MASTER OF SCIENCE IN TECHNICAL EDUCATION (ELECTRICAL AND ELEETRONIC ENGINEERING)

SKILLS GAP ASSESSMENT BETWEEN TVET INSTITUTES AND INDUSTRIES OF BANGLADESH: ELECTRONICS INDUSTRIES PERCEPTIONS

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DECLARATION

This project work is authentic, and it is an outcome of the investigation carried out by **Thafimul Islam** under the supervision of **Dr. Md. Shahadat Hossain Khan,** in the Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), Organization of Islamic Cooperation (OIC), Gazipur, Bangladesh. It is hereby declared that this thesis or any part of it has never been submitted elsewhere for the award of any Degree or Diploma. All literatures and contributions cited are fully acknowledged.

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DEDICATED

This thesis is dedicated to my family for all their continued love and support. First and foremost to my beloved parents Alhaj Md. Amirul Islam and Alhaj Mrs. Akhter Jahan, for all of their support and encouragement. You have successfully made me the person I am becoming.

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ABSTRACT

Adequate skills are required in preparing TVET graduates to fit in today's digital world. In this regard, industrial experts are the major agents through which graduates skills could be infused with the desire to accept, adapt and use those technologies in the pursuit of their career and unemployed problem in Bangladesh. However, regardless of the evidences that indicate positive effect of skills development, and its possibility of transferring the primitive knowledge of skill development processes. The implementation of industry and institute collaboration for skill development remains negligible in most of the sector. This leads to great deal of researcher that sought to examine the skills of TVET graduate of Bangladesh at their workplace. While the prior research focused on industrial expert opinion on skill requirement at industries of south Asian region. The scale used in this study is five point rating scale (strongly agree to strongly disagree). Findings from 103 industrial experts reveled that there is a gap of skills between the skills requirement of industries and skills provided by TVET institution. Such as: the way they opined and intend to the requirement of skills at today's industrial sector, their opinion on skill gap, performance of TVET graduate and the relationship between industries and institution, they identified the skills that are missing in TVET graduates and the present status of industry-institution relationship. The most sufficient findings of this research are that, the skills that are required at industries for employment can be categorized based on their importance. Overall, the study identified the skills requirement to increase the rate of employment and also identified the sector where the skills need to develop through TVET institution.

TABLE OF CONTENTS

LIST OF FIGURE

LIST OF TABLES

CHAPTER I – INTRODUCTION

1.1 Introduction

After praiseworthy achievements in relation to millennium development goals (MDGs), Bangladesh is now embarked on the implementation of the sustainable development goals (SDGs) with a strong national commitment BPC (2015). SDG is a people-centered program which basic tenet is: “no one to be left behind”. That means the downtrodden must be empowered to participate in the process of the implementation of the SDGs and benefit equitably from the achievements. Empowerment of downtrodden is possible through capability development with access to adequate facilities and resources. The main key instrument of the capability development is skill improvement of downtrodden.

Technical and vocational education and training (TVET) has a preeminent role in human capability development in the context that the downtrodden get rid of poverty and move on to a sustainable development pathway. In Bangladesh, TVET has started receiving increasing attention in recent years. The national education policy 2010 creates a great deal by emphasis on scientific, technical and vocational education along with high-quality general education. Bangladesh developed national skills development council (NSDC) in 2008, which is now ensuring coordination and monitoring of national skills development policy (NSDP) 2011.

The rapid changes in technology regulate the changes in global trends, economics, business, social life, and even health-care and education. In the region of Asia, people experienced a substantial economic and jobs growth, and sharp improvements in standards of education. Skills shortages, skills gaps, and skills mismatches are persist, particularly in developing countries. Skills gaps become apparent when the workforce is not sufficiently skilled to do the job to the standard required. This may be due to insufficient internal training, such as when an employer upgrades equipment and introduces new technology but does not simultaneously upgrade the skills of the existing workforce. Typically, skill gaps also find where the TVET system lags too far behind from new employment opportunities.

Another important aspect; according to the report of Asian development bank (ADB) in 2015, “The impact of technology on the future world of work in Asia is not well understood.

There is no doubt that it will pose significant challenges for Asian economy. Even Asia meet these challenges, the potential dividends will be tremendous" (ADB, 2015). New technologies such as artificial intelligence and robotics are driving the fourth industrial revolution (ADB, 2015). The fourth industrial revolution extends both opportunities and challenges to Asian countries. This will fundamentally change the nature of work and labor requirements for the future. Now there is a question arise from this report that "how can TVET in developing countries of Asia prepare for the future and take advantage of the opportunities?" It is so important to prepare workers for the changes of labor demands. There is a growing consensus that national industrial policy should instead focus on creating an enabling framework for economic development, including strategizing and providing skills development in support of a broad range of industries and firms (OCED, 2013b).

However, preparing workers for the future is not as easy as technology changes so rapidly. That requires a major transformation of TVET sectors. Countries that invest in addressing the required skills, and repositioning in TVET sector are least affected by disruptive innovations. The pace and impact of labor market demand are amplifying by the new technologies (such as automation of work activities). Most of the employment opportunities at industry were minimized by switching from manual to automatic. Bangladesh will not be immune from these trends which are already on display in Australia and other western countries.

1.2 Statement of the problem

Corresponding to other developing countries of Asia Bangladesh also face the real challenges of empowerment of downtrodden through capability development. Besides, government of Bangladesh takes support from donor agencies to driving a skill development program in different part of the country. Most of the time this support is financial; sometimes the NGOs and other donor agencies provide their own manpower to operate the program under the supervision of Bangladeshi government. After one or two successful seasons of a skill development program donor agencies stopped their financial support, because of the agreement between government and donor agencies was expired. Government also stopped that program because of their tight economy. That's the reason for addressing the skill requirement from the labor market is necessary before planning for a new skill development program.

7th five year plan (FY 2016 to FY 2020), sets priorities for the identified problems which need to take an immediate action (SFYP, 2015).

- Inadequate utilization of huge workforce is prevailing in Bangladesh due to skill shortage.
- According to the requirement of labor market, our TVET institutions fail to provide the relevant skills due to low internal and external efficiency. This proved as obstruct for the production of skilled manpower.

According to a brief report of Asian development bank (ADB) in 2016 "The difference between the pace of changing labor market requirement and our improvement in developing workers skills clearly shows there remains a skill gap in skill development program or education system of Bangladesh" (ADB, 2016). The report also concludes that Bangladesh should improve the quality of skills in tandem with increasing labor productivity. Stated earlier in this section, it is urgent to investigate the skills gap between TVET institution and industry on basis of industrial expert's perception about required skills at the industrial level at this present moment. After the graduation most of the TVET graduates try for employment at industries. Only the industrial experts can identify the required skills for their industry at this present moment. To reduce the unemployment through skill development program, it is important to identify the required skills first.

Addressing the skill mismatch at workplace, which clearly defined by (Cappelli, 2015) and (ILO, 2011) is, "imbalance between the supply of skills and the demand for skills in the world of work". At launch ceremony of declaration the 'Skills 21 – Empowering citizens for inclusive and sustainable growth', the honorable minister of Bangladesh education ministry said, "Government commits an inclusive economic growth and productive employment for all. A skilled and productive workforce will make a major contribution to our goal of becoming a middle-income country by 2021" (ILO, 2016). The primary challenge of developing a productive workforce is identifying the existing gaps between the skills of industries and skills provided by TVET institution.

Considering above stated four issues and the challenges, a set of pre-identified skills may prove as a beneficial tool to identify the existing skills gap. Conducting a survey of skill set in between industrial experts also provide information about industrial required skills from

newly recruited TVET graduates. Hence the present study tries to investigate the existing skills gap between industry and TVET institution of Bangladesh.

Moreover, addressing the existing skills gap is not enough for developing a productive workforce. That's only the beginning of challenges for skill development through TVET. The rapid change of technology is continuously changing the industrial skills demand. Only capacity building and expand existing formal TVET system is not quite sustainable (Rahman, Bani-Younis, Al Riyami, & Watson, 2015). A progressive institute-industrial linkage may exhibit an instant response to the skill development program. Although, identifying the present status of industry-institute linkage are simultaneously necessary for developing a productive workforce. Therefore identifying skill gap, the study also observed the present status of TVET institute and industries relationship in Bangladesh.

1.3 Purpose of the study

The purpose of this study considering, these two interlinked aspects (skills gap and industry-institute linkage) to investigate the existing gap of skills between the TVET institution and industry and to identify the existing linkage between industries and TVET institutions in Bangladesh.

1.4 Research questions

The following research questions were addressed, in relation to the purpose of the study.

1. What are the existing gaps between the skills of industries and the skills provided by TVET institution?
2. What is the overall relationship that industries maintain with TVET institution of Bangladesh?
3. What are the skills that will be required at newly recruited TVET graduates in industry?

1.5 Limitation

Three basic limitations were observed during data collection of the study. Firstly, the data was collected through self-reports from experts, therefore the possibility of self-response bias may sway the true associations between variables, which is very common in all survey research. To limit this potential bias, combinations of positive and negative items were used in the instrument to ensure that true responses are received.

Secondly, the participants in this study were experts from industry. To collect data from them, the time schedule and availability of experts need to be considered.

Thirdly, researcher distributes the questionnaire physically. For this reason, researcher need to get the permission of administration to conduct a cross-sectional survey.

Finally, the data in this research was collected using a cross-sectional survey, single administration design. The study collected its response from industries only. Farther study in future may consider response from institution and conduct a comparative study between industry and institution.

CHAPTER II – LITERATURE REVIEW

2.1 Introduction

This chapter will review the articles that focused on 3 different contexts:

1. Categories of skills linked with employability
2. Skills gap between industry and institute
3. Present status of industry institute linkage

Adequate new technological engagement required in preparing graduates to fit in today's digital world. In this regard, industries are the origin of new technologies for a developing country like Bangladesh. There should be an updated report about the present industrial skills requirement before considering the TVET system as a key for skill development.

2.2 Categories of skills linked with employability

In the literature, different studies identified vocational skills (the skills which are linked with employment) in diverse nature. For instance, S. Jayaram and Engmann (2017) identified three broad categories of vocational skills:

a) Technical skills
b) Cognitive skills,
c) Non-cognitive or soft skills

Some other studies reported skills in another names. For example Rus, Yasin, and Rasul (2014) considered skills as "Employability skills" that is essential abilities combination of knowledge, skills and attitudes that are required for 21st century workplace. They further identified them:

- Individual skills (communication skills, respect, computer skills and cultural skills)
- Skills covering individual reliability (individual management, ethical, and vocational maturity)

- Economic skills (problem-solving skills, learning skills, employability and career development skills).
- Group and organizational effectiveness (interpersonal skills, organizational skills, negotiation skills, creativity, and leadership). (Rus et al., 2014, p. 2)

However, the required skills that are discussed in the literature for the 21st century are not widely dispersed. Different studies may name them differently but in a broader perspective, most of the skills are linked and connected. Therefore, this study proposes two broad skills, which are likewise these of recent study of (S. Jayaram and Engmann (2017); S. Jayaram, Munge, Adamson, Sorrell, and Jain (2017))

Technical skills	Technical skill is that ability which is linked with specific task performance. Apprentices should have ability to perform specialized tasks or carry out a job linking with labour market (technical role/operating a tool).
Non-cognitive or soft skills	Non-cognitive skill is that which is linked with behavior (human life). Apprentices should have ability to deal with multiple factors which are not connected with other two skills. It is combination of having multiple traits such as leadership, communication, emotional and other behavior related attitudes.

The research (Jayaram & S., 2017) broadly studied on the skills which are linked with employment. Thus, it remains imperative to research more specifically about the employability skills required at the industries of Bangladesh.

Skills requirement in south Asian region:

The theoretical framework upon which the foundation of this study is laid was adapted from the study of Bridging the Skills Gap: Innovations in Africa and Asia (Jayaram S., 2017, p4). The model of skill set was adapted from this study. The table 2.1 clearly identifies the main skill gaps that are needed for employability in the current era and to bridge the skills gap in the south Asia. In many cases, the skills might be the same or similarities exist among these skills depending on the workplaces, industries and the overall economy of the particular country.

Table 2. 1: Skills need in South Asia.

Countries	**Non-cognitive**		**Cognitive**	**Specific and technical skills**
	Communication	Leadership		
Mumbai (India)	Aptitude	Willingness to learn, Appearance and personality, Diligence and hardworking, Influencing skills, Multitasking	3R's	Problem solving
Bhopal (India)	Quest for knowledge	Good Communication skills, Team work and social interaction, Quick responsiveness, Time management, Positive thinking and Attitude		Flexibility and adaptability, Physical fitness and stamina
Lahore (Pakistan)	Voluntarism	Leadership, Career planning, Communication, Entrepreneurial skills, Attitude	Conceptual understanding	Hands-on experience
Dhaka (Bangladesh)	Diligence	Interpersonal skills, Behavioral skills, Adaptability, Time management, Attitude.		Secretarial skills, Language, ICT, Business acumen, Negotiation skills, Secretarial skills, Accounting skills

Source: (S. Jayaram & Engmann, 2017, p. 4)

2.3 Skills gap between TVET institute and industry

The acquisition of workplace skills is seen universally as a key driver of economic and technological development. TVET is the type of education which provides individuals with skills, knowledge and attitudes for effective employment in specific occupation. According to (UNESCO, 2001), "TVET is a comprehensive term referring to those aspects of the educational process in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of the economic and social life".

Graduating TVET students do not always possess the necessary skills, abilities, or knowledge when beginning their careers in the industry. The lack of these skills and abilities can limit the productivity of newly hired, recent graduates, or even prevent them from gaining employment (Begel, 2008). This lack of preparation is not just limited to practical skills or other technical concepts, but can also include communication ability, familiarity and proficiency with tools, and an understanding of basic technical concepts. In some cases, there is a large enough gap between students' skills and the expectations of industry managers or other hiring personnel, that it may prevent students from receiving jobs (McGill, 2009).

The 21st century workplace is unique and only people with adequate skills can serve. The unique characteristics of the 21st century according to Iroriteraye Adjekpovu (2013): (i) a scientific and computer world; (ii) an age requiring sound scientific and technological skills for children to cope with its complexity; (iv) a world where emphasis will be more on accuracy, competence, efficiency and effectiveness which are derived from educational foundation; and (v) an era of highly skilled practitioners and generalists (Iroriteraye-Adjekpovu, 2013). These unique characteristics have made employers of labor to find graduates unusable in the world of work.

The research (S. Jayaram and Engmann (2017); S. Jayaram et al. (2017)) was conducted in Asia, more particularly in South and Southeast Asia to identify current skill gap in this region. The report identified two broad skill areas among the three South Asian countries (India, Bangladesh, and Pakistan): (i) It includes non-cognitive skills such as communication,

leadership, teamwork, honesty/ethics, and flexibility. (ii) It encompasses the skills linking with ability to learn.

The skill gap in most TVET graduates being subjected to series of retraining programs because most of them are considered to be ill-equipped and adjudged unemployable based on the quality of training acquired (ADB, 2015). In certain situations when industries cannot employ and re-train TVET graduates, they technically bring in the 'expatriates' to do the same job. The recent study of S. Jayaram & Engmann (2017) identified the existing skills gap between TVET institute and industries for the whole south Asian region. Taking all these into account, the purpose of the present study was to investigate industrial experts' opinions about the skills gap between TVET institute and industries of Bangladesh. It is assumed that opinions of industrials will provide valuable information concerning the current status of skills gap in Bangladesh so that necessary improvement can be provided to the institution.

2.4 TVET institute and industry linkage

There is a strong link between TVET and labour market globally. A substantial amount of study reported about this relationship (Agrawal & Agrawal, 2017; Weßling, Hartung, & Hillmert, 2015). It is now well-known and well reported in the literature that TVET produced skilled manpower which will reduce the unemployment rate of any country in the world. The skill mismatch is also found in the literature despite having a strong relationship between TVET and labour market demand (David & Nordman, 2017).

Employers usually want assurances that candidates have strong foundation skills, have the ability to deploy knowledge, demonstrate initiative, and can communicate with team members. New recruits, however, are usually found to lack such transferable skills mainly because they did not receive a good quality education (UNESCO, 2012). Asian countries in the past three decades was driven partly by a large supply of young workers with relatively high levels of basic education but limited levels of advanced education and skills (ILO, 2015). Combined with low wages, this endowment of basic human capital was well suited to help Asian countries capture production line industries and basic services, seizing new opportunities brought about by globalization (ADB, 2015).

The scarcity of institute industry linkage introduced the fact of underemployment and skill mismatch. The employment picture for youth is rather dismal, with one in six young people being unemployed globally, and a much higher rate of underemployment (Worldbank, 2013a). On the other hand, according to the annual Talent Shortage Survey (ManpowerGroup, 2015), firms' facing difficulty in filling vacancies is a widespread challenge globally. Skills mismatch is widespread in Asia and the Pacific. In fact, data on difficulty in filling vacancies for skilled positions (Figure 2.1) suggest that skills mismatch may be more serious in this region than the global average.

Figure 2. 1: Difficulty Filling Vacancies in Asia and the Pacific (%)

Source: 2015 Talent Shortage Survey (ManpowerGroup, 2015)

Difficulty finding qualified workers is perhaps expected in advanced and rapidly evolving economies undergoing demographic shifts such as India; Hong Kong, China; and Taipei, China (ADB, 2015). Employers globally, including Asia, appear to have difficulty finding resources for both hard and soft skills. There is some strong evidence that the need for soft skills (e.g., creativity, adaptability, and interpersonal communications) rises in more advanced firms and economies (Radermacher, Walia, & Knudson, 2014). However, more

broadly, the findings reveal that both academic education and TVET are failed to fulfill the industrial skill demand.

Adequate collaboration between technical and vocational education and training (TVET) institutions and industries would lead to provision of relevant practical skills for industrialization (Alias, 2013). Collaboration with the industries and the educational institutions are the major rising concern in many developing countries like Bangladesh. It was found out that industrial attachment was the most pronounced linkage; lack of initiative by TVET institutions and poor response from the industries were among the major challenges facing the collaboration of TVET and industry (NewStraitsTimes, 2012).

The TVET institutions are needed to strengthen links with industries to improve networking between academia and industries to create a better understanding of each other's needs and to identify how they can be met through the industry programs (Alias, 2013). The means of industry institute collaboration is the understanding of each other requirement, jointly work to produce competent skilled worker. Considering all other facts, the purpose of the study was to investigate the current status of industry institute linkage.

CHAPTER III – METHODOLOGY

3.1 Research design

The study aimed to identify the skills gap between industry and TVET institution by using the opinions from industrial experts. This chapter describes methods used for data collection, analysis, and interpretation. A quantitative method was used in this research, which includes research design, area of the study, population, sample and research tool and data analysis procedure. The method employed in this research was descriptive type of quantitative research. Descriptive research was introduced to gathering of information about prevailing condition for the description and interpretation purposes.

To describe the current condition, practices and situation descriptive method of research is suitable, which based on fact-finding and accurate interpretation of the findings. Since this study is concerned with the present status of TVET institution and industries relationship and the identification of skills gap between the requirement of industry and skills provided by the TVET institution, the descriptive method of research was found to be the most appropriate method to be used.

3.2 Research field

Researcher minimized the field of study into electronics industries to find out a crystal clear view of present skills condition of TVET graduates at workplace. Five different regions of Bangladesh were selected for conducting the research. The sampled districts were Dhaka, Gazipur, Narayangonj, Narshingdi, and Sylhet.

3.3 Population and sample

The study was conducted on the industries situated at five different districts in Bangladesh. The researcher selected participants from industries which are located in five districts which were mentioned earlier in the research field. To conduct this study, researcher sampled twelve industries from those five districts. The selected industries from the five districts were, shown in Table 3.1.

Table 3. 1: Types of industries selected from different region.

Types of industries	Dhaka	Gazipur	Narayangonj	Narshingdi	Shunamgonj	Total	Participants
Electronics		1		1		2	**16**
SME	1					1	**7**
RMG	1	1				2	**23**
Plastic				1		1	**9**
Paper					1	1	**6**
Chemical				1		1	**8**
Pharmaceutical			1			1	**9**
Cement			1		1	2	**14**
Textile		1				1	**11**
Total	2	3	2	3	2	12	**103**

The number of participants for this study was targeted about 120 from 12 industries. Unfortunately the numbers of electronics industries in Bangladesh are very few. That's why other industries in where electronics graduates are working, also selected for this study.

The researcher followed few characteristics of experts to select them as research participant. Characteristics of participant:

- The selected participants were highly skilled and experienced personnel.
- The eligible participants for the research were marked up to the supervisor level or higher, from electronics department.
- All participants of this research obtained a minimum educational certificate to understand the language and value of the research.

3.4 Research tool

The survey questionnaire which used in this study, have three sections (Section A, Section B and Section C).

Section A: Section A of the questionnaire contains general information about the participant and his workplace. Skill level of the experts was measured by asking the participants "What is your Job title?" Participants were ensured their skill level by answering the preformed multiple choices. The question, "Please describes the main operational activities of your organization. What do you produce?" clarified the types of industries. Ammount of TVET graduates employed at the industry were clarified by asking the amount of approximate skilled worker.

Section B: In the 2nd phase of survey questionnaire, Participant's opinions were measured in two different themes with 14 items.

- In first theme, the performance of TVET graduates at workplace was measured via three items (item 1, item 2 and item 14).
- In second theme, the present situation of relationship among the industry and TVET institution was measured via 11 item (from item 3 to item 13).

The participants opinions in 14 items were measured using a five-point rating scale. Strongly agree (5) Agree (4) Neutral (3) Disagree (2) Strongly disagree (1) as shown in Table 3.2

Table 3. 2: Weighted average based on five-point scale

SA (5)	A (4)	N (3)	D (2)	SD (1)
4.50-5.00	3.50-4.49	2.50-3.49	1.50-2.49	1.00-1.49

Section C: The textual answer of the open-ended questionnaire in section C was formed to address the type of skills required at industry, which may also beneficial to understand the technological changes at the industry of Bangladesh. The participants were considered the potential future skills requirement at industry, while they answered the open ended questions.

The research tool check list (skill set) was developed to identify the skills which are required for securing the jobs in industrial sectors. Based on (Jayaram & S., 2017) framework the skill set was divided into three different domain, cognitive, non-cognitive and specific technical skills.

3.5 Data collection procedure

A close-ended questionnaire and a check list of skills was used during data collection in this study with few open-ended questionnaire to textually answer by the participants. Each participant was allowed to freely and voluntarily participant and responds to the questionnaire. Participants were informed about the confidentiality of his/her opinions and identity and they were also informed that they are free to withdraw their participation at any time.

The questionnaire was distributed to the participates physically and via online. Most of the time researcher was available for giving further clarifications regarding the required responses. Out of twelve industries researcher went to nine industries by himself. Data from two institutes was collected through request letter to administrative personnel of certain industry. The questionnaires were sanded back to the researcher via currier service.

3.6 Data analysis procedure

The answers of the close-ended questionnaire were assigned with some score before. The scores of each item were aggregate to provide corresponding score for each component. To conduct a meaningful analysis the negative items were reverse coded. Descriptive statistics like frequency, percentage, means, and standard deviation were used in this study for data analysis purpose.

To examine the hypothesis of each item of the questionnaire, a chi-square test was conducted (non-parametric), with sig. value ($p < 0.05$). Category percentage for each opinion and weighted average were calculated and then tabulated, followed by its detailed interpretation. These tests were considered in the study basically for identifying problems and prospects of skills gap between TVET institution and industry. Data analysis was performed using Statistical Package for Social science software (IBM SPSS v: 25).

3.7 Validity and reliability

The items of the survey questionnaire and check list were adopted from the framework of Jayaram and Engmann (2017). The framework also dividend the skill set in different domain and sub-domain. To check the internal consistency of the instrument reliability coefficient was calculated. To ensure the reliability of the questionnaire and skill set, a pilot study was conducted on a sample of 20 participants.

3.8 Ethical consideration

The study followed the tradition and did not break any rules and regulation acted upon the data collection process in Bangladesh or the enterprises contribute to the study. Following the rules of research data collection, this study do not disclose the name and identity of any participant and the response from the participant will strictly use only for the research purposes. Data gathered from industry was strictly kept confidential. The researcher ensured the participant about all condition and rules of the certain questionnaire before participant gives his valuable response.

CHAPTER IV – RESULTS

4.0 Data analysis and interpretation

In this section, statistical procedures are presented that were used to analyze both the continuous and categorical data collected from experts of industries in Bangladesh. The first section of this chapter discusses about demographic data of the participants. The second section involves analysis of data related to the first and third research question, which are "What are the existing gaps between the skills of industries and skills provided by TVET institution?" and "What are the skills that will be required at newly recruited TVET graduates in industry?". In this section the data was computed and aggregated, and tabulated in form of frequencies and percentages. Weighted average, means and standard deviations were also calculated. Data analysis related to the second research question, which is "What is the overall relationship that industries maintain with TVET institution of Bangladesh?" is discussed in the last section of this chapter. Chi-square test was conducted by testing the components at 0.05 significant levels. Weighted average, means and standard deviations were also calculated.

4.1 Demographic data

120 respondents were considered in the sample and questionnaires were distributed to them. The reliability of the data was tested before doing any parametric test.

In statistics, Cronbach's alpha is the used for estimate of the reliability of a psychometric test. Cronbach's alpha can be viewed as the expected correlation between the items that measure the same construct. Estimates of Cronbach's alpha can take on any value less than or equal to 1, including negative values. But, statistics consider only the positive values for reliability test. Higher values of alpha are more desirable. Using the rule of thumb, some professionals thought that, variable require a reliability of 0.70 or higher with 0.60 as the lowest acceptable threshold (obtained on from substantial sample) before they will use an instrument. The overall reliability coefficient (Cronbach's alpha) is (.73) (Table 4.1) which signified that the internal consistency of instrument is good enough to measure the variables.

Table 4. 1: Descriptive Statistics and reliability coefficient (Cronbach's alpha)

	N	Mean	Minimum	Maximum	Range	Std. Deviation	Alpha
Item Means	103	3.012	2.755	3.571	.816	1.122	.734
Inter-Item Correlations	103	.170	-.309	.602	.911	1.093	.742

Within 103 questionnaires (received), 98 were valid (answer all statement) and five were uncompleted questionnaires, which statistically illustrated in Table 4.2 below:

Table 4. 2: Statement wise respondents Case Processing Summary

	Cases					
	Valid		Missing		Total	
Statements	N	Percent	N	Percent	N	Percent
Approximately how many employees (Skilled workers) are currently working?	98	95.1%	5	4.9%	103	100.0%
We have a lack of skilled workers in industries	98	95.1%	5	4.9%	103	100.0%
The graduates from TVET sectors do not have adequate skills for current workplace (industries)	98	95.1%	5	4.9%	103	100.0%
Industries are working jointly with TVET institutions to produce competent skilled workers	98	95.1%	5	4.9%	103	100.0%
The industry has been organizing and hosting internship to provide TVET students with hands on skills	98	95.1%	5	4.9%	103	100.0%
Industry sends staff overseas for field training so as to equip them with up-to-date skills	98	95.1%	5	4.9%	103	100.0%
The industry provides carrier guidance to students of vocational institutions so as to prepare them for future workforce	98	95.1%	5	4.9%	103	100.0%
There is a joint assessment of students by industry and institutions	98	95.1%	5	4.9%	103	100.0%
The industry has partnership with institutions which provides immediate employments	98	95.1%	5	4.9%	103	100.0%
Both vocational institutions and industry collaboratively organize exhibitions to motivate young unemployed people	98	95.1%	5	4.9%	103	100.0%
The industry is consulted during curriculum development for vocational institutions to improve current skill training	98	95.1%	5	4.9%	103	100.0%
The industry is providing funds and scholarships to the poor and/or disadvantaged people for skill training for future employment	98	95.1%	5	4.9%	103	100.0%
Industry provides short loans for start-ups for poor people	98	95.1%	5	4.9%	103	100.0%
The industry offer on-job training to poor families	98	95.1%	5	4.9%	103	100.0%
Female Skilled workers face higher level of unemployment compared to male	98	95.1%	5	4.9%	103	100.0%

4.2 Research questions I and II: Existing gap of skill and required skill for newly recruited TVET graduates.

The data analysis for the computed components of the scale with respect to research question one "What are the existing gaps between the skills of industries and skills provided by TVET institution?" and three "What are the skills that will be required at newly recruited TVET graduates in industry?" were describe in this section below. Total 86 check list (skills set) were distributed to the respondent and 63 were returned with no missing questions.

4.2.1 Existing gap and Required skills

After analyzing the checklists, three types of skills set were identified. Based on industries requirement researcher catagoriesed the skills set into

- Crucial skills
- Urgent skills
- Reasonable skills

Crucial skills: Most of the participants (70% and above) have identified four skills (Table 4.4) which are imperative for any graduates who wants to enter in the labor market of 21st century. These skills are considered as crucial skills because without having these skills graduates will not be able to enter in job market of 21st century.

Urgent skills: At least, 50% of participants from agreed on six skills (Table 4.4) which are important for any graduate who wants to enter in the labor market of 21st century. These skills are considered as urgent skill set because without having these skills graduate may face difficulties entering in the job market.

Reasonable skill set: At least, 35% of participants agreed on these skills (Table 4.4) which may be required for particular jobs in 21st century. Therefore TVET graduates need to achieve these skills before entering in job market. These skills are considered as reasonable skills set because it gives TVET graduates an added advantage in the workplace in order to fulfill multiple responsibilities in the workplace.

Table 4.3 shows the frequency distribution of skill set for total skill individually. From the frequency distribution of total skill set the skills set (crucial, urgent and reasonable) can be easily identified.

Table 4. 3: Total skills set percentage

Skills	%	Skills	%
Conceptual understanding	73.0	Aptitude	31.7
Quest for knowledge	57.1	Loyalty	31.0
Voluntarism	6.3	Good Communication skill	76.2
Solve complex problem	52.4	Sincerity	27.0
Interpersonal skill	33.0	Willingness to learn	58.7
Leadership	66.0	Influencing skill	38.1
Teamwork	52.4	Multitasking	51.1
Hardworking	38.1	Positive thinking	17.5
Adaptability	31.7	Working with others	28.6
Time management	39.7	Understanding	23.8
Values and ethics	27.0	Self-management	15.9
Problem-solving	82.5	ICT	55.4
Hands on experience	70.4	Navigation	17.5
Physical fitness	30.0	Secretarial skill	37.6
Language	35.3	Accounting	39.7

From Table 4.3, skills were tabulated (Table 4.4) in terms of three skills set defined earlier. It was observed from Table 4.4, above 70% of participant listed the crucial skills, above 45% participants listed urgent skills and above 30% participants listed the skills in resonable category. The skills were not catagorized which listed by below 30% of participant.

Table 4. 4: Required skills for TVET sector (industrial observation)

Type	Skills set		Remarks
Crucial	Conceptual understanding	73.0%	Listed by maximum number of participant (Above 70%)
	Good communication skill	76.2%	
	Technical problem-solving skill	82.5%	
	Hands on experience	70.4%	
Urgent	Leadership	66%	Above 45% participants listed these
	Willingness to learn	58.7%	
	Analyze and solve complex problem	52.4%	
	ICT	55.4%	
	Teamwork	52.4%	
	Multitasking	51.1%	
Reasonable	Language	35.3%	Listed by 30% and above participant
	Secretarial skill	37.6%	
	Influencing skill	38.1%	
	Interpersonal skill	33%	
	Accounting skill	39.7%	
	Time management	39.7%	

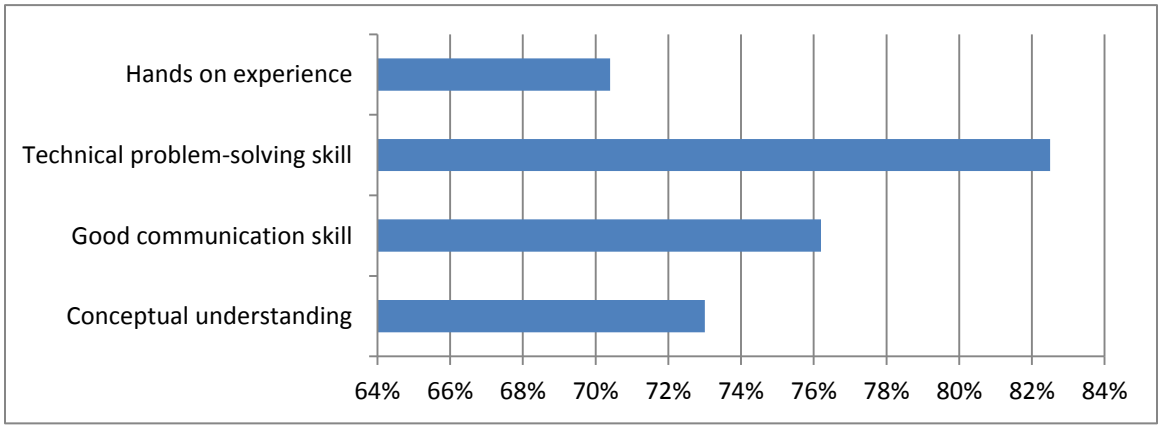

Figure 4. 1: Crucial skills set percentage

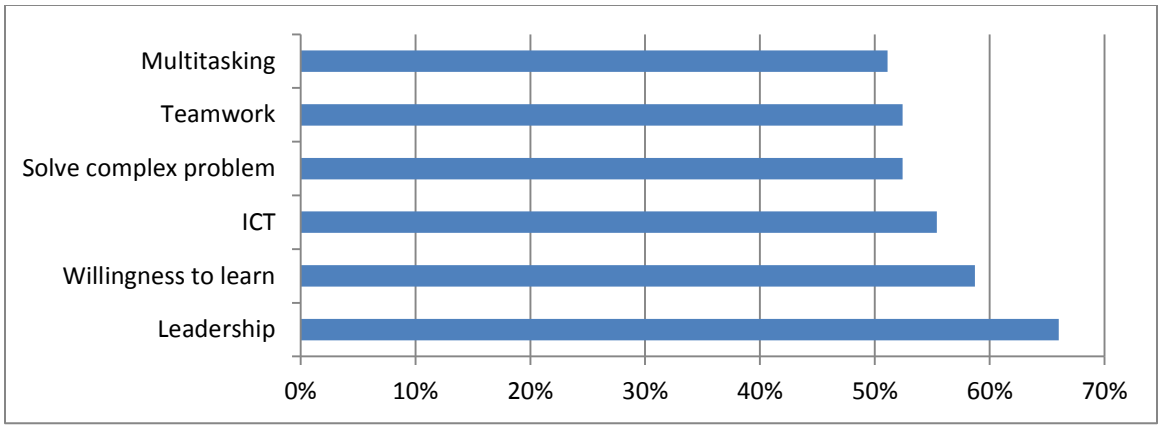

Figure 4. 2**:** Urgent skills set percentage

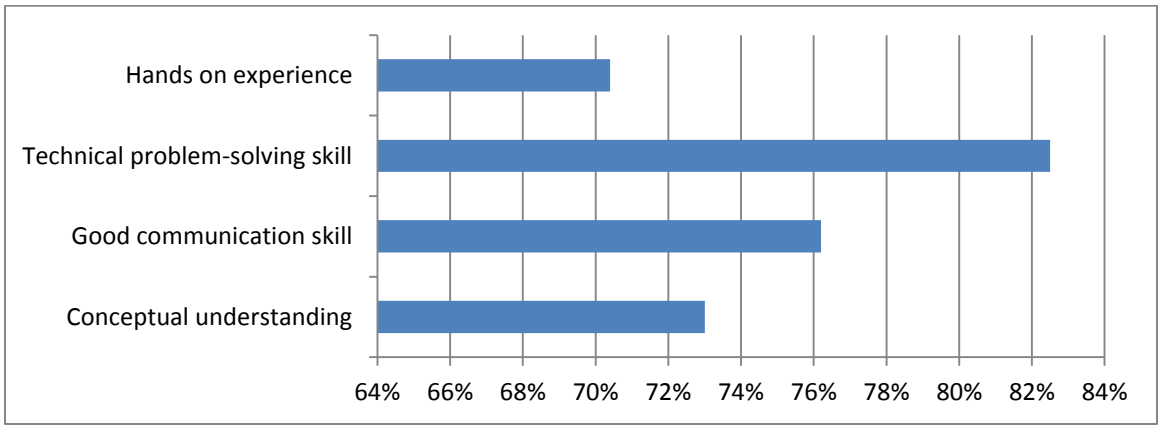

Figure 4. 3: Reasonable skills set percentage

4.3 Research question II: Overall relationship that industries maintain with TVET institutions of Bangladesh

The data analysis for the research question two "What is the overall relationship that industries maintain with TVET institution of Bangladesh" is described in Table 4.5. Table 4.5 was constructed for only the experts who had knowledge about the workplace performance of TVET graduate and the current relationship status between industry and TVET institutions of Bangladesh. From table 4.5 the responses of experts elaborate gradually.

Table 4. 5: Summary of industrial expert opinion

Sl.	STATEMENTS	SA%	A%	N%	DA%	SDA%	WA	Chi-square	Asm. Sig.
1	We have a lack of skilled workers in industries	24.3	44.7	5.8	17.5	7.8	3.60	50.641	.000
2	The graduates from TVET sectors do not have adequate skills for current workplace (industries)	13.6	31.1	17.5	31.1	6.8	3.14	24.039	.000
3	Industries are working jointly with TVET institutions to produce competent skilled workers	6.8	32.0	26.2	24.3	9.7	3.02	25.059	.001
4	The industry has been organizing and hosting internship to provide TVET students with hands-on skills.	11.7	27.2	26.2	26.2	7.8	3.09	18.098	.000
5	Industry sends staff overseas for field training so as to equip them with up-to-date skills	8.7	35.0	22.3	22.3	11.7	3.07	22.194	.000
6	The industry provides carrier guidance to students of vocational institutions so as to prepare them for future workforce	4.9	38.8	22.3	22.3	10.7	3.05	35.451	.000
7	There is a joint assessment of students by industry and institutions	7.8	25.2	27.2	29.1	10.7	2.90	20.544	.000
8	The industry has partnership with institutions which provides immediate employments	3.9	32.0	24.3	27.2	12.6	2.87	27.243	.000
9	Both vocational institutions and industry collaboratively organize exhibitions to motivate young unemployed people	9.7	31.1	30.1	20.4	7.8	3.15	24.961	.000
10	The industry is consulted during curriculum development for vocational institutions to improve current skill training	10.7	16.5	36.9	20.4	15.5	2.86	20.835	.013
11	The industry is providing funds and scholarships to the poor and/or disadvantaged people for skill training for future employment	8.7	26.2	26.2	23.3	14.6	2.91	12.706	.000
12	Industry provides short loans for start-ups for poor people	7.8	27.2	24.3	33.0	7.8	2.94	27.728	.000
13	The industry offer on-job training to poor families	7.8	18.4	29.1	34.0	10.7	2.79	26.660	.000
14	Female Skilled workers face higher level of unemployment compared to male	13.6	19.4	14.6	33.0	19.4	2.75	12.388	.015

Experts' response to the statements of the questionnaire:

Statement one*:* It was observed that overall 69% experts opined in the category of agree and strongly agree on statement one, which implies most of the experts were positive (agree/strongly agree) regarding the statement: We have a lack of skilled workers in industries. Mean value of this statement is higher than 3.5 (4.49 > 3.60 > 3.5) which means the statement is accepted.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square* observed χ^2o (50.641) was greater than the *Chi-square critical* $\chi^2 c$ (9.49), that is χ^2o (50.641) > $\chi^2 c$ (9.49), for which the null hypothesis, responses on this item is not statistically significant, is rejected. Therefore it was statistically significant that industries have lack of skilled worker.

Statement two*:* From table 4.5, it was observed that most of the respondent (44.7%) agreed with the statement: The graduates from TVET sectors do not have adequate skills for current workplace (industries). The mean value of the statement is lower than 3.5 (WA= 3.14) which means the statement is rejected.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square* observed χ^2o (24.039) was greater than the *Chi-square critical* $\chi^2 c$ (9.49), that is χ^2o (24.039) > $\chi^2 c$ (9.49), for which the null hypothesis: responses on this item is not statistically significant, is rejected. Therefore it can be conclude that the TVET graduates have adequate skills for their current workplace (industries).

Statement Three*:* In the third statement, 34% respondent disagreed and 26.2% respondents neither agree nor disagreed with the statement: Industries are working jointly with TVET institutions to produce competent skilled workers. In this case, the mean value is lower than 3.5 (WA = 3.02) which implies the statement is not accepted. The Chi-square test was conducted at df = 4 with significant value of 0.001, which is less than 0.05 level of significance. Chi-square observed χ^2o (25.059) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (25.059) > χ^2c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected. Therefore it can be conclude that the Industries of

Bangladesh do not jointly working with TVET institutions to produce competent skilled workers.

***Statement Four**:* It was observed that, 34% participants disagreed and 26.2% participants were neither agreed or disagreed with statement four: The industry has been organizing and hosting internship to provide TVET students with hands-on skills. The mean value is 3.09 which is lower than the range 3.5. That means the statement is not accepted.

The Chi-square test was conducted at df = 4 with significant value of 0.000, which is less than 0.05 level of significance. Chi-square observed χ^2o (18.098) was greater than the Chi-square critical $\chi^2 c$ (9.49) that is χ^2o (18.098) > χ^2c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected. Therefore it can be conclude that most of the Industries in Bangladesh don't have the facilities of internship program to provide TVET students with hands-on skills.

***Statement Five**:* It was observed that, 34% participants disagreed and 22.3% participants were neither agreed or disagreed with statement five: Industry sends staff overseas for field training so as to equip them with up-to-date skills. The mean value is 3.07 which is lower than 3.5. That means the statement is not accepted.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (22.194) was greater than the *Chi-square* critical $\chi^2 c$ (9.49), that is χ^2o (22.194) > χ^2c (9.49), for which the null hypothesis: responses on this item is not statistically significant, is rejected. Therefore it can be conclude that most of the Industries in Bangladesh do not send their staff overseas so as to equip them with up-to-date skills.

***Statement Six**: F*rom table 4.5, it was observed that, 33% respondents opined in the category of disagree and strongly disagree and 22.3% participants were opined in the category of neither agree or disagree for this statement. The responses were also in the category of 'Undecided' in terms of weighted average (WA= 3.05) which means most of the respondent doesn't have adequate knowledge about industries intention to provide carrier guidance to students of TVET.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (35.451) was greater than the *Chi-square critical* $\chi^2 c$ (9.49), that is χ^2o (35.451) > χ^2c (9.49). For which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be conclude that most of the Industries in Bangladesh do not provide any carrier guidance to students of TVET institutions so as to prepare them for future workforce.

Statement Seven*:* It was observed that, 39.8% participants disagreed with the statement seven: There is a joint assessment of students by industry and institutions. The mean value is 2.90 which is lower than 3.5. That means the statement is not accepted.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (20.544) was greater than the *Chi-square* critical $\chi^2 c$ (9.49) that is χ^2o (20.544) > χ^2c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be conclude that industries do not jointly asses students with TVET institution.

Statement Eight*:* It was observed that, 39.8% participants disagreed with this statement: The industry has partnership with institutions which provides immediate employment. The mean value is 2.87 which is lower than 3.5. That means the statement is not accepted.

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (27.243) was greater than the *Chi-square critical* $\chi^2 c$ (9.49) that is χ^2o (27.243) > χ^2c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the industry does not have partnership with institutions to provides immediate employment for TVET graduates.

Statement Nine*:* It was observed that, 28.2% experts disagreed and 30.1% experts neither agreed or disagreed with statement nine: Both vocational institutions and industry collaboratively organize exhibitions to motivate young unemployed people. The mean value is 3.15 which is lower than 3.5. That means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (24.961) was greater than the *Chi-square critical* $\chi^2 c$ (9.49) that is χ^2o (24.961) > χ^2c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be conclude that industry and institute do not to organize exhibitions to motivate young unemployed people collaborately.

Statement Ten*:* From table 4.5, it was observed that, 35.9% respondent disagreed and 36.9% neither agreed nor disagreed with the statement ten: The industry is consulted during curriculum development for vocational institutions to improve current skill training and the mean value is lower than 3.5 (WA = 2.86) which means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (20.835) was greater than the *Chi-square critical* χ^2 c (9.49), that is χ^2o (20.835) > $\chi^2$2 c (9.49), for which the null hypothesis, responses on this item is statistically significant, is rejected. Therefore it can be concluded that the TVET institutions do not consult with industries during curriculum development.

Statement Eleven*:* From table 4.5, it was observed that most of the respondent (37.9%) disagreed with the statement: The industry is providing funds and scholarships to the poor and/or disadvantaged people for skill training for future employment and the mean value is lower than 3.5 (WA = 2.91) which means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (12.706) was greater than the *Chi-square critical* χ^2 c (9.49), that is χ^2o (12.706) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the industries do not provide any scholarship or fund for poor and disadvantages people for skill training.

***Statement Twelve**:* It was observed that most of the respondent (40.8%) disagreed with the statement: Industry provides short loans for start-ups for poor people and the mean value is lower than 3.5 (WA = 2.94) which means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (27.728) was greater than the *Chi-square critical* χ^2 c (9.49), that is χ^2o (27.728) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the industries do not provide any loans for poor people to start-up business.

***Statement Thirteen**:* It was observed that most of the respondent (44.7%) disagreed with the statement: The industry offer on-job training to poor families and the mean value is lower than 3.5 (WA = 2.79) which means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square observed* χ^2o (26.660) was greater than the *Chi-square critical* χ^2 c (9.49), that is χ^2o (26.660) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that the industries do not offer on-job training for poor families.

***Statement Fourteen**:* It was observed that most of the respondent (52.4%) disagreed with the statement: Female Skilled workers face higher level of unemployment compared to male and the mean value is lower than 3.5 (WA = 2.75) which means the statement is not accepted.

The Chi-square test was conducted at *df* = 4 with significant value of 0.000, which is less than 0.05 level of significance. *Chi-square* observed χ^2o (12.338) was greater than the *Chi-square critical* χ^2 c (9.49), that is χ^2o (12.338) > $\chi^2$2 c (9.49), for which the null hypothesis: responses on this item is statistically significant, is rejected. Therefore it can be concluded that most of the industrial expert thought that the unemployment rate of male skilled worker in higher enough than female.

4.3.1 Workplace performance of TVET graduate

Focusing on overall performance (item 1, item 2 and item 14) of TVET graduate at their workplace, the analysis revealed that 17.16 percent of responded strongly agree that the industries of Bangladesh don't have adequate number of skilled worker, 31.7 percent agree, 12.6 percent of responded (Table 4.6) remain neutral about the performance of TVET graduate. Among 103 responded 27.2 percent responded disagreed and 11.3 percent responded strongly disagreed that the graduate from TVET institute didn't perform well at their workplace. The weighted average was 3.16 (3.49 > 3.16 > 2.5), which was not either agree or disagree with opinion of TVET graduates performing well at their workplace. (See Table 4.6)

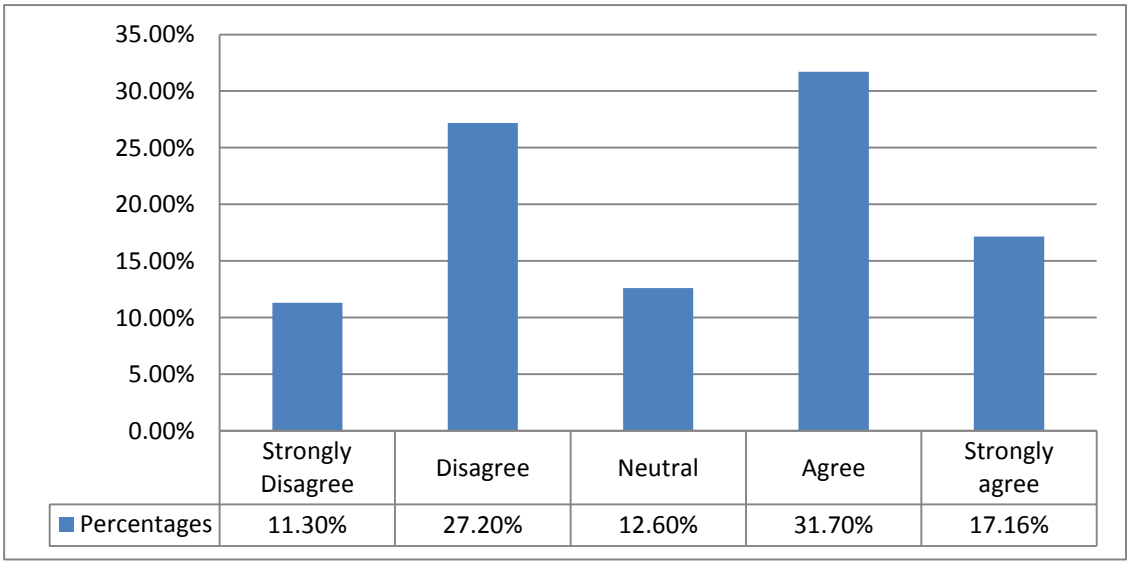

Figure 4. 4: Percentage distribution for overall performance of graduate from TVET

Table 4. 6: TVET graduates performance

STATEMENTS		SA%	A%	N%	DA%	SDA%	WA	Chi-square	Asm. Sig.
TVET Graduates Performance	We have a lack of skilled workers in industries	17.16	31.7	12.60	27.20	11.30	3.16	29.028	0.005
	The graduates from TVET sectors do not have adequate skills for current workplace (industries)								
	Industries are working jointly with TVET institutions to produce competent skilled workers								

The *Chi-square* test was conducted at *df* = 4 with significant value of 0.005, which is less than 0.05 level of significance. The calculated value of *Chi-square* χ^2o (29.02) was greater than *Chi-square* critical $\chi^2 c$ (9.49) at significant level of 0.000. For that reason the null hypotheses, responses on this component are not statistically significant, is rejected. Therefore it can be concluded that it was statistically significant and experts are agreed that the graduates from TVET sectors do not have adequate skills for current workplace.

4.3.2 Summary of the results based on research question II

Analyzing the overall relationship (from item 3 to item 13 consider as a group) that industries maintaining with TVET institution, it was observed that 2.6 percent strongly agreed 29.92 percent agreed 19.71 percent were neutral, 26.44 percent respondent (Table 4.10) disagreed and 11.08 percent strongly disagreed that industry and TVET institute of Bangladesh maintaining a strong relationship with industries. The weighted average was 3.06 (3.49 < 3.06 < 2.5), which implies the items involved with relationship of industry and institute are rejected.

Chi-square value was conducted with *df* = 4 with significant value 0.003, which is lower the significant value of 0.05 and *Chi-square* $\chi^2 o$ observed (60.03) was greater than Critical value

of *Chi-square* $\chi^2 c$ (9.49) at 0.05 level of significant. The null hypothesis, responses on the items are statistically significant, is rejected.

Table 4. 7: Industry-Institute linkage

	STATEMENTS	SA%	A%	N%	DA%	SDA%	WA	Chi-square	Asm. Sig.
Industry-Institute Linkage	Industries are working jointly with TVET institutions to produce competent skilled workers	2.6	29.92	19.71	26.44	11.08	3.06	60.03	0.003
	The industry has been organizing and hosting internship to provide TVET students with hands-on skills.								
	Industry sends staff overseas for field training so as to equip them with up-to-date skills								
	The industry provides carrier guidance to students of vocational institutions so as to prepare them for future workforce								
	There is a joint assessment of students by industry and institutions								
	The industry has partnership with institutions which provides immediate employments								
	Both vocational institutions and industry collaboratively organize exhibitions to motivate young unemployed people								
	The industry is consulted during curriculum development for vocational institutions to improve current skill training								
	The industry is providing funds and scholarships to the poor and/or disadvantaged people for skill training for future employment								
	Industry provides short loans for start-ups for poor people								
	The industry offer on-job training to poor families								

The researcher concluded that the TVET institution don't have adequate knowledge about industrial skills. Present condition of industry-institution relationship is insufficient to produce competent skilled workforce.

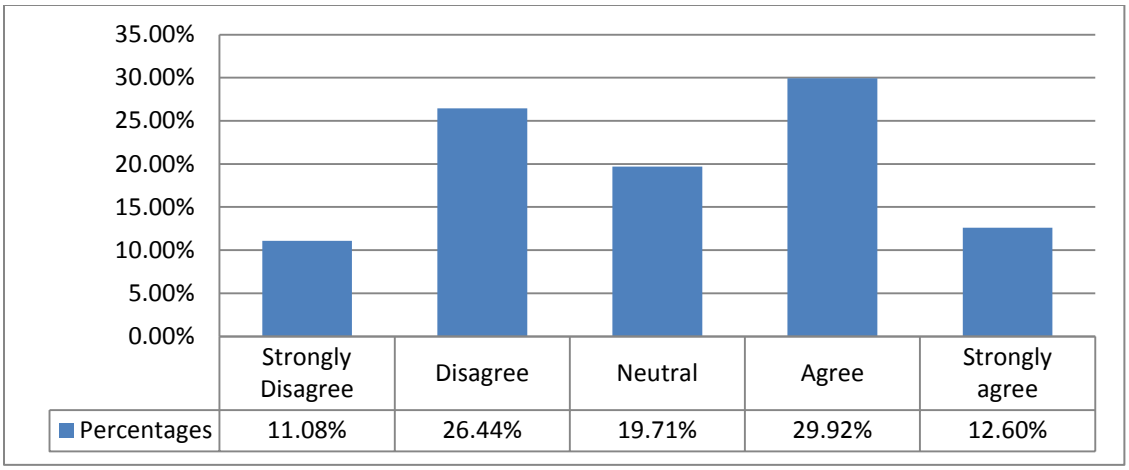

Figure 4. 5: Percentage distribution for overall present status of industry-institute linkage

CHAPTER V - DISCUSSIONS AND CONCLUSIONS

5.1 Findings

The purpose of the study was to find out the skills gap between TVET institute and industry. The study was carried out on the basis of the following objectives:

a) Find out existing linkage (relationship) between industries and TVET institutions in Bangladesh.
b) Investigate the existing gap between industrial skills and skills provided by the TVET institutions.
c) Identify the skills which are missing in the existing labor force who graduated from TVET institutions.

The study highlighted the TVET graduates performance at their workplace, existing skills gap between industry and institute, required skills for a newly employed TVET graduate, present status of industry institute linkage.

Findings of the study classify in following two sections

- Findings from research statement
- Findings from Skillset

5.1.1 Findings from research statement

Findings from research statement pointed below:

- Industries of Bangladesh do not have adequate number of skilled worker. The low level of skills possessed by the new workforce was considered a risk to productivity.
- Existing skills acquired by TVET graduates are not sufficient for their current workplace which may leads to unemployment and skill mismatch problem.
- To produce a competent skilled workforce, joint effort by TVET institution and industries is negligible. Therefore skills acquired by TVET graduates, do not match with industries skills requirement.

- Most of the industries still do not have the facilities of internship to provide TVET students with hands-on skills. Therefore newly TVET graduates are not familiar with the new technologies uses at industries.
- Industries in Bangladesh do not send their staff (graduate from TVET) overseas so as to equip them with up-to-date skills. Therefore when any new technology imported, expert of that technology also imported via industry.
- TVET students do not receive any kind of carrier guidance from industry which may prepare them for future workforce. Therefore employers need to compromise with their skills requirement when they recruit any new TVET graduate.
- Students from TVET institution were assessed by their institution. Therefore they acquire theoretical knowledge more than technical knowledge.
- Industry does not make any partnership with institutions to provide immediate employment for TVET graduates. Therefore most of the TVET graduates face unemployment immediately after completing their graduation.
- Industry-institute doesn't collaborate to organize exhibitions to motivate young unemployed people. Therefore the unemployment rate of young people in Bangladesh increased day by day.
- TVET institutions do not consult with industries during curriculum development. Therefore TVET institution doesn't have the knowledge about industries skill requirement.
- Industries do not provide any scholarship or fund for poor and disadvantages people's skill training. There is a very narrow space of skill training opportunities for poor and disadvantage people in Bangladesh.
- Industries do not provide any loans for poor people to start-up business.
- TVET graduates from poor families do not get the skill training offer from poor families. Government of Bangladesh cannot eradicate the poverty alone. Assistance from industry may boost up the poverty eradication.
- The unemployment rate of male skilled worker is higher enough than female skilled worker.

5.1.2 Findings from check list

The study already categorizes the skill into crucial, urgent and reasonable skills set. Table 5.1 showed the skills from 3 different categories:

Table 5. 1: Identified skills for TVET graduate

Type	Skills set
Crucial	Conceptual understanding Good communication skill Technical problem-solving skill Hands on experience
Urgent	Leadership Willingness to learn Analyze and solve complex problem ICT Teamwork Multitasking
Reasonable	Language Secretarial skill Influencing skill Interpersonal skill Accounting skill Time management

5.2 Findings according to objective

The following findings based on the evidence are categorized:

Objective I: The results from the analysis showed that the relationship between TVET institute and industry was not strong enough. TVET institute of Bangladesh followed their old traditional curriculum which emphasized on theoretical knowledge rather than practical skill. The following collaboration of TVET-industries cannot consider to enhancing employability skills in Bangladesh. It was observed that present relationship between institute and industry narrowing down the employment opportunities of TVET graduate.

Discussion linking with objective I: Following discussions, expert highlighted the major drawbacks for industry-institution linkage

1. Required skills development under TVET institutions were not possible without industrial support, specifically for those skills which were recently notified (crucial, urgent, reasonable skills).
2. Lack of a direct, continuous linkage between industry and institution members, affected the skill development of TVET graduates.
3. Due to the lack of industrial support, TVET graduates unable to equip with up-to date skills.
4. Immediate employments of TVET graduates were not possible without a carrier guideline from industries.

Objective II: It was observed from the analysis the skills provided to TVET graduates from their institute and the skills requirement of industries was significantly different. There is a gap remains between industrial skills and skills provided by the TVET institutions. Industries have not put much effort to collaborate with TVET institution to produce a competitive skill workforce for job market of 21st century.

Discussion linking with objective II: Most of the TVET institutions do not consult with industry during curriculum development to improve current skill training. Therefore the conventional skills were used to train in skill development program repeatedly. The TVET institutes do not have any partnership with industries which provide immediate employments

to the graduates. Thousands of students complete their graduation from TVET institution every year. Without immediate employment after completing the graduation, unemployment rate of TVET graduate will increase day by day.

Objective III: Three types of skills set were identified: crucial skills, urgent skills and reasonable skills. Conceptual understanding, Good communication skill, technical problem solving skill and hands-on experience are identified as crucial skills which are imperative for any TVET graduates who want to enter in the labor market of 21st century. Leadership, teamwork, ICT, Teamwork, Multitasking skills are identified as urgent skills, for which TVET graduates face difficulties to entering into job market. The skill, which gives TVET graduates an advantage in their workplace are language, interpersonal skill, secretariat skill, accounting skill, etc.

Discussion linking with objective III: The prior literature (Jayaram & S., 2017) was conducted on "skills needed for employability in south Asian region". It was observed from the study *(Jayaram & S., 2017);* the identified skills were categorized in non-cognitive skills, cognitive skills and specific technical skills. Findings from the prior literature prove that, cognitive skills (such as communication, leadership, honesty/ethics, teamwork, and flexibility) were emphasized more than technical skills.

From the findings of present study, it was observed that, the study categorized the skills requirement in crucial, urgent and reasonable skills. The identified skill sets from this study showed that; the crucial skill set contains both cognitive skills (conceptual understanding, Good communication skill) and specific technical skills (problem solving, Hands-on experience). The urgent skill set also contains both cognitive skills (such as teamwork, multitasking, willingness to learn etc.) and specific technical skills (like solve the complex problem, ICT). Correspond with prior literature, cognitive and specific technical skills were equally prioritized in present study.

5.3 Implication

The identified skill set may provide as a guideline for TVET graduates. Unemployed TVET graduate may identify the skills which may essential for his immediate employment. TVET facilitator may include the crucial and urgent skills in TVET sector so that the future graduates will have these skills. The identified skills set may merged with the implication of National Training and Vocational Qualifications Framework (NTVQF) which will facilitate to define the qualifications against nationally-recognized competency standards.

Industries cooperation in skill development may reduce the duplication of skill development program; reduce the competition of TVET graduate for the same skill training. Industries collaboration with TVET institution's skill training program will provide clear picture of skills acquired by TVET graduates. Collaboration of industrial management and TVET facilitator will significantly improve the skills development program without increasing the financial support and resources. More so, identifying the skills gap between industry and institution may provide knowledge about the industries skills requirement.

- **Existing literature:** This study provides an insight into a new segment of skills set which was not been reported in prior literature.
- **Practice:** The findings of this study may serve as an insight to the progress made so far, against the goals related to the skills development in TVET institution of Bangladesh.

5.4 Recommendation

To successfully reduce the skills gap between industry and institution, Collaboration initiatives should be taken on by TVET institutions for various reasons. Most emphasized industry-institution collaboration objectives are, the improvement of technical skills, to reduce demand and supply mismatch, to enhancing of employability skills, and the promotion of knowledge transfer between institutions and the industry (ILO, 2013). The following collaboration initiatives of TVET-industries may consider to enhancing employability skills in Bangladesh. This is one of the fundamental steps through which future TVET students can fully equipped with necessary skills required for the job market of 21st century (ILO, 2017).

Three types of skill sets which identified after analyzing need to be included in TVET sector so that the future graduates will have these skills. The crucial and urgent skills are proved as necessary skills required for immediate employment of TVET graduates.

The government of Bangladesh should formulate the policies on TVET industry linkages, provided the basis for the policy framework for TVET industry collaboration. Thus, a memorandum of understanding can be signed between the participating industry and the TVET institution to confirm both parties commitment in the collaboration.

Role of TVET institution: TVET institution should collaborate with the industries to properly assess the graduates. They should ensure the last year internship program for each graduate. Overall the institutions need to create a partnership which provides immediate employments and produce competent skilled workers for global labor market. TVET graduates should obtain the skills required by industry before preparing for the employment. TVET institution shouldn't only focus on technical skill. Institute should provide enough cognitive skills to their graduates.

Role of Industries: Industries should share the knowledge about their present skills requirement with TVET institution, so that TVET institutions can easily identify the skills need to be develop for their graduates. The industry should organize internship program to provide TVET students with hands on skills. To equip staff (TVET graduates) with up-to-date skills, industry should send them overseas for field training. The industries of Bangladesh should join with TVET institution to assess their students with new technologies. To motivate young unemployed people, TVET institutions and industry should collaboratively organize seminar and exhibitions. To develop the skills of poor and disadvantaged people, industry should provide funds and scholarship for their skill training. The highly competitive environment of industry today has resulted in greater focus by employers on increasing their productivity and they feel the need to incorporate the latest technologies in their work environments. They are also in dire need of qualified employees. Given this situation, TEVT Institutes could operate as outlined by below:

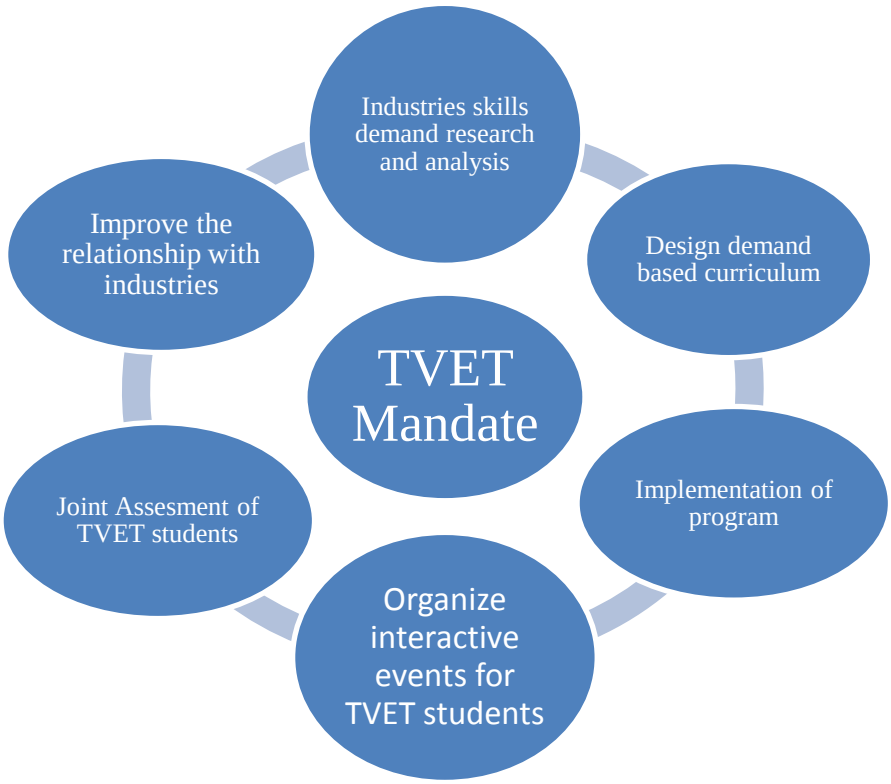

Figure 5. 1: Recommended operation of TVET institution. Adapted from (ILO, 2013, p. 37)

5.5 Conclusion and future research direction

The TVET institutions should develop linkages between industrial production and education and serve the needs of local economic development. On the basis of the findings the following conclusions were drawn:

- There was a gap between the skills required at industry and skills provided by the TVET institute.
- Performance of TVET graduates at their workplace couldn't fulfill the industries skill requirement.
- Industries of Bangladesh required cognitive and soft skills besides of technical skill.
- Industries of Bangladesh were not fully collaborated with TVET institution.
- Industries didn't jointly work with TVET institutions to produce competent skilled workers.

This study investigated performance of TVET graduates from their workplace. However, due to time and resource constraints twelve industries from five different were considered as sample. It would be better if the number of industry could be increased including more trades in order to generalize the results. Future research may also include a comparison of results in this study with larger sample size using institutional response. The skills set introduce by the researcher could be adapted to conducting a research with specific skills requirement. Qualitative research may conduct in future to understand the finding depth.

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APPENDIX

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SURVEY QUESTIONNAIRE

Introduction

Senior Researchers from the Technical and Vocational Education (TVE) department, Faculty of Science and Technical Education (FSTE), Islamic University of Technology (IUT) are conducting a research study in the area of Technical and Vocational education and Training (TVET) titled **"Skills gap assessment between TVET institutes and industries of Bangladesh: Electronics Industries perception".**

Your response will strictly be used only for the research purposes and will be treated with strict confidentiality (Your name and identity will always be kept confidential).

Please note that your honest response will have a significant impact on this research project and will be high appreciated.

Terminologies Used

TVET: Technical and Vocational Education Training

In this project, TVET means the training provider by the government, NGO, international agency, industries and institutions with the aim of equipping trainees with practical skills, attitudes, understanding and knowledge (competencies) relating to occupations in various sectors of economic life (low and mid-level skilled worker).

Your response will strictly be used only for the research purposes and will be treated with strict confidentiality (Your name and identity will always be kept confidential).

Note: ***TVET/Vocational Education*** *is used interchangeably in this questionnaire.*

In this study**, skilled workers** mean the graduates who completed skilled training (formal training (six months to three/four years) from any technical and vocational education and training (TVET) sectors. Those who graduated from engineering universities will not be considered as skilled workers.

Section A: General Information

Please choose the best answer that applies to you and circle one correct letter (A, B, C, D or E)

1. What is your Job title?
    A. Proprietor/Owner
    B. CEO/ Chief Executive / Managing Director / General Manager
    C. Operations Manager
    D. Human Resource / Employee Relations Manager
    E. Other (please Specify)…….

2. Please describe the main operational activities of your organization. What do you produce?

……
……
……

3. Approximately how many employees (Skilled workers) are currently working?

……
……..

Section B: Research questions

In response to questions in this section, please consider the current and potential future skills needs of your workplace.

[Strongly Agree **(SA)**; Agree **(A)**; No option **(N)**; Disagree **(DA)**, Strongly Disagree **(SDA)**]

S/No	ITEMS	SA	A	N	DA	SDA
1	We have a lack of skilled workers in industries					
2	The graduates from TVET sectors do not have adequate skills for current workplace (industries)					
3	Industries are working jointly with TVET institutions to produce competent skilled workers					
4	The industry has been organizing and hosting internship to provide TVET students with hands on skills					
5	Industry sends staff overseas for field training so as to equip them with up-to-date skills					
6	The industry provides carrier guidance to students of vocational institutions so as to prepare them for future workforce					

7	There is a joint assessment of students by industry and institutions					
8	The industry has partnership with institutions which provides immediate employments					
9	Both vocational institutions and industry collaboratively organize exhibitions to motivate young unemployed people					
10	The industry is consulted during curriculum development for vocational institutions to improve current skill training					
11	The industry is providing funds and scholarships to the poor and/or disadvantaged people for skill training for future employment					
12	Industry provides short loans for start-ups for poor people					
13	The industry offer on-job training to poor families					
14	Female Skilled workers face higher level of unemployment compared to male					

Section C: Open ended questions

Is there any other skills needed for your organization?

……
……
……
……

Please share with us any other possible gap between vocational education and the need in the labor market?

……
……
……
……
……

Is there any other effort in skill acquisition towards poverty reduction or attracting poor students towards skilled training?

……
……
……
……
……

Thanks for your maximum cooperation,
Kind Regards

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Check List

Please tick or mark the skills that are lacking in most of newly recruited employees (especially from Vocational institutions) or are already employees (with vocational education background)?

Domains	Subdomain	Skill set	
Cognitive Domain	Communication	Diligence ☐	Motivation & discipline ☐
		Quest for knowledge ☐	Conceptual understanding ☐
		Voluntarism ☐	Analyze & solve complex Problems ☐
		Aptitude ☐	Loyalty ☐
		Good Communication skills ☐	Sincerity ☐
	Leadership	Willingness to learn ☐	Interpersonal skills ☐
		Leadership ☐	Team work and social interaction ☐
		Diligence and hardworking ☐	Adaptability ☐
		Time management ☐	Influencing skills ☐
		Multitasking ☐	Positive thinking and attitude ☐
		Working with others ☐	Understanding ☐
		Self-management& Competiveness ☐	Values and ethics ☐
Specific and technical skills		Problem solving ☐	Hands-on experience ☐
		Physical fitness and stamina ☐	Language ☐
		ICT ☐	Negotiation skills ☐
		Secretarial skills ☐	
		Accounting skills ☐	