academia experts believe that the reason for unemployment in the sector is due to lack of investment. Yet, the quantitative research confirms that there is a clear mismatch between the market demand and what is given in university curricula. This gap in research results shows that there might be lack of communication between people working in the academic sector and people in the field, practicing the profession. This might be an area for further discussion. The academia experts agree that a change must take place on the curricula, focusing on technological advancements in the sector, like BMS (building management systems) and smart cities. They also expressed that a strategic roadmap for continuously updating the curricula is needed to ensure that students are coping with global updates. Both literature and quantitative research agree that there is a need to make changes to the current system and it needs to be more updated and engaging students with real life examples and projects. Regarding COVID-19 pandemic and its impact on market's needed skills, all research methods confirmed that the pandemic impacted the need for re-skilling and upskilling in civil engineering market, and that this change must be reflected on university curricula's, additional external training programs and internal employees' programs in private companies. The pandemic also impacted the supply chain within companies which affected employment. Companies are now relying more on outsourcing and freelancing services instead of fulltime employment. The study did not investigate why did this shift happen, but this could be a future area of study.

6. Recommendations

The study recommended the following:

- Jordanian Universities should review their curricula to incorporate skills that are highly demanded by the market, and this should be done periodically.
- Jordanian universities should incorporate more practical practice for graduates to be able to adapt to career requirements and issues.
- Jordanian universities should collaborate with different stakeholders, especially the private sector to enhance graduates' skills and provide better employment opportunities.
- Graduates must be equipped most importantly with management, administrative and communications skills, to better fit with market needs.
- Jordanian universities and the private sector should improve their communication channels with each other to understand the needs for each other.
- Jordan engineering association must play a role in bridging the skills gap through special programs such as capacity building, internships, etc.

7. Research Limitation

Several conditions and indicators may affect this study such as demographics, gender, average rate, personal characteristic, entrepreneurial skills, health status, and social status, all these conditions and indicators will not be covered/taken into consideration during this research. Moreover, the survey will focus on civil engineering graduates in general rather than focusing on the seven types or branches of civil engineering which include: structural, construction, environmental, geotechnical, transportation, water resources, and surveying. As the study is considering the impact of COVID-19 on the needs gap of the civil engineering market, we might have some lack of literature reviews or previous studies for Jordan, or even the region. The timeframe of the study is restricted to 3 months, which will limit the data gathering and the depth of the study to comply with delivering the research at the end of the semester.

8. Conclusion

For the purpose of determining if civil engineering graduates and the market have distinct degrees of competence and skill sets, this study intends to compare the two groups. Proposing ideas on how to better educate students for the industry's rapid worldwide change. Experts from other nations in the area will be engaged as necessary, but the majority of work will be done in the country of Jordan itself. Graduates are being accused for being unable to find job because they lack the requisite new knowledge and skillsets. In such a situation, businesses and governments will be unable to keep up with global changes. Learning new global skills and narrowing the gap between market demand and supply will help new

graduates and businesses succeed. Jordan's economic progress is seriously hampered by a lack of competent workers in certain fields. Engineering skills shortages have deteriorated as a result of SETA programs. Engineering requires constant education, therefore it's vital for fresh graduates to develop the skills they need to succeed in their new roles. Graduates of the Civil Engineering degree have low managerial and technical skills. Over two-thirds of those polled indicated a need for new skills in their current position. 33% of individuals surveyed said their educational experience had a positive impact on their career success. With support from other nations in the Middle East and North Africa, the majority of the work will be carried out in Jordan (MENA). Engineers' competences and skills, as well as relevant literature, will be reviewed in the survey. In an effort to examine the difficulties whether there is a lack of skills and knowledge in civil engineering graduates, literature research is conducted. There is a direct correlation between the amount of money a person is paid and their cognitive and social abilities. Using job vacancy data, researchers were able to determine the industry's skill needs. As a result of its defense legislation, Jordan imposed a state of emergency during the COVID-19 pandemic. Individuals' educational and work position had a significant influence on their level of depression. There are a lot of people in the workplace who are depressed and have difficulty functioning. In comparison to other construction sub sectors, civil engineering has the fastest rate of development. Many firms were compelled to adjust their basic practices overnight because to the COVID-19 pandemic. Some of the construction industry's future abilities, such as the capacity to adapt to change, were recognized. Right now, it is thought, corporations can start investing in their employees' education and training. In the opinion of several educational establishments, nothing beats first-hand experience when it comes to learning new things. The "Project Based Learning" approach may be used by universities to accommodate this trend. Pupils get to put what they've learnt into practice in an actual workplace setting using this strategy. There is a continual rise in the need for new talents as a result of technology, economics, and globalization. These days, graduating students are expected to be capable of solving problems in a range of situations, as well as possessing both soft skills and technical proficiency. There has to be a greater emphasis on hands-on learning, according to the author. Jordanian university graduates who can't find work confront a very high unemployment rate. This is mostly the result of a mismatch between educational outcomes and the needs of the labor market. Overeducated students' rates of unemployment are also on the rise. Education reform is urgently needed, according to certain studies. The demand for labor is higher when there are fewer jobs available than when there is a significant need for it. Jobs will not be created by skills if there is no demand for them. For this research, it is essential that participants have as much information as possible about what employers are looking for, as well as what they are willing to learn. A yearly review of the courses in question was also suggested. Students who were in class during the outbreak will receive additional instruction from their schools. When it came to presenting lectures while students were isolated, colleges and universities were woefully unprepared. COVID-19 training is more influenced by private sector enterprises than by colleges. There is a lack of data analysis topics offered by universities, and this has to be addressed by institutions as soon as possible. Engineers have a strong theoretical foundation, which is why we only propose well regarded institutions that provide both classroom and hands-on training. Only 29.8 percent of those who participated in the survey were female, while 70.2 percent were male. Whether this is a sign that this industry prefers to hire men or that this field is dominated by men is up to debate. We may be confident in the accuracy of the poll because it had a response rate of 94.7% from civil engineering graduates. Among those who answered, 50% indicated that graduates of civil engineering lack marketable skills. A majority of respondents polled said that colleges should rethink their curriculums in light of current job market trends and expectations.

Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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