FIELD SKILLS ASSESSMENT OF CIVIL ENGINEERING: CASE OF PAKISTAN

Final Year Project (2016-17)

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CERTIFICATION

This is to certify that thesis of the Final Year Project titled

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ABSTRACT

The success of construction industry is largely dependent upon both the technical and managerial skills of the civil engineering graduates. After a review of published literature, it can be concluded that not much research has been done in this area in Pakistan. This study identifies and ranks the key skills that fresh graduates of today must possess to succeed in the multipart construction industry of today. It also evaluates the satisfaction level of the employers regarding the currently employed civil engineer. Employers hiring fresh graduates would be surveyed for this study. Conclusions and recommendations are provided in order to minimize the gap between product quality (product being a fresh civil engineering graduate in this case) and industrial demand may be provided. Direction is also given for future work in this area.

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CHAPTER 1

INTRODUCTION

1.1. Background

Civil engineering is one of the most crucial industries globally; the developing nations, for example, Pakistan can exploit the undiscovered assets offered by it and convert it into a basic resource over helping the nation prevail in a globally aggressive market. Most modern development projects these days are intricate and multi-disciplinary in their nature from specialized and administrative perspectives. It brings about a strengthened requirement for knowledge and aptitude.

Civil engineers assume an extremely important part in molding the development business' prosperity and adequacy. The achievement of a venture and development business is exceedingly affected by the abilities practiced by civil engineers. The work that civil engineers can convey to an organization has its impact in deciding a definitive accomplishment of the organization's ventures. It is certain that the UG programs must be continually refreshed to address the requirements of the construction business. The value of all organized courses and in addition industry experience and criticism must be part of the programs (Dawe, Jucker, and Martin, 2005). Many world-class colleges and universities are putting forth different degree projects to prepare experts for neighborhood and universal markets (Domal and Trevelyan, 2009). By remembering this, the undergrad (UG) program in Civil Engineering is intended to meet the developing demand for graduates with solid soft and hard skills. Generally this program is required

to outfit engineers with the essential aptitudes to prevail in the present focused condition of the construction market.

Given the recent changes in the construction industry within Pakistan, the up and coming local engineers must be trained in order to be able to work with the construction practices and methods which are being used worldwide (Farooqui et al. 2008). UG programs which are currently being used in Pakistani universities have been shown to meet the construction and industry needs, as this study demonstrates. An evaluation of the relative importance attributed to different skills by the industry in contrast to the institutions' program will help determine the existing differences. Final recommendations for changes in the existing program will be provided based off of observed differences. The scope of this research was limited to a small number of participating universities. Given the international construction industry's increasingly standardized practices, this study's results could be used by the international community.

There is a dire need to assess the current Pakistani construction industry regarding their demands and expectations from a civil engineering graduate.

1.2. Research Questions

1. What skills are required from a fresh graduate of civil engineering by the employers?
2. What are the latest trends of civil engineering field skills?

1.3. Research Objectives

Narrowing down to the research objectives, this study is limited to the below mentioned out comes of this topic under consideration.

1. To identify the skills necessary for civil engineering graduates.
2. To rank different set of skills expected from a civil engineering graduate in the industry of Pakistan.
3. To investigate and analyze the current approach and gap between engineering institutes and the industry.
4. Developing a report and providing recommendations for institutes to improve their training program.

CHAPTER 2

LITERATURE REVIEW

This part contains the relevant data collected on the subject matter collected from different sources such as research paper, international conferences etc.

According to recent research, technical and non-technical skills such as decision-making, professionalism, communication and lifelong learning are also of high importance for employability in the industry, Zaharim et al. (2010).

In Pakistan, Farooqui and colleagues (2008) concluded for the graduates that skills like value engineering and design review were greatly rated by the industry. They also urged that there is a need to re-evaluate the construction industry's requirements and academic product, as it has been growing massively for the last few years and is struggling hard to touch international standards in construction.

Yusoff (2012) studied and presented a formula to measure the technical skills for employability of engineering graduates. Zaharim (2009) put forward a list comprised of the skills needed by four countries (Malaysia, Japan, Singapore and Hong Kong), and compare the existing similarities and differences of these enlisted skills. Sivapalan Selvadurai (2012) identified employers' perception of the ideal generic skills that graduate employees should possess, and elicited employers' perception of the lack of generic skills that prospective graduates (i.e. industrial trainees) currently possess.

Table 2-1: Engineering Employability Skills Required By Employers in Asia (AZAMI ZAHARIM, 2009)

No.	Malaysia	Japan	Singapore	Hong Kong
1	Communication effectively	Communication skills;	Workplace literacy & numeracy	Work attitude
2	Competent in application and practice	Problem-solving skills;	Information & communications technology	Interpersonal skills
3	Interpersonal or team working skills	Goal-setting skills;	Problem solving & decision making	Analytical & problem-solving skills
4	Engineering problem solving and decision making skills	Personal presentation skills;	Initiative & enterprise	English language proficiency
5	Apply knowledge of science and engineering principles	Visioning skills;	Communication & relationship management	Numerical competency
6	Competent in specific engineering discipline	IT and computer skills;	Lifelong learning	Information technology literacy
7	Understand professional , social and ethical responsibilities	Leadership skills;	Global mindset	Management skills
8	Lifelong learning	Self-assessment skills	Self-management	Chinese language proficiency.
9	Engineering system approach		Workplace-related life skills	
10	Knowledge of contemporary issues		Health & workplace safety	

Sivapalan Selvadurai (2012) identified employers' perception of the ideal generic skills that graduate employees should possess, and elicited employers' perception of the lack of generic skills that prospective graduates (i.e. industrial trainees) currently possess.

A total of nineteen internationally published research papers were reviewed which were mostly from Asia in general and Malaysia in particular. During this time, it was found very less research has been carried out in Pakistan. Furthermore, PEC website was reviewed for their requirement and criteria of a civil engineer's skills set. It was observed that all the research papers were not alike, some identified and emphasized on soft skills while others highlighted both soft and hard skills.

Skills were extracted out from research papers and the PEC website and data entry was carried out in MS Excel. Using this software, frequency of each skill's mentioning in number of research papers was calculated. Finally the skills were sorted in descending order of their frequency number as shown in Table 1.

Table 1-2: Collation of Civil Engineering skills expected from the graduates by the industry and PEC.

Skills	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	PEC	Frequency
Problem Solving skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	19
Communication Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	18
Teamwork skills	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓			✓	✓	15
Lifelong Learning	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓			✓		✓	14
Professionalism	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓				✓	✓	14
Technical knowledge	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓					✓	13
Contemporary knowledge		✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓			✓		✓	13
Ethics & Responsibility	✓	✓	✓	✓	✓			✓		✓		✓	✓		✓			✓		✓	12
Analytical Thinking	✓	✓	✓	✓	✓					✓	✓		✓		✓				✓	✓	11
Decision Making Skills	✓	✓	✓		✓	✓	✓			✓			✓	✓				✓		✓	11
Business & Management Skills	✓	✓		✓	✓						✓		✓		✓	✓		✓	✓	✓	11
Information and computing technology skills	✓	✓		✓			✓				✓		✓		✓		✓	✓	✓	✓	11
Technology specific skills		✓	✓			✓	✓			✓	✓		✓	✓	✓			✓			10
Data collection and collation		✓		✓	✓					✓			✓	✓		✓	✓	✓		✓	10
Numeracy Skills	✓	✓				✓	✓						✓	✓				✓	✓	✓	9
Systems Thinking Approach	✓		✓		✓	✓	✓					✓		✓	✓		✓				9
System Design Skills	✓				✓					✓		✓	✓		✓					✓	7
Leadership Skills	✓	✓						✓					✓		✓	✓	✓				7
Entrepreneurship Skills	✓	✓			✓			✓							✓			✓			6
Cultural and Social Awareness	✓				✓					✓					✓					✓	5
Inter/Multi-Disciplinary Skills	✓	✓								✓			✓							✓	5
Innovation Skills	✓	✓									✓		✓								4
Managing Change Skills	✓	✓									✓		✓								4
Foreign Language Skills	✓										✓		✓						✓		4
Critical Thinking	✓							✓			✓										3
E-skills		✓									✓		✓								3
Sustainable development skills		✓			✓										✓						3
Research skils				✓	✓										✓						3
Creative Thinking	✓	✓																			2

A graph (Figure 1) was plotted with frequency on y-axis and skills on x-axis. According to Babar et al. (2016) and Ullah et al. (2017), an element's frequency greater than 50% in a general sample size of research papers shows its healthy importance. In this case, total research papers reviewed were 19, thus their 50% value is 9.5 (denoted my a red line on the graph) Therefore, with the plotted graph, it was found that nine skills were have a frequency of greater than 9.5 (denoted by a black rectangle). This means, these nine skills have been mentioned in 10 or more research papers. They may or may not be mentioned in the PEC website.

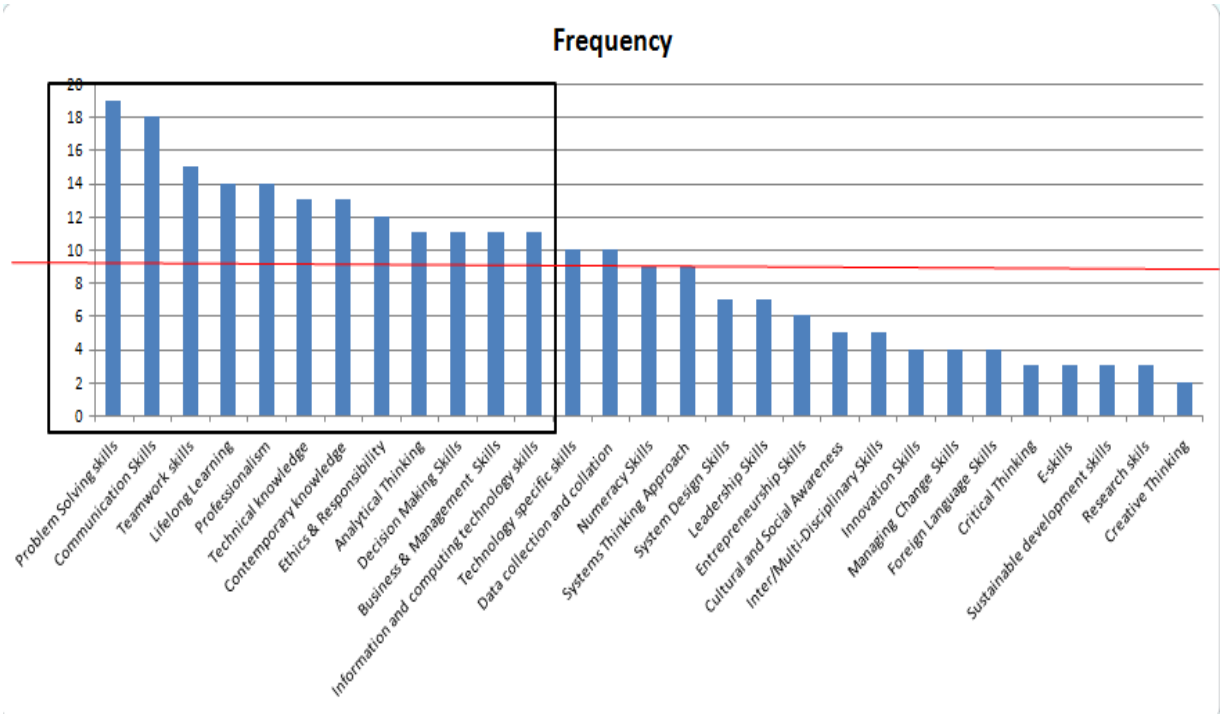

Figure 2-1: Chart depicting the result of literature review

Figure above shows the outcome of literature review in graphical form. Notice the red line which has been drawn out to separate more important skills from the lesser ones.

CHAPTER 3

METHODOLOGY

In this chapter, the research methodology will be explained thoroughly by explaining all the steps of the project. The research was carried out mainly through quantitative approach however responses were taken from qualified employers and interviews were conducted face to face which was makes this research approach qualitative also.

Quantitative Research Approach:

The research approach which is mainly concerned on the quantity of data and information which is later converted into numerical form for further calculations to produce desired results.

Qualitative Research Approach:

The research approach which is mainly concerned with the quality of data and information rather than number or quantity. The assessment is done on the basis of quality.

Both approaches have their importance in the field of research. They are subjective and it depends on the type of research to choose between wither of the two. Therefore, according to the scope of the research decision is made.

This research was mainly carried out through quantitative approach however responses were taken from qualified employers with an average experience of 12 years and interviews were conducted face to face which makes this research approach quantitative as well.

3.1. Identification of Skills

The research needed some prior information which was to identify the civil engineering skills which need to be assessed by the employers. For this purpose, extensive literature was reviewed online. A total of nineteen internationally published research papers were reviewed which were mostly from Asia in general and Malaysia in particular. The most popular research paper comes from Malaysia has been cited more than 40 times which shows the Malaysian concern on the significance of field skills assessment. During this time, it was found that very less research has been carried out in Pakistan. Furthermore, PEC (Pakistan Engineering Council) website was reviewed for the official requirement and criteria of a civil engineer's skills set in Pakistan. During this stage of research, it was observed that all the research papers were not all alike, some identified and emphasized on soft skills while others highlighted both soft and hard skills.

Skills were extracted out from research papers and the PEC website and data entry was carried out in MS Excel. Using this software, frequency of each skill's mentioning in number of research papers was calculated. Finally the skills were sorted in descending order of their frequency number.

A graph was plotted with frequency on y-axis and skills on x-axis. According to Babar et al. (2016) and Ullah et al. (2017), an element's frequency greater than 50% in a general sample size of research papers shows its healthy significance. This means any skill which has been identified by half the number of research papers, is an important skill and it must be assessed for it deserves our attention. Therefore, with the plotted graph, it was found that nine skills were having a frequency of 10 which was greater than 50%. This means, these nine skills have been mentioned in more than 10 research papers. They may

or may not be mentioned in the PEC website. The PEC criteria for civil engineering degree needs an update which is being done by a committee but their final decisions have not been published yet.

3.2. Sample size of the employers

The research needed responses from a good number of qualified employers. In the quantitative approach, greater quantity produces better results however proper methods have been introduced in statistics and numerical method for the selection of a samples size. So to find out how many employers have to be approached, or the sample size of the survey was calculated using the formula given by Yamane, 1967. Yamane's formula is widely used for calculating the sample sizes for research purposes.

The calculations are given below:

Total number of registered civil engineers in Pakistan: **44000 (PEC Website)**

$$n = \frac{N}{1 + N(e^2)} \ , n = \frac{44000}{1 + 44000(.15^2)} \ , n = 44.3996$$

Where,

n= minimum sample size

N= population size = 44000

e= margin of error = 0.15

Thus,

Minimum Sample Size: 44

(According to Yamane (1967), with 0.15 margin of error and 85% confidence level, population 44000)

Hence the minimum research sample size is calculated to be 44. However, total responses received in this research survey were 53 which is greater than 44, thus this criteria is satisfied. Now, we could convert this data into numerical form or graphical form for further calculations to produce results.

3.3. Questionnaire Development

To collect the responses from the employers, a questionnaire was needed which would be used for the survey. Therefore, using the output of extensive literature review, a questionnaire was developed and distributed among the targeted respondents through emails, e-survey forms, socially interactive apps to approach distant employers while hard copies were distributed through personal interactions. During the personal interactions, interviews were also conducted side by side.

Google forms were used to design the questionnaire, attached in Annex-A. It contains all the skills extracted out from literature review which were to be rated on two different scales. i.e. The scales were modified forms of standard likert scales.

3.3.1. Likert Scale

It is the most widely used approach to scaling responses in survey research, such that the term (or more accurately the Likert-type scale) is often used interchangeably with rating scale, even though the two are not synonymous. The scale is named after its inventor, psychologist Rensis Likert.

The format of a typical five-level Likert item, for example, could be:

1. Strongly disagree 2. Disagree 3. Neither agree nor disagree 4.Agree 5. Strongly agree

3.3.2. Scales on the Questionnaire

The typical or standard likert scale was modified in to two different scales *Scale A and Scale B) according to the need of this research i.e for a better assessment of civil engineering skills:

Scale A: Industrial Requirement

1. Unimportant 2. Recommended 3.Relatively Significant 4.Very Significant 5. Essential

Scale B: Current Situation

1. Very Poor 2. Poor 3.Average 4.Satisfied 5. Impressive

3.4. Survey and response collection

The next phase after designing the questionnaire was to use it for conducting the survey to collect the required responses. Target packages were approached by visits on daily bases for four weeks as well as through internet. The questionnaire was distributed online using Google type forms. The hard copies of questionnaire were distributed locally by visiting various construction sites and employers' offices. Interviews were conducted face to face for better understanding and recommendations. The ratings obtained using the questionnaire were transferred in to an excel sheet for further analysis explained in the next chapter thoroughly.

Statistics

A total of 53 responses were collected from the targeted employers with the following details:

Domain of employers:

23.3% Public, 76.7% Private

Employers' category:

53.5% Consultants, 46.5% Contractors *(Construction firms were above C-5*

Average Experience of an employer:

12 years.

This data was critically analyzed. The data collation is explained in the next section.

CHAPTER 4

DATA COLLATION

This chapter explains the critical analysis carried out on the data obtained through survey. The calculations were done using different techniques to produce useful information. The important skills have been identified and ranked based on the employer's responses. Firstly, all the skills are arranged with "Industrial Requirement" as major sort, i.e the skills are sorted based on their significance in the industry. This sorted list is then rearranged with "Industry/Product Gap" as minor sort. Thus, a sorted list is made as shown in the table below.

Table 4-1: Engineering Employability Skills Required By Employers In Asia (AZAMI ZAHARIM, 2009)

Skills	Industrial Requirement	Satisfaction so far	Difference
Communication Skills	5	3	2
Teamwork skills	5	3	2
Professionalism	5	3	2
Ethics & Responsibility	5	3	2
Decision Making Skills	5	3	2
Leadership Skills	5	3	2
Critical Thinking	5	3	2
Creative Thinking	5	3	2
Analytical Thinking	4	2	2
Problem Solving skills	4	3	1
Technical knowledge	4	3	1
Data collection and collation	4	3	1
Systems Thinking Approach	4	3	1
System Design Skills	4	3	1
Cultural and Social Awareness	4	3	1
Inter/Multi-Disciplinary Skills	4	3	1
Innovation Skills	4	3	1
E-skills	4	3	1
Research skils	4	3	1
Information and computing technology skills	4	4	0
Lifelong Learning	3	3	0
Contemporary knowledge	3	3	0
Business & Management Skills	3	3	0
Technology specific skills	3	3	0
Numeracy Skills	3	3	0
Entrepreneurship Skills	3	3	0
Managing Change Skills	3	3	0
Sustainable development skills	3	3	0
Foreign Language Skills	2	3	-1

Figure 4-1 is the graphical representation of sorted ratings of each skill on the two scales. We can see that there is a visible gap between the two lines. This indicates that the employers are not very much satisfied with an average fresh graduate's performance. The gap also illustrates that employers urge the institutes for better nourishing of skills in their product. Figure 4-2 shows the gap variation among the skills with respect to the scales' ratings. The gap occurs to be 2 among top 9 skills which is a serious concern. This means the skills which are highly important for the success of a fresh graduate in the industry are found to be averagely possessed according to the employers. The lack of satisfaction among the employers can be one of the major reasons of less employability of fresh graduates because a fresh graduate with this level of skills set will require due training before properly being able to contribute in the industry.

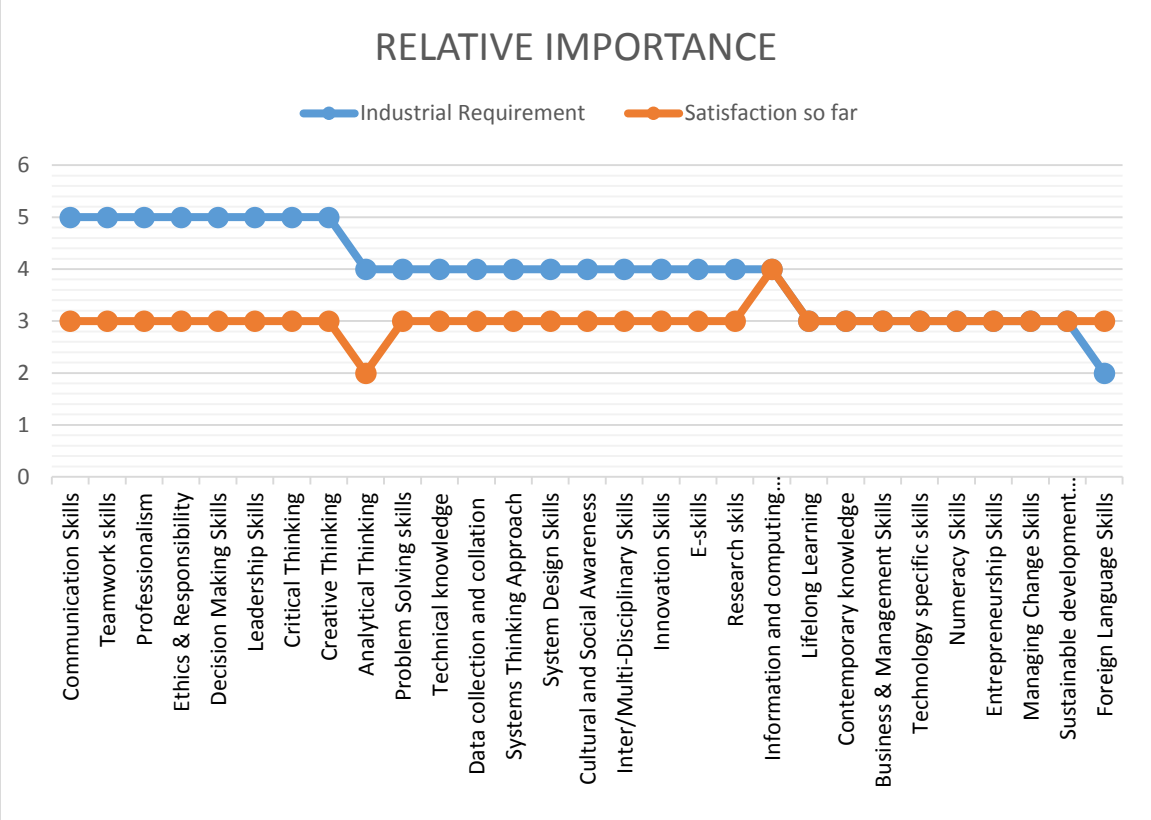

Figure 4-1: Graph of Industrial requirement and Satisfaction so far

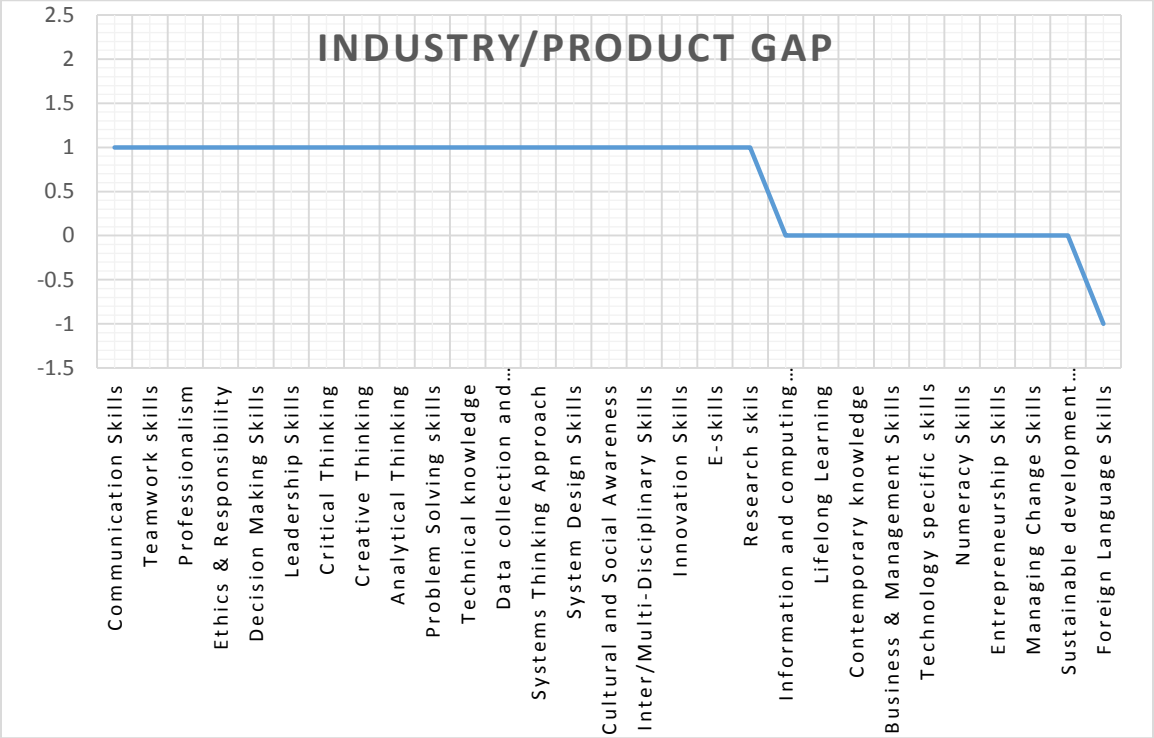

Figure 4-2: Graph of gap between the scale ratings for each skill

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter contains the conclusions drawn from the research project and recommendations the authors believe to be helpful for the institutions towards building a better product as well as for the future researchers.

5.1. Conclusions

The gap between the industrial requirement (employer's demand) and satisfaction so far (employer's satisfaction) leads to the following conclusions.

Tabulated below are the most important skills for a fresh graduate to possess based on the survey. When skills have the same 'Industrial Requirement', 'Satisfaction so far' and 'Difference' Ratings, they are ordered based on their importance with respect to the literature review. For example, the top eight skills in Table 5-1 have exactly the same ratings. They are then arranged with respect to their position in Table 2-2.

The employers' responses regarding these skills happened to be very critical and they seem to request the institutions/academia for better training of the engineering students. An engineering student's active involvement in the practical work through internships and projects may help produce or enhance these skills. Since, there is a considerable gap between the industrial requirement and the product quality of universities, institutions ought to work on these skills to produce better product which succeeds in the industry.

Table 5-1: Top 10 skills for the employability of a fresh graduate Table

Top 10 skills required in the industry

Skills	Industrial Requirement	Satisfaction so far	Difference
Communication Skills	5	3	2
Teamwork skills	5	3	2
Professionalism	5	3	2
Ethics & Responsibility	5	3	2
Decision Making Skills	5	3	2
Leadership Skills	5	3	2
Critical Thinking	5	3	2
Creative Thinking	5	3	2
Analytical Thinking	4	2	2
Problem Solving skills	4	3	1

Top-3 Skills

5.2. Recommendations for Academic Institutions

The top 10 list constitutes both the hard and soft skills i.e the technical and managerial skills. Six of these are soft skills, namely Communication Skills, Teamwork Skills, Professionalism, Ethics and Responsibility, Decision Making Skills and Leadership Skills. The other four are hard or technical skills, namely Critical Thinking, Creative Thinking, Analytical Thinking and Problem Solving Skills. It can be clearly seen from the table that all of the top six skills are soft, followed by four hard skills. This indicates the relative importance of soft skills compared to technical ones. This high importance of soft skills also demands a higher attention from the educational institutions.

5.3. Recommendations for Future Research

There is limited literature available in Pakistan related to this kind of research. Interested researchers are given the following recommendations:

- Improve survey by increasing the sample size.
- Enhance research by identifying more skills through an even extensive literature review.

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ANNEX-A

QUESTIONNAIRE FOR FIELD SURVEY OF CIVIL ENGINEERING EMPLOYABILITY SKILLS

* Required

NUST INSTITUTE OF CIVIL ENGINEERING

NATIONAL UNIVERSITY OF SCIENCES AND TECHNOLOGY

Description

This questionnaire deals with the skills which directly and indirectly affect the employability of a civil engineer (fresh graduate).

Each question will be graded on "1-5" scale. There are two scales i.e. Scale A and Scale B.

For any queries, kindly contact through email:

Ali Ahmad: aliqaktunk@yahoo.com

Faizan Faheem: faizjav@hotmail.com

Scale A: Industrial Requirement

Importance of the skill for a fresh graduate in the industry.

1. Unimportant 2. Recommended 3. Relatively Significant 4. Very significant 5. Essential

Scale B: Current Situation

Your satisfaction level with respect to employed fresh graduates.
1. Very Poor 2. Poor 3. Average 4. Satisfied 5. Impressive

Your Details

1. **Name (Optional)**

2. **Company Name (Optional)**

3. **Domain** *
   Mark only one oval.
   - ◯ Public
   - ◯ Private

4. **Since (Optional)**

5. **Category** *
   Mark only one oval.
   - ◯ Contractor
   - ◯ Consultant

6. **Contractor category (for contactors only)**

7. **Location**

Survey Questions

8. **1. Problem Solving Skills** *
   Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement	◯	◯	◯	◯	◯
Satisfaction so far	◯	◯	◯	◯	◯

9. **2. Communication Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

10. **3. Teamwork Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

11. **4. Lifelong Learning** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

12. **5. Professionalism** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

13. **6. Technical Knowledge** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

14. **7. Contemporary Knowledge** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

15. **8. Ethics & Responsibility** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

16. **9. Analytical Thinking** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

17. **10. Decision Making Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

18. **11. Business & Management Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

19. **12. Information and Computing Technology Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

20. **13. Technology Specific Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

21. **14. Data Collection and Collation** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

22. **15. Numeracy Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

23. **16. Systems Thinking Approach** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

24. **17. System Design Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

25. **18. Leadership Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

26. **19. Entrepreneurship Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

27. **20. Cultural and Social Awareness** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

28. **21. Inter/Multi-Disciplinary Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

29. **22. Innovation Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

30. **23. Managing Change Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

31. **24. Foreign Language Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

32. **25. Critical Thinking** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

33. **26. E-skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

34. **27. Sustainable Development Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

35. **28. Research Skills** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

36. **29. Creative Thinking** *
Mark only one oval per row.

	1	2	3	4	5
Industrial Requirement					
Satisfaction so far					

37. **Are there any other skills you consider important for a fresh graduate to succeed in the industry? Please mention them below:**

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