Research Report

TRACER STUDY ON POLYTECHNIC GRADUATES TO UNEARTH EFFECTIVENESS, EFFICIENCY AND CHALLENGES OF THE DIPLOMA IN ENGINEERING PROGRAM IN BANGLADESH

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Tracer Study on Polytechnic Graduates to Unearth Effectiveness, Efficiency and Challenges of the Diploma in Engineering Program in Bangladesh

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ABSTRACT

Considering the importance of technical skills to increase productivity, income generation and employment rate, technical education is offered through both government and non-government polytechnic institutes throughout the country. However, there is not enough empirical data regarding effectiveness, efficiency and involved challenges of the program in Bangladesh, and in response to the data gap, this study aimed to explore those factors in polytechnic institutes from the perspective of current and future market driven employability and income generation skills of the diploma graduates. Thus a tracer study following mixed method approach was conducted where total 272 graduates were surveyed along with conducting FGDs with some selected graduates and interview with head of the polytechnic institutes, instructors/trainers of the institutes, and employers.

The findings showed that graduates responded quite positively about the relevance of training contents and quality of technical skills trainings at polytechnics. The fact that the responses from graduates and employers are consistent with the students' positive views suggests that training programs at polytechnics are indeed meeting the basic technical skills demand of industries. Despite the generally positive responses towards the quality and relevance of training programs, graduates seem to see weaknesses in the institutions and trainers capacity of training delivery along with lack of modern equipment and tools for training. They also found lacking in providing soft skills such as communication skills and problem-solving skills as well as industry-academia linkage to support graduates' learning and employment opportunities. In case of income and employment outcome, diploma graduates' performance found considerably below expectation where only about three-fifth of the polytechnic graduates found full-time or part-time job, and around 40 percent of the graduates remained unemployed. Only 4 percent employed graduates found self-employed. Among the graduates, employment shares of female and rural graduates are faring far worse than their male and urban peers. Income level of the diploma graduates are also not satisfactory. On average a polytechnic graduate earned BDT 11,859 monthly and like employment opportunity female and rural graduates earned less than their male and urban counterparts. Apparently technical diploma certificate would not be adequate in many cases to find the kind of jobs that polytechnic graduates are typically looking for. As a result, 29 percent of polytechnic graduates straight moved on to further education and training without first trying to find jobs, which would further stretch out the period of their de facto unemployment and would create greater financial pressure on their families.

To response the findings, there need to create a meaningful career pathway for diploma students by incorporating a flexible demand-driven curriculum, upgrading the technical and teaching skills of teachers as well as equipment and facilities, strengthening partnership with industry in an effort to improve the quality of education and promote graduates' employment., expanding and improving job placement support services to students at the institution level, forging stronger ties with industry communities who would accept female technical specialists and technicians to boost job outcomes for female graduates, providing special training programs on entrepreneurship and business management for polytechnic students to encourage entrepreneurship and self-employment, and strengthening the evidence-base in technical education to drive evidence-based discussion and policy making towards more and better employment.

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CHAPTER ONE: INTRODUCTION

1.1 BACKROUND

Bangladesh is one of the fastest growing economies of the world. It has experienced over 6% of gross domestic product (GDP) growth for more than a decade (Ministry of Finance [MoF], 2018). Its recent gradation as lower middle-income country (LMIC) status and vision 2021 requires more investment especially in human capital (e.g. education). Despite fastest growing of Bangladesh's economy, critics view this progress as unsustainable and term this as stagnant growth trap. Therefore, handsome amount of investment is required to get momentum towards a higher GDP growth and sustainable development. This refers to two types of investments: physical and human capital investment. Human capital investment is the critical factor for the growth and development of a country (Bureau of Economic Research, University of Dhaka [BERDU], 2018).

Over the years investment on human capital has increased in both public and private sectors. However, the allocations are lagging behind the actual requirement. Currently, education sector of Bangladesh is characterized by non-unified, lack of bridge between academics and industry, dismal focus on technical and vocational education and lack luster research outlook. As a result, skill mismatch problem is acute and inadequate labor training producing low-skilled labors which ultimately hurting our potential growth and development.

According to a study by Bureau of Economic Research (BERDU, 2018) major challenges of education sector of Bangladesh are the lack of quality education, lack of scientific and technical education, dropout and equity issues, access and gender discrimination and lack of skill labor. The government of Bangladesh has articulated its commitment to overcome these challenges in its National Education Policy 2010 and National Skill Development Policy 2011. These policies are already in action for achieving certain goals related to education and skill. The education and skill policies are particularly designed to produce skilled human resources that will cater the future need of dexterous graduates. These policies emphasize greater importance in imparting technical and vocational training and bring more secondary school enrolment into the fold of technical and vocational education & training. Under the National Skills Development Policy 2011, the National Technical and Vocational Qualifications Framework (NTVQF) has been designed to improve the quality and consistency of nationally recognized qualifications and/or certifications. It is also providing a new benchmark for the international recognition of the skills and knowledge of Bangladeshi workers. The Skills and Training Enhancement Project (STEP) has been implemented to improve the quality of training and employability of trainees. Government envisioned various strategic plans to improve vocational and technical education.

According to Education Policy 2010 highest importance will be given to equip students with technical knowledge so that they can handle the newer challenges of global change and can adapt themselves with newer technology. Science, technology and information will be vital to transform them into competent workforce what we call manpower. Graduates of technical and vocational education will be able to meet the contemporary labor market needs. It will ultimately contribute to the economic transformation of the country (Ministry of Education [MoE], 2010). This policy has articulated the definite aims and objectives which focuses the following aspects: -

- Creating competent manpower with diverse skill to meet various sectoral demand of home and abroad,
- Building skilled manpower to face newer challenges of globalized world and to open the window of opportunities for further economic development and dignity of their service,
- Generating more foreign currency through export of skilled labors through diverse economic activities.

According to Seventh Five Year Plan (2016-2020) following programs are being undertaken to give a new outlook to technical and vocational education and training (TVET):

1. To strategize plan of action a draft national strategy for promotion of gender equality in technical and vocational education and training (TVET) 2012 has been developed;
2. Introduction of technical and vocational courses in secondary, higher secondary and madrasa levels;
3. Introduction of double shift in the existing technical schools, colleges and polytechnic institutes;
4. Undertaken a project to establish 100 Technical Schools (TS) at Upazila (i.e., sub-district) level;
5. A project named "Bangladesh - Skills for Employment and Productivity (B-SEP)" has been introduced;
6. Recognition of Prior Learning (RPL);
7. Improved access for under-represented groups;
8. Industry Training & Workforce Development (ITWD).

Some 21 Polytechnic Institutes are being established in 21 districts along with 389 technical schools and colleges at the upazila level. 100 technical schools are being established through a project for conveying appropriate and rural based technologies/trades in SSC vocational courses at the upazila level (Bangladesh Technical Education Board [BTEB], 2018a).

In Bangladesh, formal TVET consists of SSC, HSC and Diploma courses. The Directorate of Technical Education (DTE) and the Bangladesh Technical Education Board (BTEB) oversee vocational and technical education (VTE) provided by both public and private institutions. These institutions offer programs include time-bound, institution-based and graded training with formal certification (BTEB, 2016).

Government of Bangladesh has designed National Technical & Vocational Qualifications Framework (NTVQF) to provide a new benchmark for the international recognition of the skills and knowledge. Moreover, Bangladesh government has introduced Competency Based Industry Sector Standards & Qualifications that will be responsive to the present and future industry needs and will move to implement a competency based training and assessment. Additionally, Bangladesh Skills Quality Assurance System has been introduced to serve new national quality standards to ensure nationally consistent and high-quality training and assessment services (BTEB, 2018b).

According to Bangladesh Technical Education Board (BTEB) despite government emphasize on TVET, the enrolment rate is still very low and it was only 13.11 percent for overall average for SSC and HSC level compare to total students of those level (BTEB, 2016). In case of Diploma

program in Polytechnic institutes, annually around 50 thousands students get the diploma (BTEB, 2019). In personal conversation with the diploma graduates, the researchers learnt that the program lacks effectiveness and efficiency to produce market driven graduates. They also mentioned some other challenges those are involved with low rate of enrolment in the program. Therefore a tracer study is aimed to explore the effectiveness, effeminacy and challenges of the diploma program in polytechnic institutes in Bangladesh.

1.2 STATEMENT OF THE PROBLEM

The rapid development of the current working world needs proficient workers mainly in fields which involved latest technologies. According to Bangladesh Bureau of Statistics (BBS) the number of workforce in Bangladesh has increased up to 6.8 million where there is an increase from 56.7 million in the year 2010 to 63.5 million in the year 2016-17 which shows an average of 1.0 percent increase per year. The unemployment level remains at the average of 4.2% (BBS, 2018). Different studies and policy reports by national and international organizations suggests that TVET could increase the level of productivity and income generation level along with reduction of unemployment rate. Technical skills are highly recommended in this regard and technical education is expanding gradually in the country where both public and private shares are increasing day by day. However, the projected rate of TVET enrolment is not more than 20% at the end of 2020 though most of the policy level organizations and experts including ILO suggests for more than 50 percent of enrolment in TVET (BTEB, 2018b).

Studies suggest that effectiveness and efficiency of is the key factors to attract students and trainees towards TVET. Appropriate curriculum content, learning facilities and available resources in institutions are also a factors that influences trainers' production quality. Mismatch of skills occurred when there are imbalances in the curriculum content as the produced workforce does not match with industrial needs and the suitability of certain occupations in term of the skills that they are required to have (Mohd Yahya, 2003). Nonetheless, so far, there is no empirical data regarding effectiveness, efficiency and involved challenges of the program in Bangladesh. Therefore the problem of this study was to explore how much effective and efficient the diploma program to create employability skills among the graduates of polytechnic institutes in Bangladesh.

1.3 IMPORTANCE AND RATIONALE OF THE STUDY

It is important to conduct a tracer study on diploma graduates of polytechnic institutes to explore the effectiveness and efficiency of the program as well as to know the involved challenges to generate supportive policy and documenting the success of the program. There are around 439 public and private polytechnic institutes where 2,50,077 students are studying on different technologies (BANBEIS, 2019) this very small number compare to total number of HSC level students in Bangladesh. According to the researcher's personal experience, one of the main reason behind this lower enrolment rate is that most of the people are not informed how much the program is effective and efficient to create employability skills among the diploma graduates. Some also alleged that there has no effective academia and industry linkage in the sector and thus graduates remain unemployed. Some informed that most of the institutes lacks adequate learning materials and resources for learning these technical skills. Hence, there need to conduct a survey among the diploma graduates of polytechnic institutes along with consultation with the potential job provider.

Moreover, the relevance of the curriculum content with the current and future job market need to be explored for further revision of the program. In general, it can be said that this study will help to reveal the status of diploma graduates, effectiveness and efficiency of the program to generate employability skills and underlying challenges of the program that will ultimately provide important policy direction for further shaping of technical education program in Bangladesh.

1.4 RESEARCH OBJECTIVES

As mentioned earlier, this study aimed to explore the effectiveness, effeminacy and challenges of the diploma program in polytechnic institutes in Bangladesh. In order to do this, three subsidiary research questions led this study:

1. What is the current status of diploma graduates of polytechnic institutes regarding employment and income generation?
2. How effectively and efficiently the program is designed and delivered to create market driven skills among the graduates?
3. What are the challenges the diploma graduates faces regarding their employment in the industry?

1.5 SCOPES AND LIMITATIONS OF THE STUDY

The research was designed to conduct a tracer study on the diploma graduates of Bangladesh Technical Education Board to explore the effectiveness, efficiency and challenges of the diploma program. Here the term scope was used to reveal the relevance and suitability of the curriculum contents in relation with market driven skill needs. Efficiency measured the delivery modality and resources used for skill development compare to market needs. To measure those indicators the study explored how much the program creates employability skills among the graduates and their income generation level. Moreover, it checked industry-academia linkage and the acceptance of the graduates in current and future job market. On the contrary, what challenges involve against effectiveness and efficiency of the program were explored. Hence it tried to identify the challenges underlying in program design and curriculum content, challenges regarding program delivery and resources used, challenges involved in implementation process. At the end, the study tried to draw some recommendation based on study findings. To do so, the study conducted a graduate survey, consult with technical education providers and experts and job providers. Moreover, the study reviewed the curriculum contents and program delivery modality.

Apart from the scopes, few limitations were involved in this study -

- Identification of graduates in tracer study is always challenging, especially who leaved institutes some 5 to 10 years back. Thus there was a high possibility to sampling error and unintentional biasness as some sample cannot be reached though after repeated try. Moreover, the graduate survey could not be done face to face due to COVID-19 situation and depended on online survey where technology enabled and active graduates were possible to reach through the survey. It also limited the scope to reach the expected number of respondents from different sample categories, regional areas, technologies and genders.
- The impact measured by this study could be the results of interventions other than program which can’t be separated or substantiated.

- Perceptions of the respondents could have added value to this study, which could depict the societal and cultural hindrance that impedes potential learners from accessing in technical education.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This part of the report reviewed relevant literatures on technical and vocational education in Bangladesh. It includes the literatures and information those are relevant to this study for giving relevant background information as well as current practice in the field for the reader so that they can relate the study findings further. Moreover, it aimed to discuss the findings and verify in light of the literatures. It not only gave an orientation about the TVET and in specific technical education of the country, but also shaped the methodology of the study, helped data exploration and presentation with a validation by the exiting literatures relevant to the study.

2.2 TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING AND ITS IMPORTANCE

There are 160 million people live in 147570 square kilometer area of Bangladesh. Among them 4.52 million are found as Higher Secondary aged population (16-17 Years) in 2014 (BANBEIS, 2014). It has been found in Bangladesh Education Statistics-2014, BANBEIS that the Gross Enrollment Rate and Net Enrollment Rate of secondary level education are 69.23% and 62.25% respectively. Similarly, it has also been found that the Gross Enrollment Rate and Net Enrollment of higher secondary level education are 46.61% and 33.16% respectively in the year 2014. In addition, it has also been found that the Dropout Rate of secondary and higher secondary level education are 41.59% and 21.37% respectively in the year 2014.

Bangladesh is going to face skill shortages in different sectors while Bangladesh has many potential workforces to develop to ensure timely supply in labor market. Skills development remains out of reach of these potential workforces as most of them having low level of education so that they could not enter into their desired formal skills training programs as well as they cannot enter into the formal employment market due to lack of national recognition of their skills (BTEB, 2018b). This means people who could not afford to continue general education had little option but to find a low paid and low-skilled job in the informal job market. As a result huge potential workforce was deprived of the opportunity to attain formal skills training and job pursuing decent work. The demand for skilled human resources continues to grow. TVET is the only source in Bangladesh by which we can have economic developments. We need to make our manpower with having global competitiveness. We need to introduce courses to match industry need and opportunities of demographic dividend to be harnessed. In this regard strategic planning is required to develop TVET system.

A large number of people of Secondary and Higher secondary Schooling group is out of Schooling. Technical and Vocational Education and Training (TVET) is one and only educational mechanism to convert these population to employable workforce to contribute to develop the national economy of our country. The major targets of expanding TVET in our country as follows-

- Skilled workers to satisfy the growing needs of industry;
- A high level means to facilitate job for unemployed youth and widespread underemployment;
- Competencies need to find employment;

- Match the requirements of the private sector;
- Skills for the job market in line with labor market demands;
- Understand the attitudes expected in the industry area;
- Gain insights into the kind of career;
- Make informed decisions about further training and study;
- Become more employable;
- To be better equipped for business and employment opportunities;
- Aims to improve socio-economic conditions create jobs and alleviate poverty as a key element of any policy initiatives
- Promote industrial linkages in the skill training delivery to produce young skilled workforce for the market needs;

National Education Policy, 2010 states the three specific objectives of Technical and Vocational Education and Training (TVET) to ensure skills of high standard at different areas and levels of education so that learners can successfully compete at the global context (MoE, 2010). The specific objectives of TVET include the followings:

1. to build up skilled manpower at a fast pace to create opportunities of economic development and to increase dignity of labour;
2. to create wide-ranging employment opportunities through export of skilled manpower and to enhance foreign currency earnings;
3. to increase competent manpower in diverse sectors including Information and Communication Technology (ICT) at a fast pace keeping in mind the national and international demands.

National Skill Development Policy, 2011 aims to improve the development of human resources by establishing an expanded and reformed system of skills development that integrates and applies to the full range of formal and non-formal vocational, technical and skills-based education and training for employment and/or self-employment (MoE, 2011). The National Technical and Vocational Qualifications Framework (NTVQF) is the central mechanism designed to:

- enable more effective planning, coordination and monitoring of skill development activities by different ministries, donors, industry and public and private providers;
- establish more flexible and responsive delivery mechanisms that better service the needs of labor markets, individuals and the community at large;
- improve access to skills development for various groups of citizens including women and people with disabilities, encourage participation in skills development by industry, organizations, employers and workers and improve skills acquisition in communities;
- improve the alignment of formal and non-formal training programs with industry requirements;

- improve the quality and consistency of nationally recognized qualifications;
- improve the quality and relevance of skills development in Bangladesh;
- increase options for students by broadening program and progression pathways;
- introduce consistent naming of credentials for formal and non-formal skills based education and training;
- provide formal recognition of workplace skills obtained in both the formal and informal economies;
- provide high quality skill outcomes to maintain individuals' employability and increase their productivity; and
- support lifelong learning by providing recognized pathways for workers to raise the level of their knowledge and skills throughout their working life and beyond.

2.3 NATIONAL TECHNICAL AND VOCATIONAL QUALIFICATION FRAMEWORK

As per National Skills Development Policy (NSDP) 2011, Table 1 shows the National Technical and Vocational Qualification Framework (NTVQF) which consists of 6 skill levels and 2 Pre-vocational levels for defining labor forces on the basis of their knowledge, skills and attitude (KSA).

Table 1: National technical and vocational qualification framework in Bangladesh

NTVQF Level	**Pre-Vocational Education**	**Vocational Education**	**Technical Education**	**Job Classification**
NTVQF 6			Diploma in Engineering or Equivalent	Middle Level Manager/ Sub Assistant Engr. etc.
NTVQF 5		National Skill Certificate 5 (NSC 5)		Highly Skilled Worker/ Supervisor
NTVQF 4		National Skill Certificate 4 (NSC 4)		Skilled Worker
NTVQF 3		National Skill Certificate 3 (NSC 3)		Semi-Skilled Worker
NTVQF 2		National Skill Certificate 2 (NSC 2)		Basic-Skilled Worker
NTVQF 1		National Skill Certificate 1 (NSC 1)		Basic Worker
Pre-Voc 2	National Pre-vocation Certificate 2 (NPVC 2)			Pre-vocational Trainee

Pre-Voc 1	National Pre-vocation Certificate 1 (NPVC 1)			Pre-vocational Trainee

As per Article 20.17 of the NSDP 2011, Bangladesh Technical Education Board (BTEB) has been entrusted with the responsibility for the implementation of the National Technical & Vocational Qualification Framework (NTVQF) with the support of the National Skills Development Council Secretariat (NSDCS), Industry Skills Councils (ISCs) and Technical & Vocational Education & Training (TVET) providers. NTVQF standards qualification consists of 6 skill levels plus 2 Pre-vocational (MoE, 2011). Since 2012 the BTEB has approved 51occupations tuned to NTVQF with 141 standards covering from Pre-vocational to skill levels 5. A total of 43 registered training organizations and assessment centers (Public = 19, Private = 11 and NGO =13) have been established and functionalized during 1st phase action plan of 3 years duration from 2012 – 2015 which is increased to 1861 at present. But only 25 institutes among those 43 organizations has already produced 9,554 NTVQF standard qualification classified graduates through BTEB. This comprises Pre-voc-2 (6,516), Level-1 (2,340), Level-2 (236), Level-3 (08) and NC-IV (454) including trainers and industry assessors. It seems that most of these graduates are employed in the industries and institutes of the different sectors in the employment markets. Moreover, 130 trainers and 324 industry assessors have NTVQF standard qualifications (BTEB, 2016). These graduates acquired skills through formal or informal training.

2.4 PATHWAY OF COMPETENCY BASED TRAINING AND ASSESSMENT

The complete pathway of Competency Based Training & Assessment (CBT&A) system is shown in the Figure 1.

Figure 1: Pathway of training, assessment and certification

In order to accelerate the implementation of NTVQF standards as per decision of the Executive Committee of National Skills Development Council (EC, NSDC), BTEB has started the preparation of the 2nd phase Action Plan of 5 years duration from 2016 - 2020. The 2nd phase Action Plan has in-built project as the part of the strategic plan being prepared that spreads up to 2030, the year of the least dependency of the population of Bangladesh. The 2nd Phase Action Plan within the frame of the overall responsibility of the BTEB entrusted by the NSDP covers wider aspects of the different sector of the economy, BTEB's ongoing selected courses for the translation tuned to NTVQF standards up to skill level 6 and that may be leading to Bangladesh Qualification Framework (BQF) raising the standards up to level 10 (A. Rafique, 2017).

2.5 TYPES OF TRAINING PROVIDED

According to BTEB (2016) there are mainly two types of TVET in our country, such as-

A. Formal Training (28 curriculum)

B. Informal and Non-Formal Training

2.5.1 Formal Training under BTEB

1. Short Course
    a. Basic Trade Course (360 hours, 95 trades)
    b. CBT&A Course (51 Occupations)
2. Secondary Level
    a. SSC Vocational Course (31 trades)
    b. Dakhil (Vocational) offered by Madrasahs
3. Higher Secondary Level
    a. HSC (Vocational) Course (14 trades)
    b. HSC (Business Management)
    c. Diploma in Commerce
4. Diploma Level
    a. Diploma in Engineering Course (34 technologies)
    b. Diploma in Textile Engineering Course (3 technologies)
    c. Diploma in Agriculture Course
    d. Diploma in Fisheries Course
    e. Diploma in Forestry Course
    f. Diploma in Medical Technology Course (8 technologies)
5. Others Professional Level Courses

2.5.2 Informal and Non Formal Training

- 23 ministries are conducting skill training and maximum of those graduates are not certified by BTEB.
- Only SSC (vocational) and other SSC status vocational course conducted by some of those ministries are affiliated with BTEB. Rests are not affiliated with BTEB.
- Industry and Private organization also conduct skill training not affiliated with BTEB.
- Some NGOs are conducting training not affiliated with BTEB.

Initiative has taken for informal and CBT&A courses conducted by other agencies to bring under BTEB certification.

According BANBEIS (2019) there are 439 polytechnic institutes in Bangladesh where number of public and private institutes are 52 and 387 respectively. In those institutes 250770 students were enrolled in 2018 where number of girl students were 41,614 (16.59%) only. The divisional distribution of the institutions and students are as given below:

Table-2: Divisional distribution of polytechnic institute and students

Parameter	Manage. Type	Divisional distribution of polytechnic institute and students								
		Barisal	Chittag.	Dhaka	Khulna	Rajsh.	Rangp.	Sylhet	Mymen	Total
Number of Polytechnic institute	Public	4	12	9	8	8	5	3	3	52
	Private	34	42	101	54	64	48	13	31	387
	Total	38	54	110	62	72	53	16	34	439
Number of student	Public	11076	25475	32607	11367	16713	16703	4818	12909	131668
	Private	6534	14274	34445	25351	17943	10850	1053	8652	119102
	Total	17610	39749	67052	36718	34656	27553	5871	21561	250770

However according to BTEB (2016) around 50 thousands students graduated annually from these institutes that comprises around 100 thousands diploma graduates in assessment year 2016 and 2017.

2.6 DIPLOMA COURSES OFFERED IN POLYTECHNIC INSTITUTES

There are variety of diploma courses which are then segregated in different technologies. A list of diploma courses and their different types of institutes are given below:

List of diploma courses *(Source: BTEB, 2016)*

a. Diploma in Engineering Course (34 technologies) - Institutes Namely:

i. Govt. Polytechnic and Mono-technic Institutes;

ii. Private Polytechnic Institutes;

b. Diploma in Textile Engineering Course (3 technologies) - Institutes Namely:

i. Govt. Textile Institutes;

ii. Private Polytechnic & Textile Institutes;

c. Diploma in Agriculture Course - Institutes Namely:

i. Govt. Agricultural Training Institutes;

ii. Private Agricultural Training Institutes;

d. Diploma in Fisheries Course - Institutes Namely:

i. Govt. Fisheries Training Institute;

ii. Private Agricultural & Fisheries Training Institutes;

e. Diploma in Forestry Course - Institutes Namely:

i. Govt. Forestry Training Institute;

f. Diploma in Medical Technology Course (8 technologies) - Institutes Namely:

ii. Private Medical Training Institutes;

From the above list, only diploma in engineering graduates will be reached though this study those who are served through public and private polytechnic institutes. There 34 technologies are offered under this diploma in engineering course in 439 private and public polytechnic institutes.

2.7 EMPLOYMENT, INCOME AND SKILLS STATUS OF DIPLOMA GRADUATES

According to relevant literature, employment and income generation of the diploma graduates are not satisfactory. According to Washington-based multilateral lender's findings in the report 'Bangladesh Development Update October 2019: Tertiary Education and Job Skills, graduate tracking surveys found that around 75 percent of the polytechnic graduates, 30 percent of the college graduates and 20 percent of the university graduates have experienced joblessness lasting more than a year (The Daily Star, 11 October 2019). According to the report, employed tertiary graduates generally earn reasonable salaries, with university and male graduates faring better. Most tertiary graduates make at least Tk 11,000 per month ($138) within one or two years after graduation. This level of income is comparable to the average national monthly earnings. However, the return on qualification is not uniform. University graduates earn significantly more than graduates from polytechnics. On average, their earnings are three times as high as that of polytechnic graduates. A university graduate earns on average around Tk 29,932 per month ($375) with no significant gender wage gap. On the other hand, gender wage gaps are significant among employed graduates from polytechnics, especially among those who are not full-time permanent employees.

The report showed that, the high incidence of prolonged unemployment among graduates raises concerns about the job readiness and relevance of skills that tertiary educational institution in Bangladesh impart to their students. Labor market surveys have consistently demonstrated that employers struggle to fill job vacancies for highly-skilled positions such as professionals, technicians and managers: around 69 percent of employers reported a shortage of skilled applicants for professional positions. Employers in Bangladesh are seeking higher-order cognitive skills and soft skills, the report said. They rank three higher-order cognitive and soft skills as most relevant for current work environment: problem-solving and independent thinking; work attitude; and positive personality. However, they struggle to find graduates with these skills. Around 80 percent of the employers of polytechnic graduates reported that problem-solving skills is a key area where polytechnics need to train students better. Moreover, the employers would like the polytechnic institutes to strengthen skills training on information and communication technology, English and higher-order thinking such as communication, problem-solving and team work.

To bridge the demand and supply gap, investments in skills training, equitable access for female and poor students, public funding mechanisms to develop market-relevant skills and an effective regulatory and accountability framework are needed, said the report. As Bangladesh moves towards upper middle-income status skills upgradation will become important.

CHAPTER THREE: METHODOLOGY

3.1 RESEARCH DESIGN

As a part of evaluating the diploma program of polytechnic institutes, we employed a tracer study approach as an assessment tool. Here, we have discussed the data collection process and methodology used for this study to verify the effectiveness and efficiency of diploma program of Bangladesh Technical Education Board (BTEB). With a view to implementing quality assessment of the program, quality research is very important. All we know that quality research depends on the quality data collected from the appropriate field. Therefore, data collection is extremely important to establish any valid empirical evidence. Data collection process sometimes severely suffers from inappropriate question to respondents, difficulty of understanding question, failing to explain purpose to the respondents, moral hazard problem of enumerators etc. In these considerations, data collection needs to be done under close supervision and proper guidance. All these were kept in our minds during the data collection for this tracer study.

ILO Thesaurus defines tracer study as an assessment tool which refers to "impact on target groups is traced back to specific elements of a project or program so that effective and ineffective project components may be defined". In addition, graduate survey results are important for examining the relationship between education and work (Schomburg, 2003). Furthermore, Millington (2013) and Shongwe et al. (2011) describes quantitative structural data on employment and career, the character of work and related competencies, and information on the professional orientation and experiences of their graduates. During the course of a tracer study, the collected data reveal very important aspects of the quality of education. By conducting a survey on the cohort of graduates from a specific institution, profession, discipline, level of education, employment characteristics, competencies and skills development, a comparative analysis based on the information collected can be used by the graduate's alma mater and other education stakeholders for curriculum development and other emerging reforms. This tracer study is intended to collect the following information from the diploma graduate respondents:

- Personal data,
- Educational background,
- Employment characteristics,
- Employment history,
- Professional achievement,
- Level of Satisfaction of the graduates,
- Own assessment about diploma program delivery modality,
- Preferred sector where they like to be employed,
- Challenges they face while in job,
- Their strength as diploma graduates and
- Transition

This study also focuses on covering the following issues:

- Satisfaction with the institutional services, learning environments and facilities;
- Adequacy of skills learned and

- Adequacy and relevance of curricular program in terms of competencies etc.

As this tracer study aimed to explore the effectiveness, efficiency and challenges of the diploma course from graduates' perspectives, so a wider picture regarding their employment and income status along with their education and training and relevant support found in polytechnic institutes was necessary. Thus it tries capture all relevant source of information that would help to generate the findings and then draw relevant conclusion.

3.2 SAMPLING

From methodological viewpoint, the sample of tracer study should be carried out on the graduates who passed from that institutions in near past. To be precise it should be at least 2 or 3 years back from present time. However, it should not be too long as during the course of time people may change their skill by attaining different kinds of training or degree. Therefore, we have chosen 2012 to 2016 periods of graduates of diploma courses under BTEB as our target respondent.

The representative sample size for this study was determined by using following formula $n= Z^2pq /d^2$ to calculate the sample number for graduate survey. For this study graduates were selected from the different divisions. It was done by considering 90% confidence interval and 10% margin of error. Proportionate random sampling strategy were followed to determine the number of sample from each division.

By using the formula of sample size determination, we estimated our sample size of $n= Z^2pq /d^2 = (1.65)^2*(.5)*(.5)/(.05)^2 = 272$. This sample size comprises male 228 (84%) and female 44 (16%) that represented the gender variation of the diploma graduates of the assessment year. This male-female number maintained the ratio of male-female in our study population. However, for equal distribution the male and female sample resized as 224:48.

Male and female samples were then divided into their weights by divisions. In each division there are many districts, all of them had varying number of graduates. Therefore, we selected 1 district randomly per division. Then from each district we selected at least two institutions. We tried cover maximum number of technologies (subject) from per institute. The sample selection process reported in following table. To capture the trend and to understand whether responses are consistent over time we interviewed the graduates who passed from 2014 to 2018 periods.

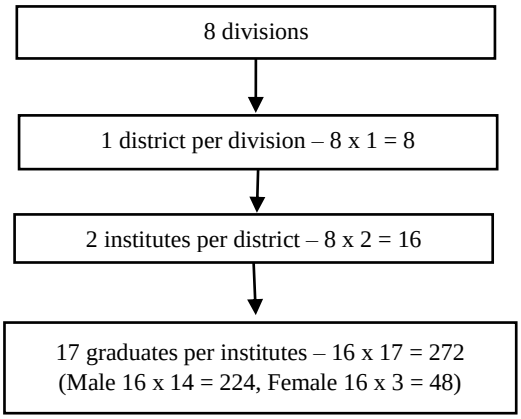

Figure-2: Graph of sampling procedure

3.3 SOURCE OF DATA AND DATA COLLECTION METHOD

This study uses the mixed-method strategy to collect information in regard to the broad and specific objectives of the study. Under the mixed-method strategy, this study uses structured survey questionnaire along with Focus Group Discussions (FGDs) and Key Informant Interviews (KIIS). This tracer study used a structured survey questionnaire that mainly comprises two sections. Section one aims to collect data on Biographical coverage and the section two will focus on Retrospective Evaluation of the Programs.

The survey questionnaire was used to obtain both quantitative and qualitative feedbacks from the graduates about their course-related skills, attitude, reactions and suggestions. Part of this questionnaire uses a rating scale (e.g., Likert Scale) intended to determine the adequacy and relevance of the different course competencies. In addition, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) have also been conducted not only to validate the findings but also to explore the potential aspects in regards to the objectives of the study. From each division, 2 FGDs were intended to conduct on diploma graduates and polytechnic institutes' instructors in order to explore the geographical context and validate the quantitative findings from the overall perspective. However, due to COVID-19 situation, it was reduced in total 2. These were employed to gather the graduates' and instructors' collective experiences while taking major courses including the strengths of the courses and changes that may improve the course and their delivery. For the KIIs, key stakeholders like Instructors, BTEB employees and job providers were interviewed for in-depth understanding of the strength, weaknesses, potentialities and the way forward. For this purpose we have employed open-ended questionnaire.

Under this tracer study we have interviewed the following respondents for assessing the diploma program:

- Diploma graduates
- TVET Providers
- Instructors/Trainers
- Policy Makers
- Employers/Industry representatives

The total sampling procedure along with data collection process is given below table 1.

Table 3: Sample, method and techniques for data collection by the specific objectives

Sources of data	**Data collection tools**	**Sampling technique**	**No. per unit**	**No. of unit**	**Total**
Diploma graduates	Survey Questionnaire	Snowball/convenient sampling	17	16	272 (300)
	FGD schedule	Purposive sampling	2	1 (8-10)	18
Instructors	Interview schedule	Purposive sampling	2	16	32 (39)
TVET Providers/ Institute Heads	Interview schedule	Purposive sampling	1	16	16 (19)

Employer/ Industries	Interview schedule	Purposive sampling	4	8	32 (35)

Due to COVID-19 situation, survey data could not be collected directly from the field. Data collected online where survey was conducted through an online survey tool called Kobo Toolbox, and interviews and FGDs were conducted by using phone conference or video conferencing software like Zoom/Sype/Google Meet. Team leader and other team members themselves conducted these interviews/FGDs.

3.4 TOOLS OF DATA COLLECTION

Data was gathered by using mainly three techniques of data collection and a number of instruments were used for this study. The details are given below:

3.4.1 Survey

Structured questionnaire was developed to know about respondents' opinion regarding their course-related skills, attitude, reactions and suggestions. Part of this survey questionnaire uses a rating scale (e.g., Likert Scale) intended to determine the adequacy and relevance of the different course competencies. The survey questionnaire was used for the diploma graduates who completed diploma program in 2012 to 2016 periods. A set of self-administrated questionnaire form was used where respondents provided their response by their own. It was administrated in online modality as face-to-face modality was not possible due to COVID-19 pandemic.

3.4.2 Interview

Open-ended interview schedules was used to know the necessary information as well as perception of the Instructors on the given topics. During interview, questions were also asked to know about teaching-learning process, program delivery modality, resources available and skills practice students do during their learning in polytechnic institutes. Moreover, the respondents were asked about challenges regarding skill development and implementation of the program. One sets of structured questionnaire was developed and used for this specific group of respondents.

Moreover, the interview was conducted on selected number of TVET providers and policy makers. An interview schedule was enlisted for this purpose and consulted the participants accordingly to gather their opinion on these points. It tried to explore their context to design the course, effectiveness and efficiency of the program to achieve the intent objectives. The respondents were selected based on their expertise in the study field.

Apart from the providers and policy makers, open-ended interview was conducted with the domestic and foreign (recruiting agency) employer/ industry representatives to know their experience about the diploma graduates. Moreover, it seek their expectation from the graduates, how much the graduates are competent to meet their market needs, how effectively the diploma program is designed and delivered to meet present and future needs of the market etc.

3.4.3 Focus Group Discussion

FGD schedules was developed to know about respondents' perception and opinion to validate the findings as well as to explore the potential aspects in regards to the objectives of the study. It was

used to explore the geographical context and validate the quantitative findings from the overall perspective. It was employed to gather the graduates' experiences while taking major courses including the strengths of the courses and changes that may improve the course and their delivery. Selected number of diploma graduates were consulted through focus group discussion in this purpose for deeper understanding on the issue. However, participants of FGD group were different than the respondents of survey questionnaire.

3.5 PILOTING AND REVISION OF THE INSTRUMENTS

The instruments were piloted among small number participant groups who represented the respondents of different groups. However, to reduce the response biases due to the effect of content familiarity, they were be included in the final study sample. Based on the feedback from the pilot testing, the instruments were modified and finalized for employing on the participants of the study.

3.6 METHOD OF DATA ANALYSIS AND DATA PRESENTATION

The methodological approach to this research was designed as quantitative and qualitative in nature, thus data analysis included quantitative and qualitative approach. For quantitative data, statistical analysis was used that mainly used descriptive statistics to describe the basic features e.g. central tendency of data, data deviation of the data. Quantitative data was analyzed by using MS Excel and SPSS 20.

In order to analyze the qualitative data collected from diploma graduates in FGDs, Instructors, TVET provider, policy makers and employers, data-driven thematic analysis was incorporated (Braun and Clarke, 2006). It is a systematic process of reading the data several times in order to come with some words, phrases, sentences and/or paragraphs that researcher can code in purpose of developing some themes or concepts that summarize the similar contents of the data (Braun and Clarke, 2006). In addition, in this process researchers can organize the raw data into some conceptual categories and develop candidate themes or concepts and construct thematic map (Neuman, 2006; Cohen, Braun and Clarke, 2006). Moreover, the major themes were incorporated with some specific sub-themes based on participants' responses regarding specific research objectives where data triangulation were done to merge multiple approaches. Alongside, from the interviews and FGDs with the participants, ideas were emerged which could be analyzed under different themes that make sense. Thematic analysis focuses on identifiable themes and patterns of similar opinions of potential respondents collectively. For this reason, the data-driven thematic approach was followed in this study suggested by Braun and Clarke (2006, p. 87) to undertake the qualitative analysis (see figure 2) part. Data were analyzed in a systematic way that will feed into quantitative findings for explaining provable reason behind quantitative findings and led to convincing conclusions of this study.

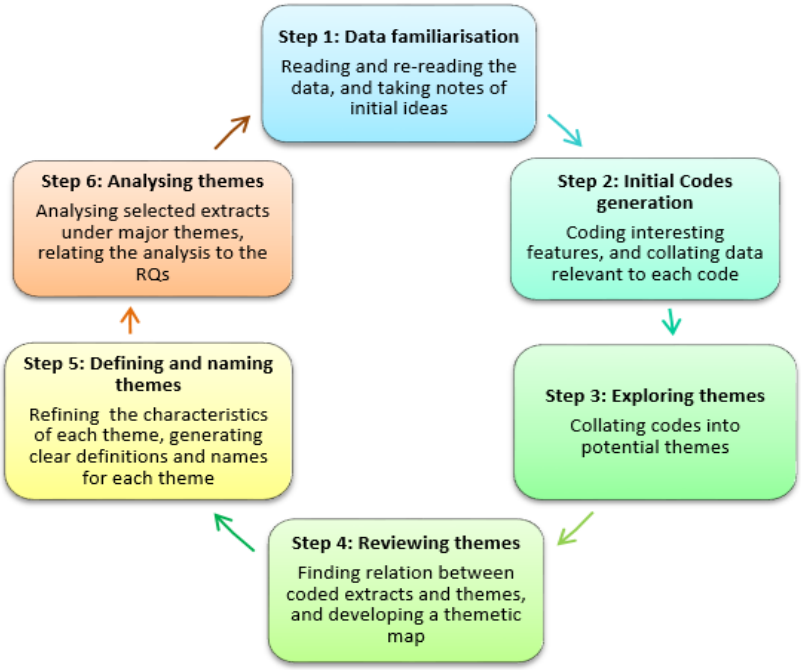

Figure 3: Thematic analysis model

However, mixed method research is endlessly creative and interpretive where interpretations constructed. To do so, we followed few steps after collecting data from the field. We created a field text consisting of field data, then we made notes and interpretations based on that field notes. Subsequently, researchers reinterpreted the text to make sense. Finally, we made public text for the readers based on our qualitative and quantitative analysis by drawing meanings from displayed data (Denzin and Lincoln, 2005).

Analysis and findings of the data presented according to the research objectives of this study. Thus readers need to consider the study objectives to read and understand the analysis and discussion part of the study. Study methodology also led the analysis and presentation of data that would be appreciated if readers can follow.

3.7 QUALITY CONTROL MECHANISM

Quality of the data was ensured in various ways. Firstly, all the desk reviews were done by the team members and each of the reviews, especially findings, was cross-checked. Secondly, the research team attended a day long workshop on data collection so that their understanding on the studied issue been in a similar stage. This helped to ensure same level interpretation and data collection procedures. Besides, among the research team, Team Leader worked as quality control manager to coordinate the whole data collection process, make necessary communication with the respondents and stakeholders and to check the validity and reliability of the information. Finally, as research data demands a saturation point on the discussed topics, so if the study team felt that they should conduct more survey, interviews and FGDs in order to have deeper understanding on the studied issues, they did in sake of ensuring quality data despite the limitation of COVID-19 situation. Besides, all the collected data were checked by the assigned team member and two types of triangulation processes (such as by the respondents and by the methods) were ensured.

3.8 ETHICAL CONSIDERATION

The study tried to follow all the necessary ethical checking. There was nothing in the study that might be harmful for respondents regarding legal or medical ground. No one was forced to provide information. The research objectives were clearly explained to the respondents before data collection. Only those who were willing to provide information were interviewed. The researchers abstained from collecting data from those who denied or show any kind of disinterest in providing information. Thus, verbal as well as written consent of the respondents were taken before collecting data. The researchers was highly committed to the respondents to keep the privacy of their information and source of data as well as put heartiest endeavor to be unbiased in collecting data. A promise of maintaining confidentially was added at the top of each questionnaire, interview schedule and FGD checklists. In addition, all the correspondents between the researchers and respondents were kept confidential.

CHAPTER FOUR: FINDINGS

4.1 BACKGROUND INFORMATION

This part illustrates the demographic information of the respondents of the study. Demographic information includes gender, residence location, institute, educational qualification, studied courses, post-diploma education, professional experience, employment status, industry experience, year of experience, types of industries etc. those are relevant ho this study.

4.1.1 Background information of diploma graduates

Diploma graduates are the highest number of respondents of this study (N=300) among all the respondent categories. The diploma graduates who completed their diploma course during 2012 to 2016 were reached in this study through opinion survey. Background information of the diploma graduates is illustrated below:

Gender, residence and institutional background

Most of the graduate respondents took part in the survey were male. Female share was only 16 percent that is also proportionate to the diploma students of BTEB during the period (***See:*** *Figure 4*). Among the respondents around two-thirds resided in rural area and the rest lived in urban area of the country period (***See:*** *Figure 5*). In case of graduates' shared according to institute type, around three-fourths were from public polytechnic institutes, when others participated from private polytechnics period (***See:*** *Figure 6*).

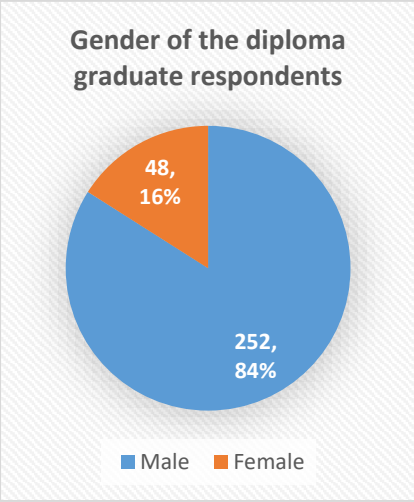

Figure 4: Gender distribution of the respondents

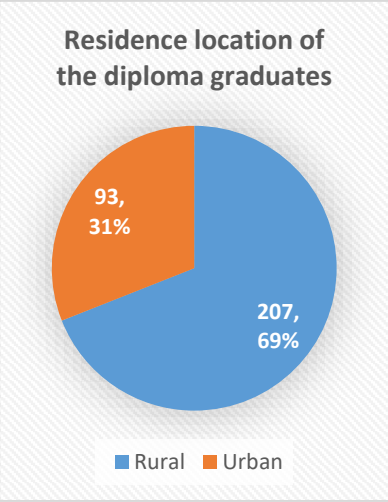

Figure 5: Residence location of the respondents

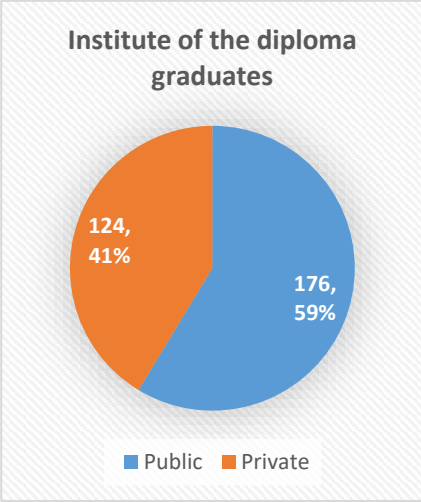

Figure 6: Institute of the diploma graduates

Among the FGD respondents, 14 were from male student and 4 were from female. In case of their residence location, 5 respondents participated from urban area and 11 from rural area. Institutional distribution of the respondents showed that 10 out of 18 people were from public institutes and the rest were from private institutes.

Passing year of the graduates

Among the graduate respondents, there is a gradual increase of the percentage by starting from 16.7 in 2012 to end at 22.7 in 2016 (***See:*** *Figure 7*). However, graduates' participation from the 2015 was slightly reduced compare to the year 2014. Overall, it is seen that graduates who passed recent years, comparatively participated in higher number than that of the previous years. It is always harder to trace the graduate who passed earlier and thus their participation reduced over time.

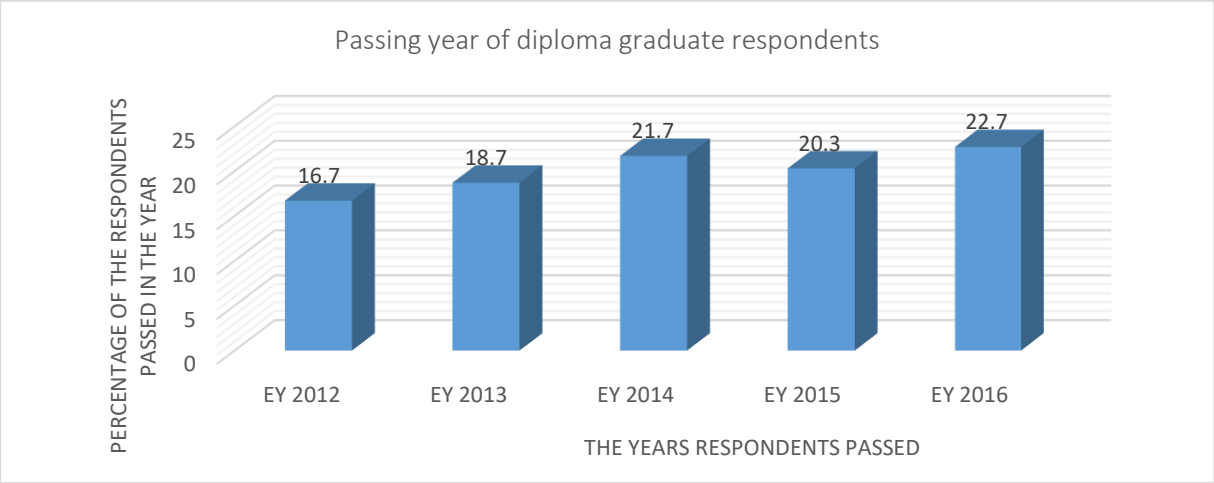

Figure 7: Passing year of diploma graduate respondents

Technology the graduates studied

Among 37 technologies of diploma in engineering program, graduates participated from 16 technologies (***See:*** *Figure 8*). Other respondents could not be reaches for depending on online survey instead of face-to-face survey due to COVID-19 situation. Participation of the respondents was the highest from the Civil technology (10) and lowest from the Ceramics technology and Marine technology (10). Overall, male participation from all the technologies was higher than that of their female counterpart.

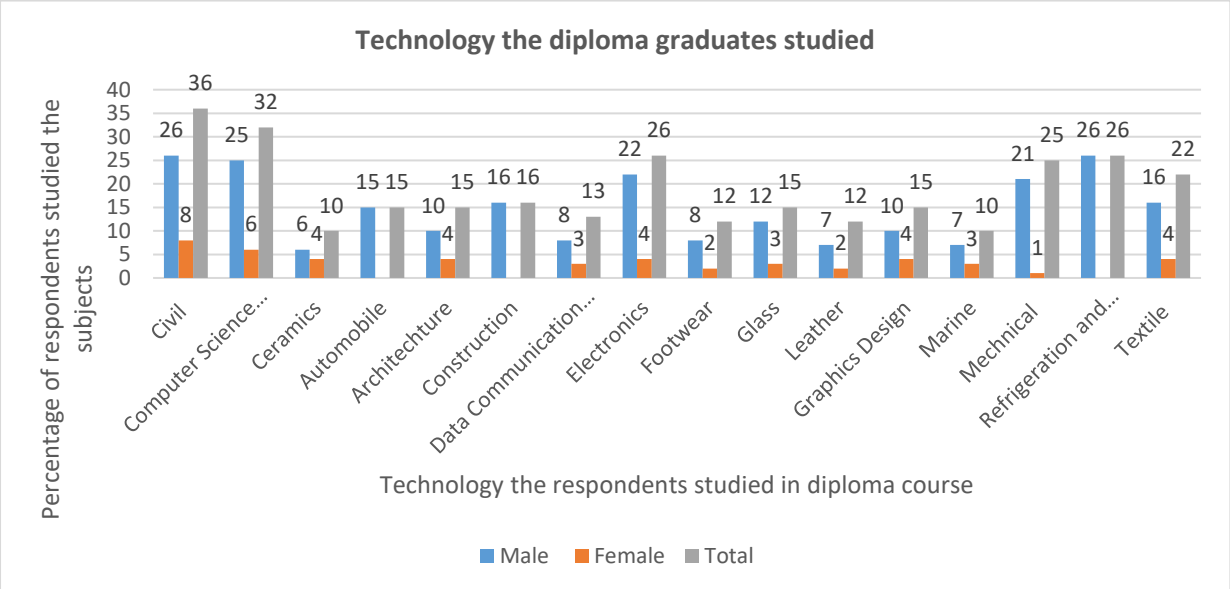

Figure 8: Technology the diploma graduate respondents studied

Reason behind choosing the diploma program

The diploma graduate respondents were asked the reason for they chose the diploma program. Most of the respondents (62 percent) replied that they chose it because they need a diploma degree to get a job earlier (***See:*** *Figure 9*). The second highest number of the respondents reported that they learned diploma degree had great demand in job market. Besides around 66 percent of the respondents chose it because their family or friends suggested it. Though not much, but 8 percent reported that they chose diploma program as they were not much meritorious to continue higher education.

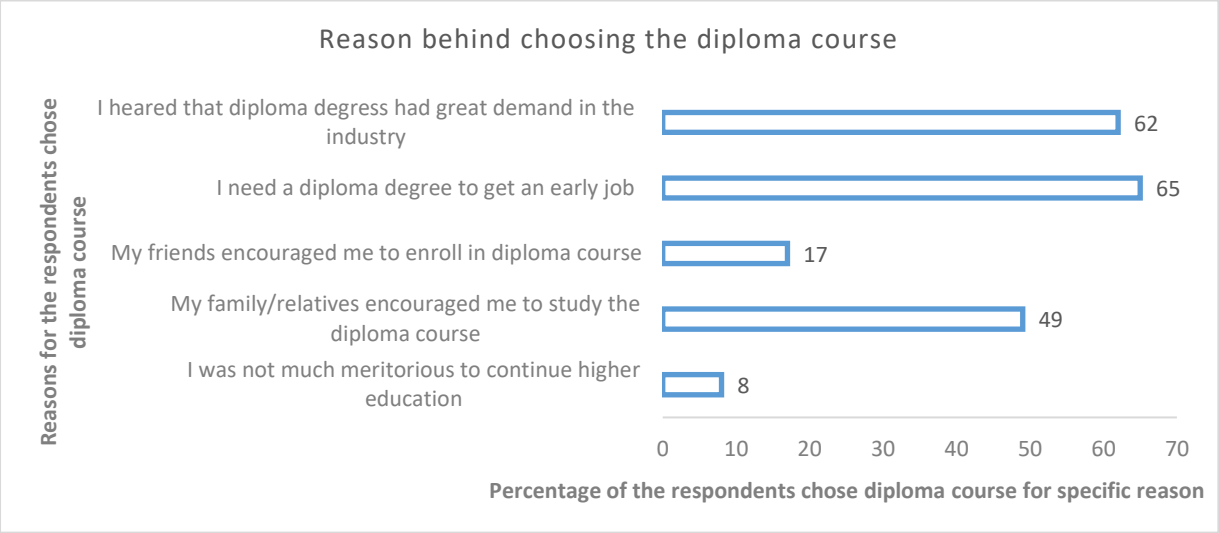

Figure 9: Diploma graduates' opinion regarding reason behind choosing the diploma course

Post-diploma education/training

Around 30 percent of the graduate respondents reported that they attended in post-graduate education or training (***See:*** *Figure 10*). Among the graduates who attended post-diploma education/training, most of the respondents attended in bachelor and/or master degree in relevant subjects (***See:*** *Figure 11*) that indicates that a large portion of the graduates cannot depends only on their diploma degree for their employment or the income/facilities provided to the diploma graduates are not satisfactory in large for them. Besides, 9 percent respondents attended in short term technical training.

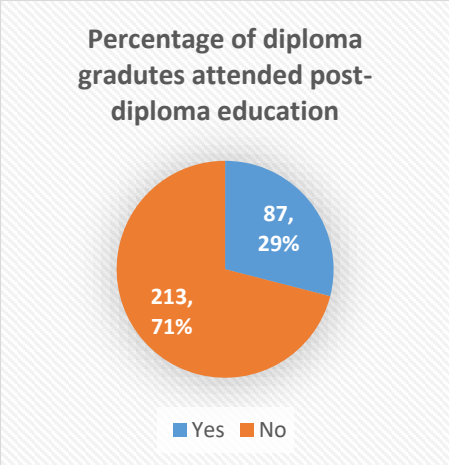

Figure 10: Percentage of the diploma graduates attended post-diploma education

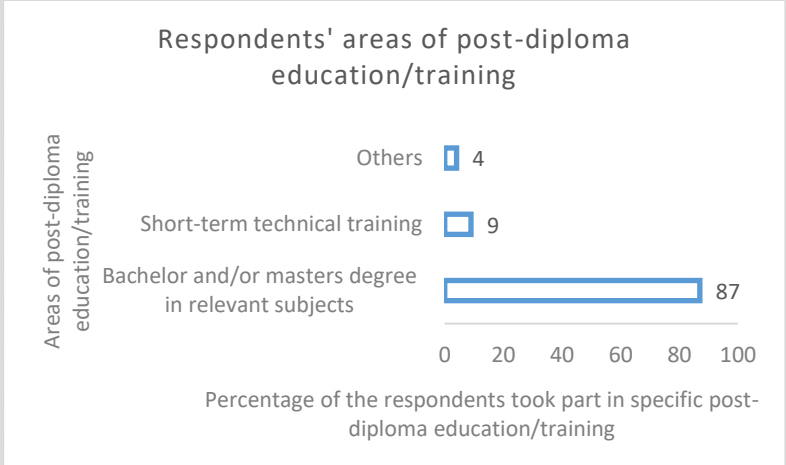

Figure 11: Area of post-diploma education/training done by the graduate respondents

Motivation for post-diploma education/training

Different motivational factors were reported by the graduate respondents behind attending post-diploma education/training. The main reason reported was to get a better job by doing post-diploma education/training. Around half of the respondents did post-diploma education/training for uplifting their knowledge and skills that is also related to getting better job opportunity (***See:*** *Figure 12*). Around 70 percent of the respondents mentioned their family and friends as motivation for attending further education/training. Besides, 38 percent of the respondents replied that they earned further education/training because diploma degree is not well accepted by the employer. Thus the assumption made in previous figure (figure 10 and figure 11) seems true as the responses of the diploma graduates showed that they took part in post-diploma education to get better job opportunity or uplifting their skills for getting a job, and a portion of employers do not accept diploma graduation degree very cordially. Thus a question remained about the quality of the diploma program offered through the polytechnic institutes.

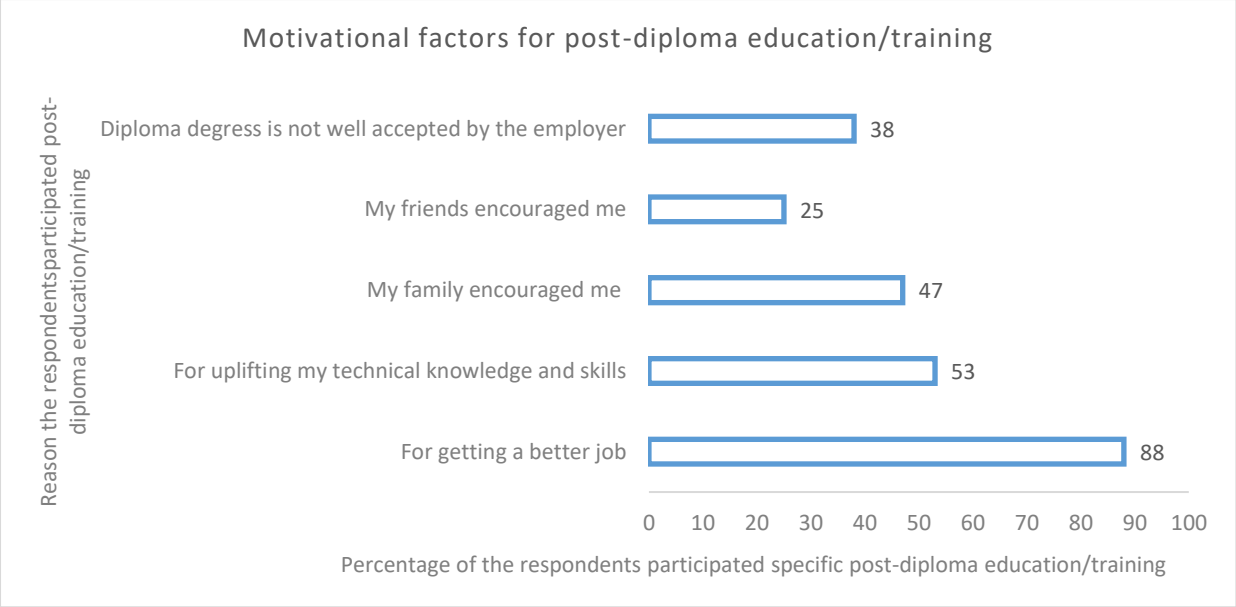

Figure 12: Motivational factors of diploma graduates behind doing post-diploma education/training

4.1.2 Background information of institute heads and teachers

This study reached 16 polytechnic institutes from 8 divisions where 1 institute head and 2 teachers were interviewed from per institute. Thus 19 institute heads (3 extra from Dhaka) and 39 teachers (7 extra from Dhaka) were interviewed in this study. The institute heads were usually the principals of the institutes, and in case if any principal was unavailable then vice-principal was interviewed. To interview the teachers, experienced Instructors were tried to interview first and if seniors were not available then other available experienced Instructors were interviewed. Background information of the institute heads and teachers are illustrated below:

Education qualification

Around two-thirds of the institute heads had education qualification of post-graduation or above level (***See:*** *Figure 13*). While around one-third of the heads had education qualification equal to bachelor degree. Only 2 percent of the heads found with diploma degree. On the other hand, around two-thirds of the heads studied in engineering/technical university, and around one-fourth

studied in general university. Among the teachers, majority (43%) had education qualification equal to bachelor degree (***See:*** *Figure 14*). Besides, around one-third and one-fourth of the total respondents had diploma degree and post-graduate degree respectively. By institute type, around one-fourth of the public institutes' teachers had education qualification equal to diploma degree when in private institute around two-fifth of the teachers had diploma degree as their higher education qualification. Thus teachers' education qualification is comparatively better in public institutes.

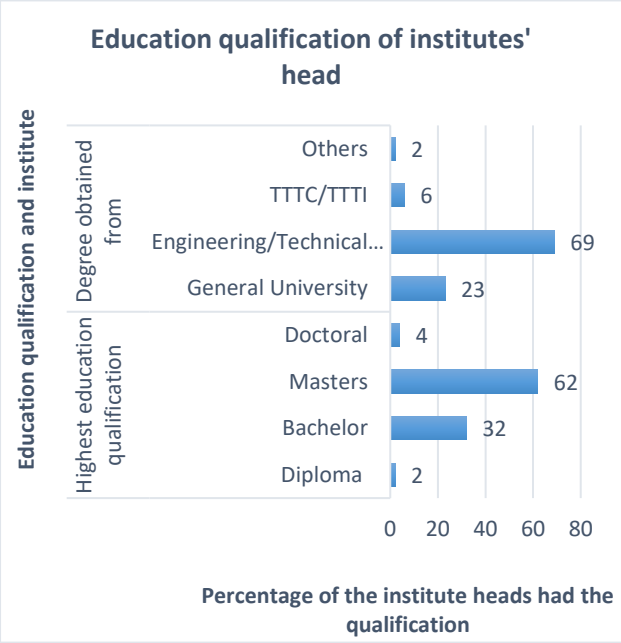

Figure 13: Education qualification of the institute heads

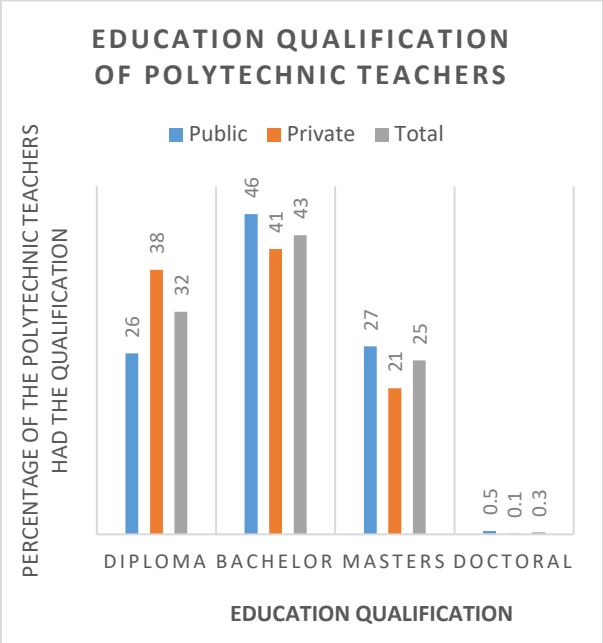

Figure 14: Education qualification of the polytechnic teachers

Industry experience

Among the institute heads, 61 percent found with industry experience (***See:*** *Figure 15*). However, majority of their (37%) industry experience was limited in 2-5 years. Besides, 28 percent of the institute heads industry experience was limited within 1 year. Apart from that 15% and 17% of the heads found with 6-10 years and 11-15 years of industry experience respectively. Only 3 of them had more than 15 years of experience. On the other hand, 31 percent of the total teacher respondents had industry experience (***See:*** *Figure 16)*. By institute type, the percentage of private polytechnic teachers had industry experience was bout twice compare to that of the public polytechnic teachers those are 41% and 23% respectively.

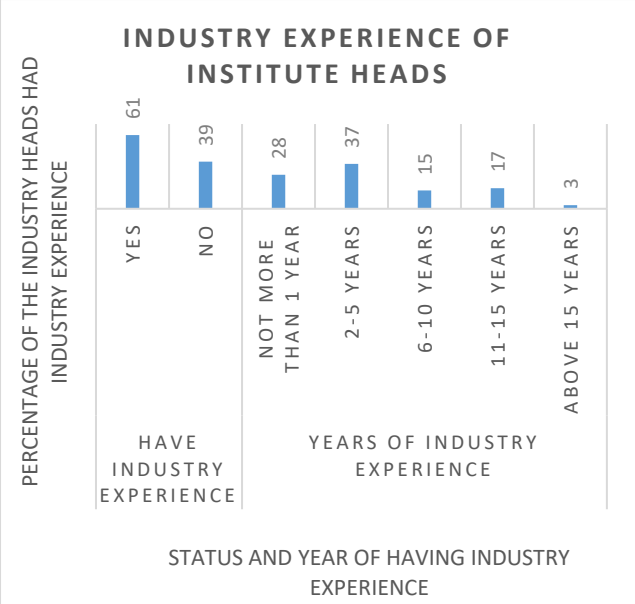

Figure 15: Industry experience of the institute heads

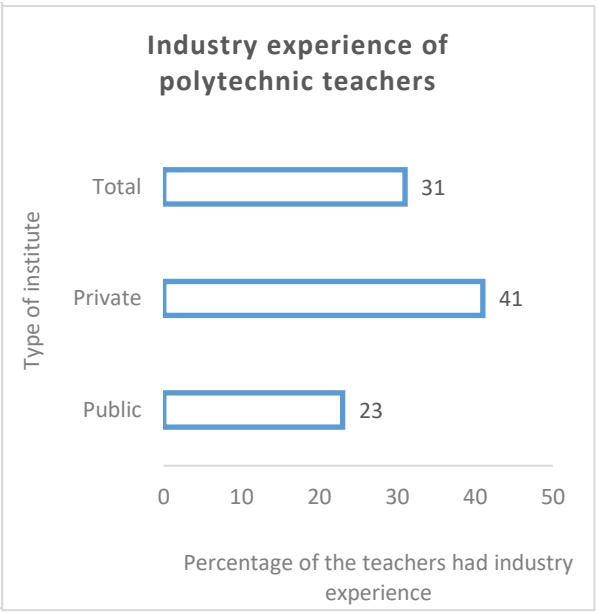

Figure 16: Industry experience of the polytechnic teachers

Teaching and training experience

In case of teaching experience, around one-third of the teachers experience is limited into 2 years (***See:*** *Figure 17*). Besides, around one-fourth of the teachers and one-fifth of the teachers' experiences were found limited into 3-5 years and 6-10 years. Between public and private institutes, teachers of private polytechnic had less teaching experience compare to the public polytechnic teachers. In case of teachers' service training, 71 of the teachers got the training in last 5 years (***See:*** *Figure 18*). By gender, around three-fourths of the male teachers got the training during the period that is 14 percent higher than that of their female colleagues. By institute type, around four-fifths of the public polytechnic teachers got the training in last 5 years that is 24 percent higher than that of private polytechnic teachers.

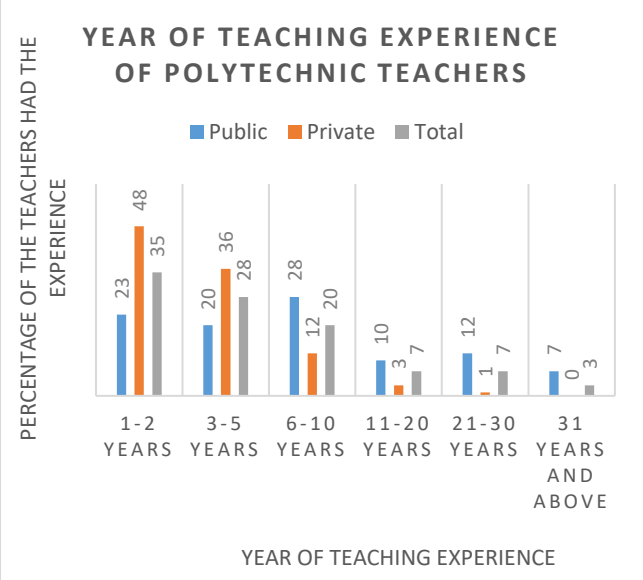

Figure 17: Year of teaching experience of the polytechnic teachers

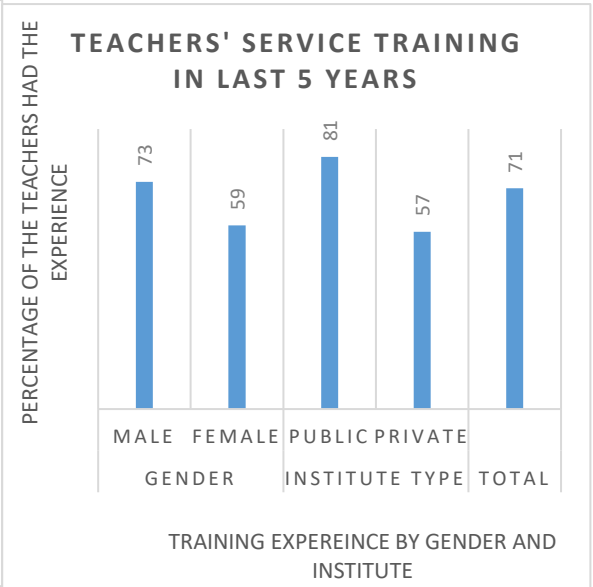

Figure 18: Percentage of polytechnic teachers got service training in last 5 years

4.1.3 Background information of the employer

Total 35 employers from 9 different industries were interviewed to get the employers' perspective (***See:*** *Figure 19*). The industry owners covered by the interview were manufacturing, construction,

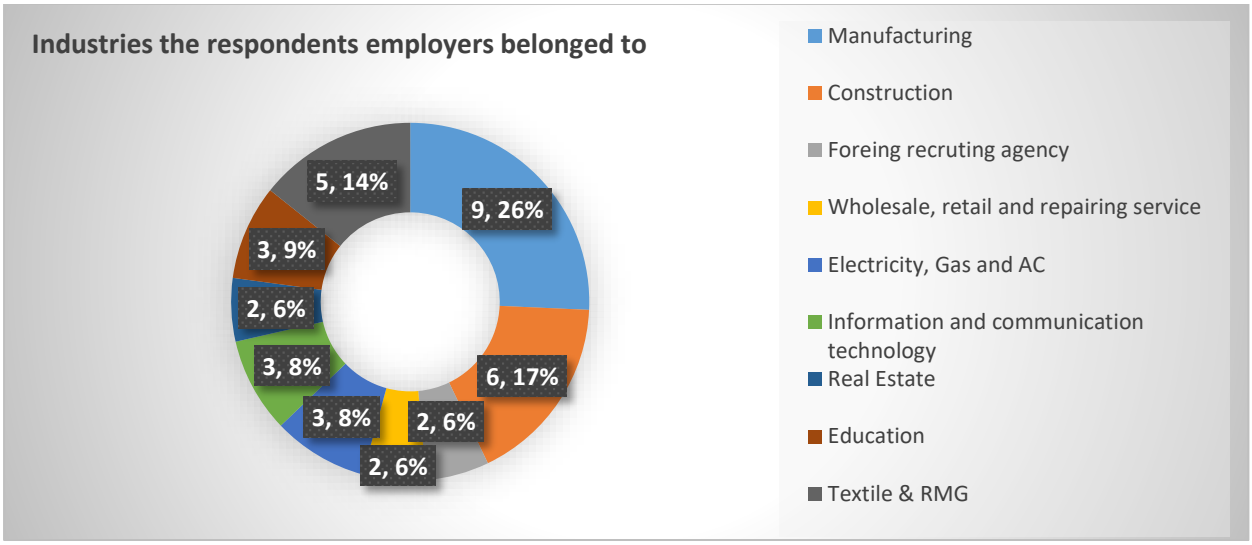

Figure 19: Industries the respondent employers belonged to

foreign recruiting agency, wholesale-retail and repairing service, electricity-gas and AC, information and communication technology, real estate, education, and textile & RMG. Among the employer, the highest percentage of the owner were interviewed from manufacturing industries (26%) and the lowest percentage was from electricity, wholesale and foreign recruiting agency (6%) in all.

4.2 CURRENT STATUS OF DIPLOMA GRADUATES REGARDING EMPLOYMENT AND INCOME GENERATION

This section of the findings illustrated the findings related to current status of diploma graduates regarding employment and income generation. Findings related to employment status, period took for employment, employment and occupation type, types of employer and industry graduates work for, starting of self-employment, current and starting income, distribution of income between self-employed and wage employed, opinion regarding current profession, satisfaction regarding job facilities, and strategies of further job search among the unemployed are included here. The detail of the findings are given below:

Employment status

Among the surveyed graduates, 54 percent was employed and 4 percent were self-employed (***See:*** *Figure 20*). Among the respondents, 38 percent reported them as unemployed and 4 percent were not interested to work. Among the respondents, employment rate found higher among the male graduates compare to their female counterpart, and in case of unemployment the findings reversed. By residence, employment rate of the graduates seen higher percentage in urban area, and unemployment rate in higher percentage is seen in rural area (***See:*** *Figure 21*). In rural area employment rate and unemployment rate around equal. Thus around two-fifth of the total respondents are unemployed along with significant disparity in gender and residential location of the respondents. Several reasons might be work behind lower employment rate among the female

graduates. According to the FGD respondents, employers less interest towards female technicians and unwillingness of female graduates' family members to allow their daughter in technical type job. A female graduate said, "*When I appeared in the interview, one of them asked whether I am able to technical job in the field? He suggested me for searching some office oriented job.*" Another female graduates said similar experience about her family. She said, *"My father told me that I should apply for a technical job as it needs to work in field level. He suggested me for advanced studies so that I can apply for some official desk job."* Lack of relevant industry and job opportunity in rural area might be the reason behind lower rate of employment among the graduates belonged to rural area of the country, especially for them who returned their area after completion of their diploma degrees.

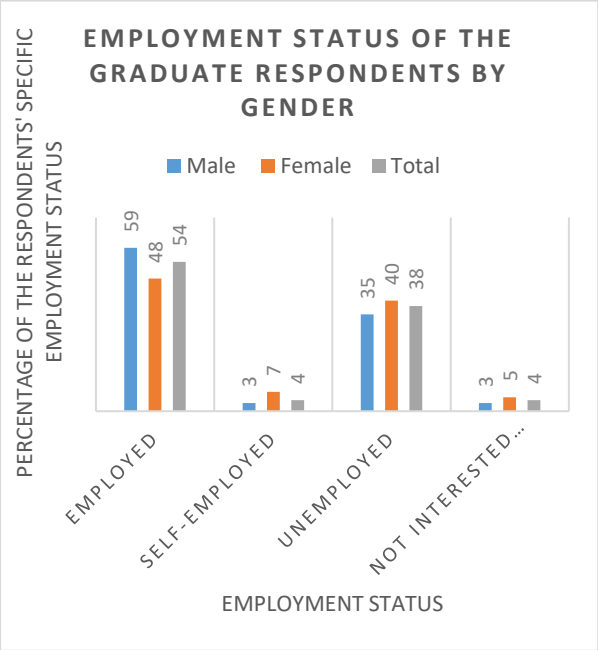

Figure 20: Employment status of the graduate respondents by gender

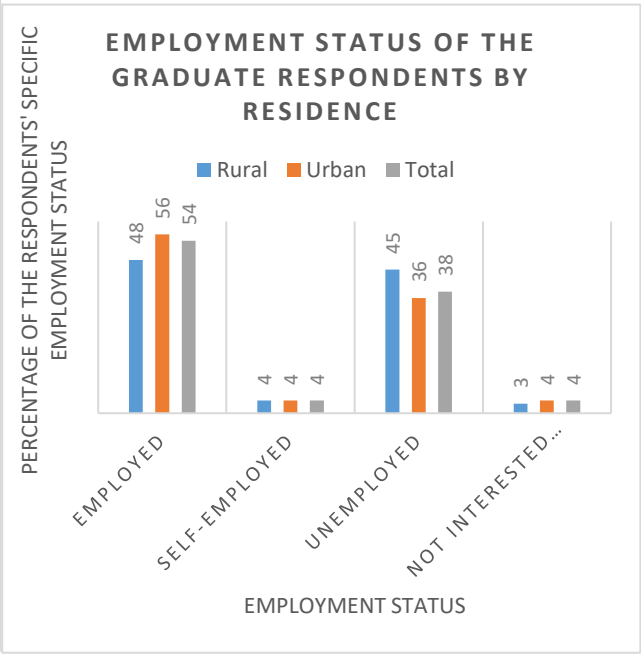

Figure 21: Employment status of the graduate respondents by residence location

Number of months took for first employment of the employed graduates

Employment rate of the diploma graduate was higher after the recent years of their graduation. One-third of the graduates got employed by 12 months of their graduation, and by 24 months two-thirds of total graduates got employed (***See:*** *Figure 22*). In third years and four years the employment rate was 18% and 9% percent respectively.

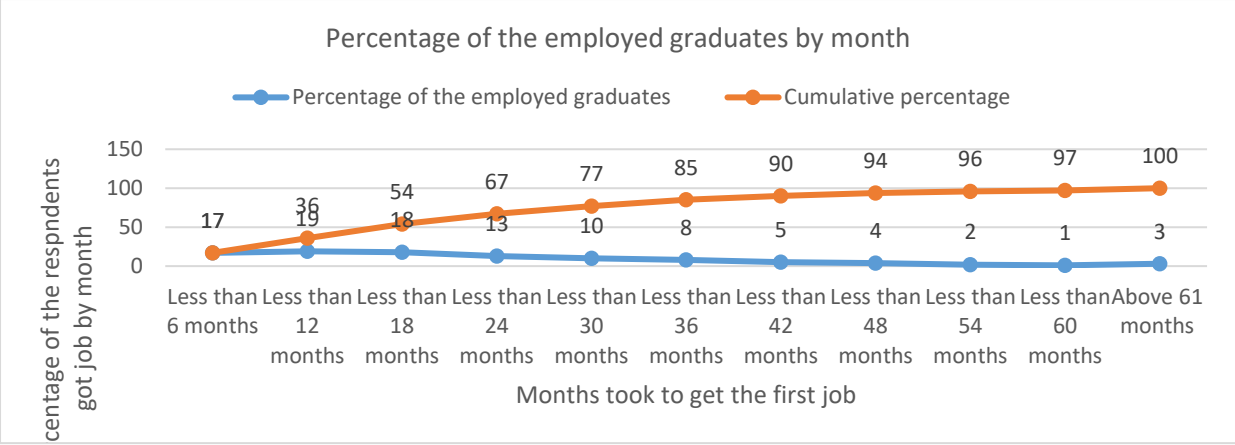

Figure 22: Percentage of the employed graduates by month

According to the focus group discussion, preparation is one of the reason behind late employment of the graduates. Some of the graduates do not know how to approach for job, some cannot determine their professional choice and some take time for preparation for government job.

Employment contract and occupation type of the employed graduates

There four types of employment contracts found where around two-thirds of the contracts was for permanent full time job (***See:*** *Figure 23*). 69 percent of the male graduates are found in permanent full time job that is 16 percent higher than that of their female counterpart. The percentage of graduates found in contractual full time and part time job are 18 and 14 respectively. In both cases, female shares found higher than that of the male graduates. Around 3 percent of the diploma graduates found employed in seasonal job.

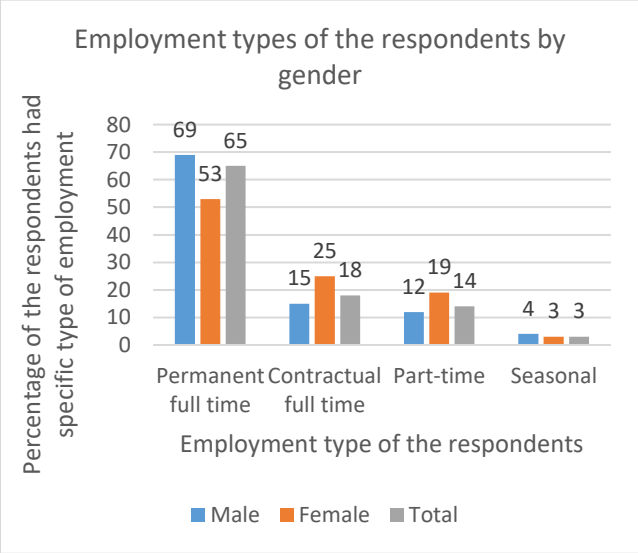

Figure 23: Employment types of the respondents by gender

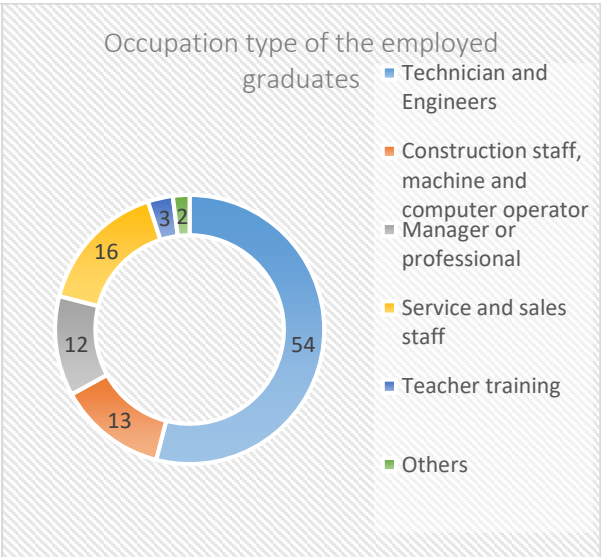

Figure 24: Occupation type of the employed graduates

According to focus group discussion, reason behind higher rate of contractual or part-time employment among the female graduates is not only because they did not get permanent full time job, rather some female take it by choice as their family did not provide sufficient support to get involved in full time job. For example, one of the respondents from Barisal stated, *"I was offered*

a full time job after immediate completion of my graduation. However, my family did not allow me to do the job as they expected household job from me. So I chose to do a part-time job so that can serve both family and job."

The employed diploma graduates were involved in major 6 categories of occupation where major share (54%) of the graduates found in technical and engineering job (***See:*** *Figure 24*). The second highest share of the respondents are found in service and sales related job. Besides, construction staff, machine and computer operator related service are done by 13 percent employed graduates while 12 percent are involved in managerial/professional job. Around 3 of the graduates found in teaching and teacher training.

Types of employer and industry

The graduate employees are recruited by 4 categories of employers those are governmental, private enterprise, NGO/autonomous organization, and individual owned business. Amon these categories, around two-thirds of the graduates are employed by the private enterprise (***See:*** *Figure 25*). Besides, around one-fourth of the graduates are employed by the individual owned business. Governmental and NGO/autonomous organizations share 5 and 6 percent of the employed graduates. Apart from the employer category, the graduates are employed by 10 different categories of industries where manufacturing industries employed around one-fourth of the graduate respondents (***See:*** *Figure 26*). After that construction industry employed the second highest share (17%) of the diploma graduates. Around 12 percent of the respondents are found in electronics, gas and AC supplier industry. 15 percent of the respondents are employed in ICT, scientific and technical service industry while 9 percent respondents found employed in education and training sector. The lowest share (2%) of the respondents found in real estate industry.

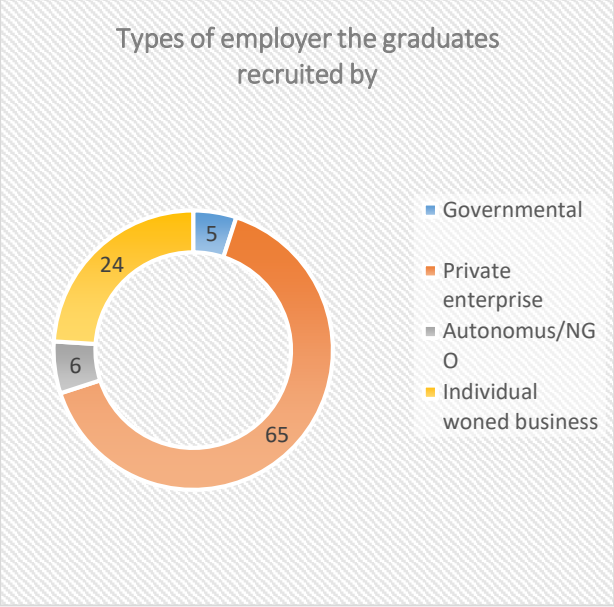

Figure 25: Types of employer the graduates recruited by

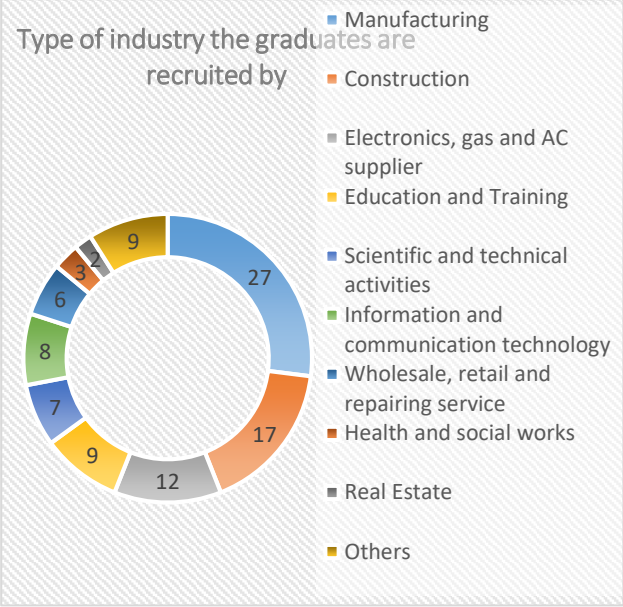

Figure 26: Type of industry the graduates are recruited by

Starting of self-employment

Most of the respondents who chose self-employment as career path started it by their own business or entrepreneurship and the share is around three-fifth of the total self-employed graduates (***See:***

Figure 27). However, one-fourth of the self-employed graduate started it by joining their family business/entrepreneurship. Around 17 percent of the self-employed respondents started it by joining in a business/entrepreneurship started by their friends or relatives. The motivation behind the self-employment are different. More than three-fifths of the self-employed respondents reported that they started self-employment because they saw a business opportunity with their skills (***See:*** *Figure 28*). Around two-fifths of the respondents reported that they started self-employment because they wanted do something their own. Around a quarter of the all respondents stated that they started self-employment because they could not find a good job for them. Besides, 15 percent of the respondents mentioned their parents/family name who invited to start self-employment. Whatever the reason are, the percentage of self-employment is limited in 4. Social desire or lack of training/skills on self-employment might be the reason behind lower rate of self-employment. One of the graduate said in FGD,

> *"In our family or in institution we were never expected for creating self-employment, rather everybody expected to join in a job after completion of the diploma course. Even, we were not taught any course on how to run a business or how to create our self-employment by using our skills that kept us away from any self-employment initiative. Now I feel the approach should be changed and there some course/training needs on how diploma graduates can start a self-employment initiative by using his/her skills."*

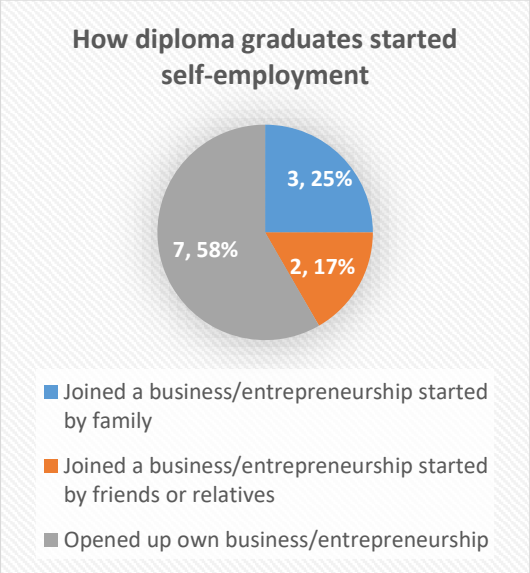

Figure 27: How diploma graduates started self-employment

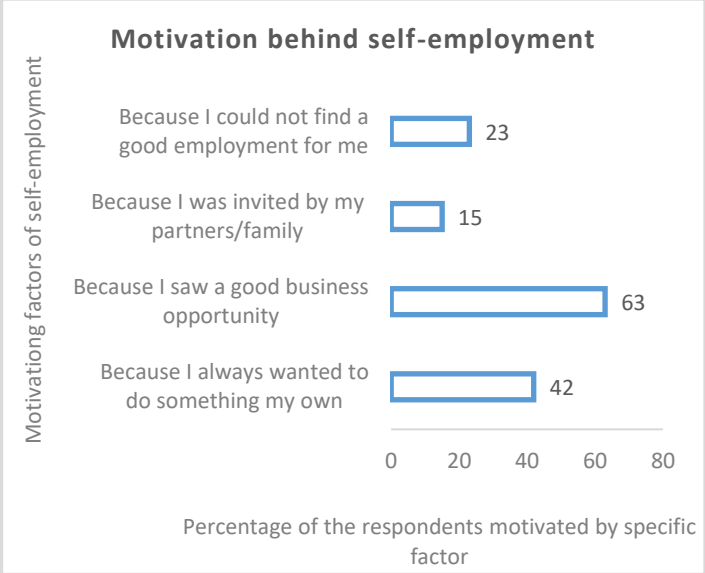

Figure 28: Motivation behind self-employment

Income level of the employed graduates

It is found that overall monthly income of current employed graduates varies by their contract type, residence location and gender. Permanent full time employed graduates earn the highest amount of salary than all other categories of the respondents and the amount is around BDT 11,500 in average in a month (***See:*** *Figure 29*). Average income of non-permanent full time employees are around BDT 1700 less than that of the permanent full time employees. Employee of urban areas earn BDT 11,263 on average per month that is around BDT 2500 higher than that of their rural counterparts. Overall, male graduate employees earn more than that of their female counterparts in all categories. Here, average income level of the respondents seemed lower paid

compare to the technical skills and profession of the diploma graduates. So when diploma graduates were asked in FGD, they replied that the incomed showed lower because most of the diploma graduates attended in the survey were very young and most were working in entry position as passed in 2016 or afterwards. Besides, salary in entry position for the diploma graduates are still comparatively lower. They get higher payment after a certain time of experience. Even, employers confirmed that diploma graduates are paid lower amount in entry position and then gradually increases over time. Employability survey of post-secondary TVET program in Bangladesh conducted by World Bank found similar findings. In the study average monthly income was found BDT 10,843 where average male and female income were found 11,088 and 8,308 respectively in full time job (Nakata et. al., 2018). Thus the financial benefit of the diploma graduate showed that much lower comparative to general education graduates in the country.

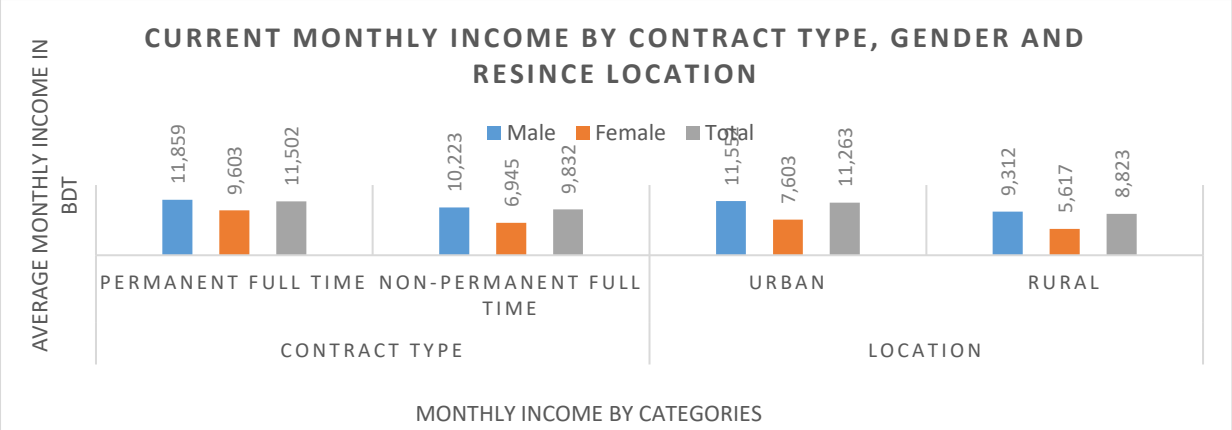

Figure 29: Current monthly income of the diploma graduates by contract type, gender and residence

Starting salary

There found a significant difference in graduate employees starting salary based on the source they got recruitment. In case of recruitment by public advertisement, average monthly starting salary was around BDT 8400 while they got recruitment by information network the salary amount reduced by around BDT 1100 (***See:*** *Figure 30*). However, it was interesting to find that female starting salary was higher in both cases of public advertisement and information network than that of their male counterpart. Provably the reason behind is that male graduates were not much calculative to start a job and even join some odd jobs, those female graduates avoided usually. Discussion with the graduates in focus group gave the hint, though did not explain much about it.

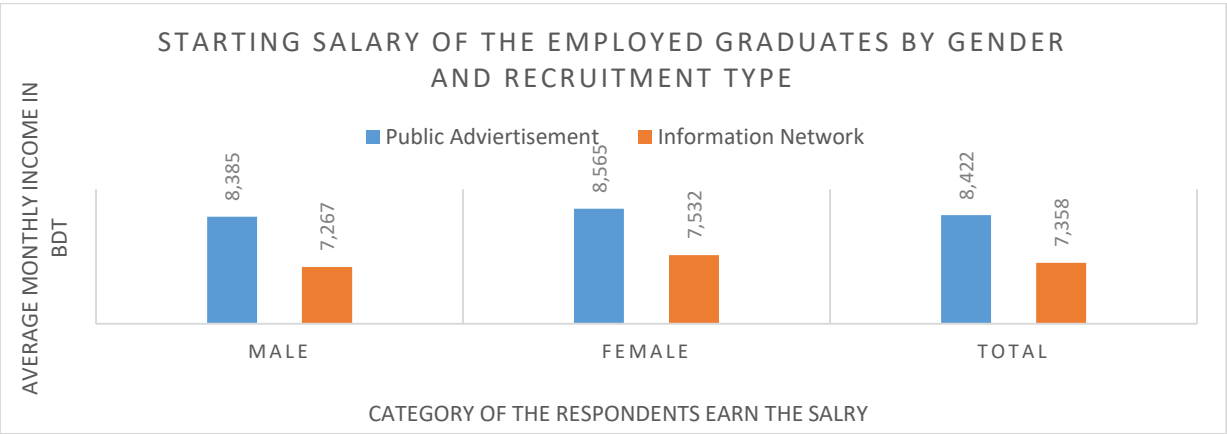

Figure 30: Starting salary of the employed graduates by gender and recruitment type

Distribution of monthly income between self-employed and wage-employed

Distribution of monthly income between self-employed and wage employed showed that percentage of both category of employees are highest in income range of BDT 10001 to 15000 where the percentages are 35 and 44 respectively (***See:*** *Figure 31*). Second highest percentage (40) of income of self-employed is shown in income range BDT 5001 to 10000. In other income range percentage of wage employed graduates found very low in number. However, income range of self-employed graduates found vast that started from BDT 0 and continues to 30000 and above where the percentage of the respondents found between 9 and 13. So, self-employment has potentials to earn divers level of income that is limited in case of wage employment.

Figure 31: Distribution of income between self-employed and wage employed

Opinion regarding current profession

The findings showed that around one-third of the respondents agreed that they are satisfied with their current profession (***See:*** *Figure 32*). However, around two-fifths and 29 percent of the respondents showed their neutral and disagreed opinion respectively. In case of coherence between diploma course and current profession around half of the total respondents agreed with that their profession is coherent with their education and 29 percent disagreed with the opinion. Around two-fifth of the respondents agreed that they are interested to change their current profession while around 36 percent refused to change the current profession. Graduates in discussion informed that technical expertise allowed them to work in their relevant fields, but they needed to start in lower position and with lower salary that is not rewarding for them. As a result some graduates are interested to change their job sector though it does not bring in change. They added after a certain period diploma graduates are promoted in a better position if they do their job with patience.

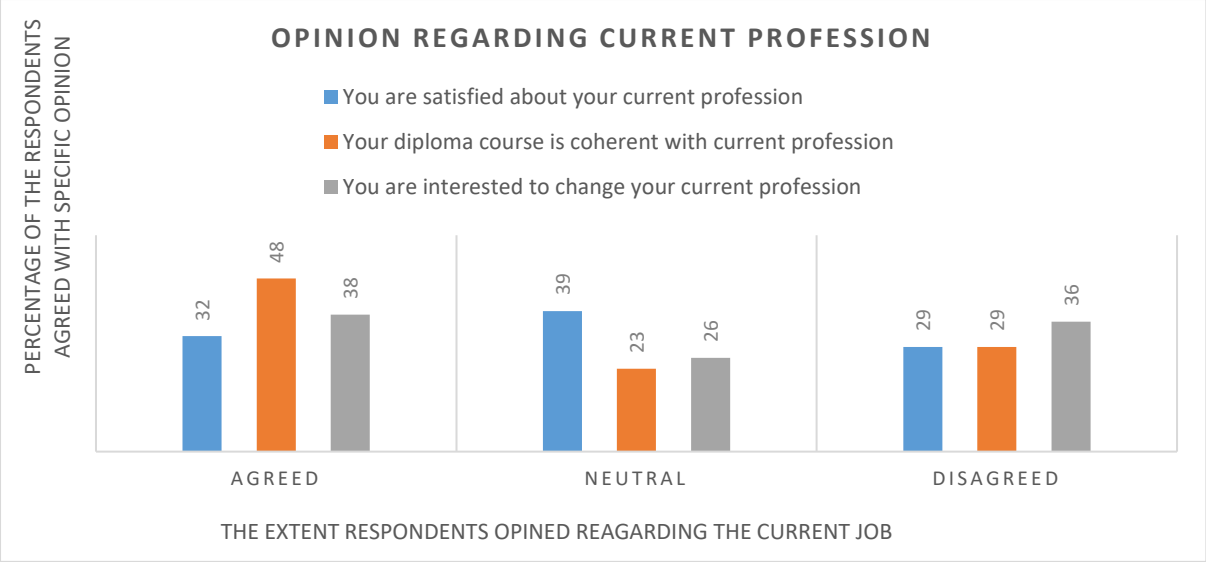

Figure 32: Diploma graduates' opinion regarding current profession

Satisfaction regarding the job facilities

Diploma graduates opinion regarding satisfaction in job facilities showed that around one-third of the respondents are satisfied with their professional development opportunity and work environment (***See:*** *Figure 33*). Around two-fifth of the respondents are satisfied with their social status, family status, job security and current leave/vacation. Around 29 percent of the respondents are satisfied with their job type and current income. Around one-fourth of the respondents are satisfied with scope of increasing their income level. Others respondents are either dissatisfied or showed neutral opinion regarding the job facilities.

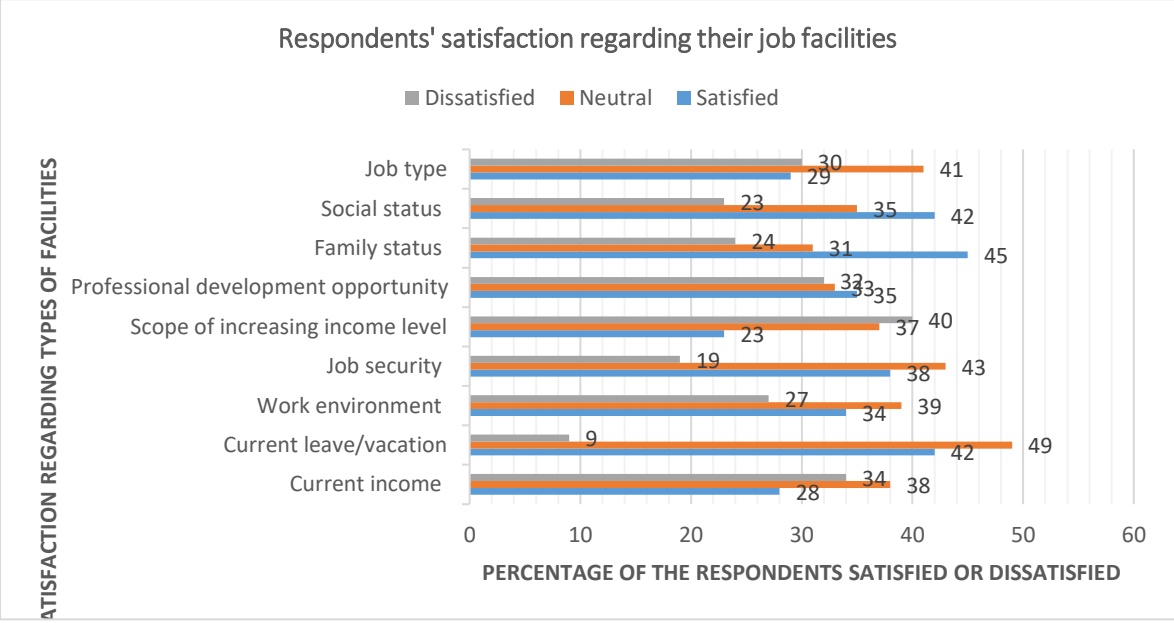

Figure 33: respondents' satisfaction regarding their job facilities

In focus group discussion, diploma graduates expressed their satisfaction about their work environment, professional development opportunity and scope of increasing income level though it is not satisfactory at present. However, they were dissatisfied about current level of their income

and job security. They reported that after a certain period income level start increasing that is a hope for them. They enjoy their job as they can serve their own field.

Strategies in further job search among the unemployed

Among the unemployed graduates, 47 percent responded that would accept lower paying job and 32 percent would accept short-term employment since not getting expected job (***See:*** *Figure 34*). However, 45 percent sated that they would keep looking for a job that meet their expectations. 38 percent of the respondents would explore additional training opportunities and 36 percent would explore different occupation. Only 9 percent of the respondents stated that would start their own business/entrepreneurship. Respondents in focus group discussion showed similar opinion. They stated that they would continue searching job until they find suitable one, and in this case they would compromise with lower payment, short-term job or explore other sectors including work as a migrant worker if do not get desired one. However, few of them stated they would try for self-employment as did not find a desired job. Additional training was also an option for them to enhance their skills for desired field along with soft skills training.

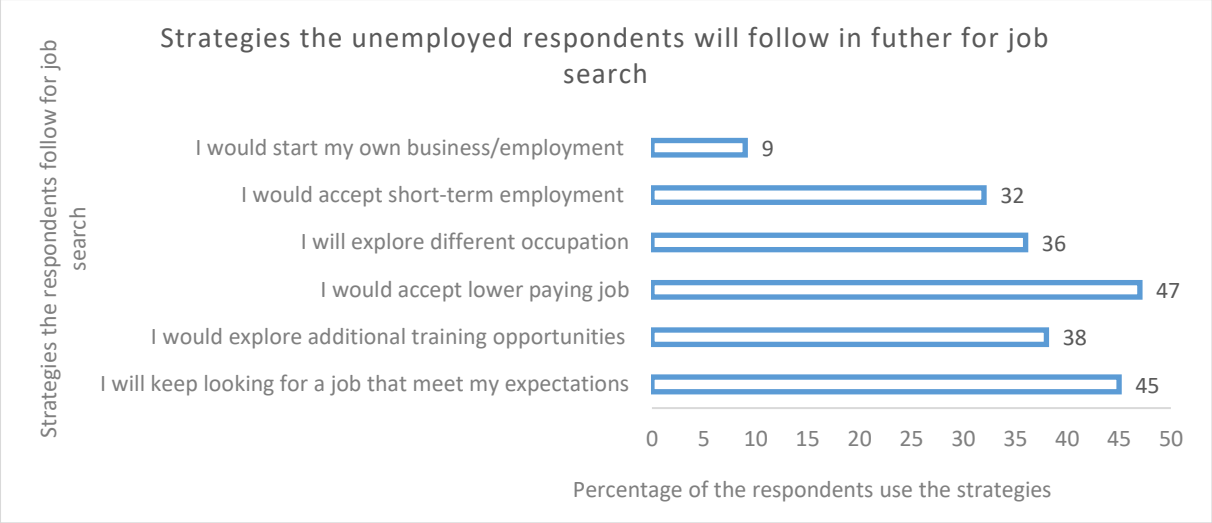

Figure 34: Strategies the unemployed respondents will follow in future for job search

4.3 EFFECTIVENESS OF THE DIPLOMA PROGRAM TO CREATE MARKET DRIVEN SKILLS

This section of the findings discussed the findings related to effectiveness of the diploma program to create market driven skills among the diploma graduates. Findings related to employment outcome of diploma technologies, the extent diploma program equip the graduates, factors considered by the employer during recruitment of young staff, current and future market driven skills, how much diploma graduates are equipped with the market driven skills, and employers' assessment about diploma graduates are included in this section. The detail of the findings are given below:

Employment outcomes of diploma technologies

Accumulated opinion by graduate survey and teacher interview were used to create a hierarchy list of diploma technologies based on employment outcome. The findings showed that textile is reported as highest employment outcome technology (***See:*** *Figure 35*). More than three-fourth of the respondents reported it as the highest employment outcome technology. Besides, architecture,

mechanical, garments design, electrical, refrigeration and AC, electro-medical, power, ceramics are also reported as higher employment outcome subjects. In the list, automobile listed by lowest number of respondents. Other technologies found as lower employment outcome are mining and mine survey, environmental, and mechatronics those are rated by less than 30 percent of the respondents. In discussion with the employers it was explored that employment outcome does not depend on education/training quality only. Coherence between supply and demand is also important for higher employment outcome. According to one of the employer,

> *"We do not have demand survey about human resource requirement for different job and number of seats for diploma technologies in the polytechnic institutes are not distributed proportionately. So the technologies those have higher number of graduate supplies than the market demand, employment outcome increases, and in case of lower number of graduate supplies employment outcome decreases."*

Another employer from the foreign recruiting agency said, *"There is high demand of skilled workers throughout the world. However, we mostly send unskilled workers. Our employment outcome and earning can be increased if we can plan our diploma technologies based on global market demand and export migrant workers accordingly."* So there is scope of increasing employment outcome by market survey of human resource demand and distribute number of seats for different technologies accordingly.

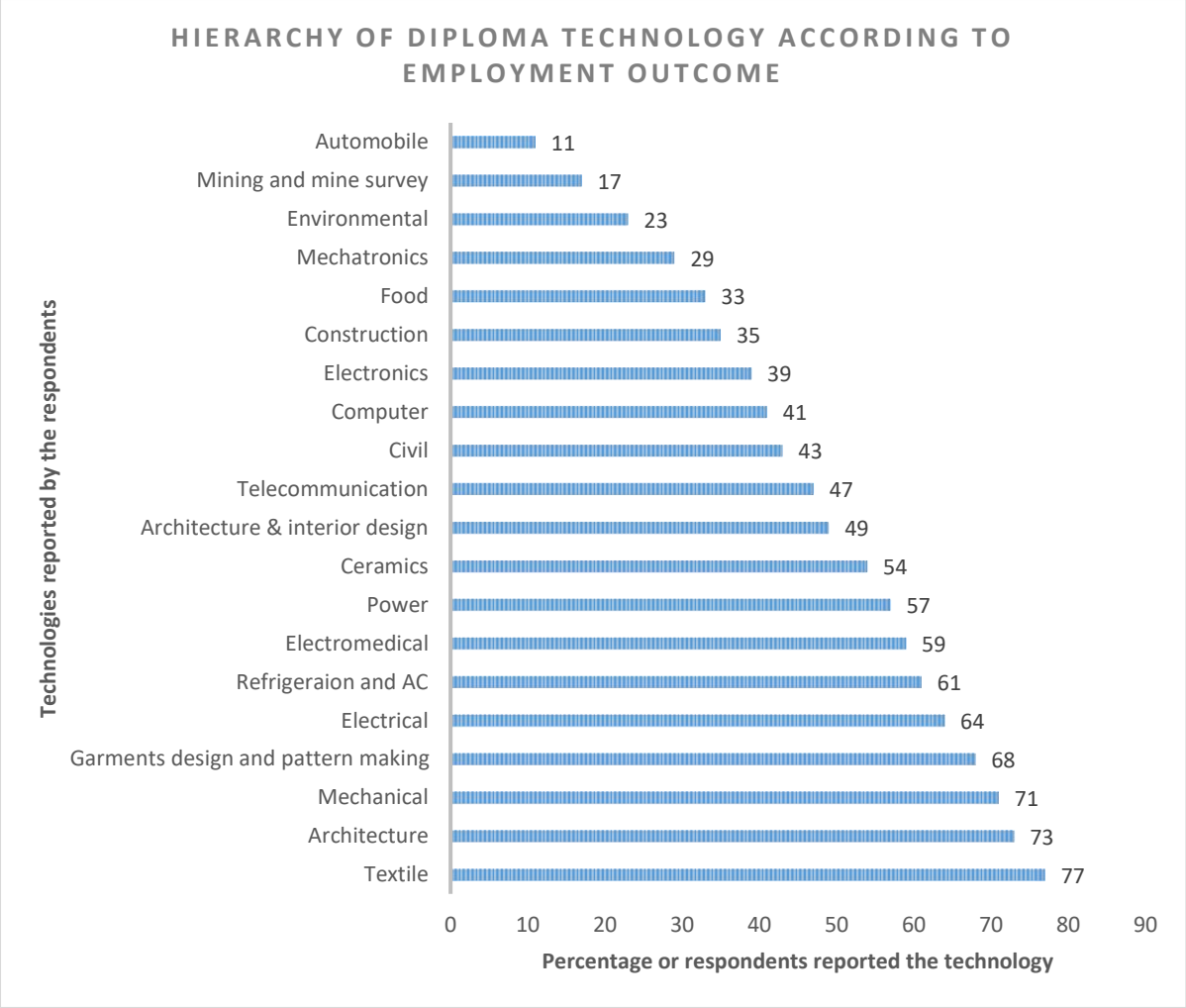

Figure 35: Hierarchy of diploma technology according to employment outcome

To what extent diploma course equipped the graduates

Around half of the graduates in all categories opined that diploma program equipped their knowledge, skills and attitude (***See:*** *Figure 36*). In specific, 52 percent of the diploma graduates reported that the program enabled them to apply the knowledge in their job when around half of the respondents reported that diploma program enhance their ability to apply the attitude/values they achieved in their profession. 57 percent of the respondents that the course enhance their skills to perform in their job. Around one-fifth respondents in all categories reported that their ability to apply the knowledge, attitude and skills they achieved are not satisfactory for their job. However, around 30 percent of the respondents remained neutral during their rating that is a big question for the program achievement.

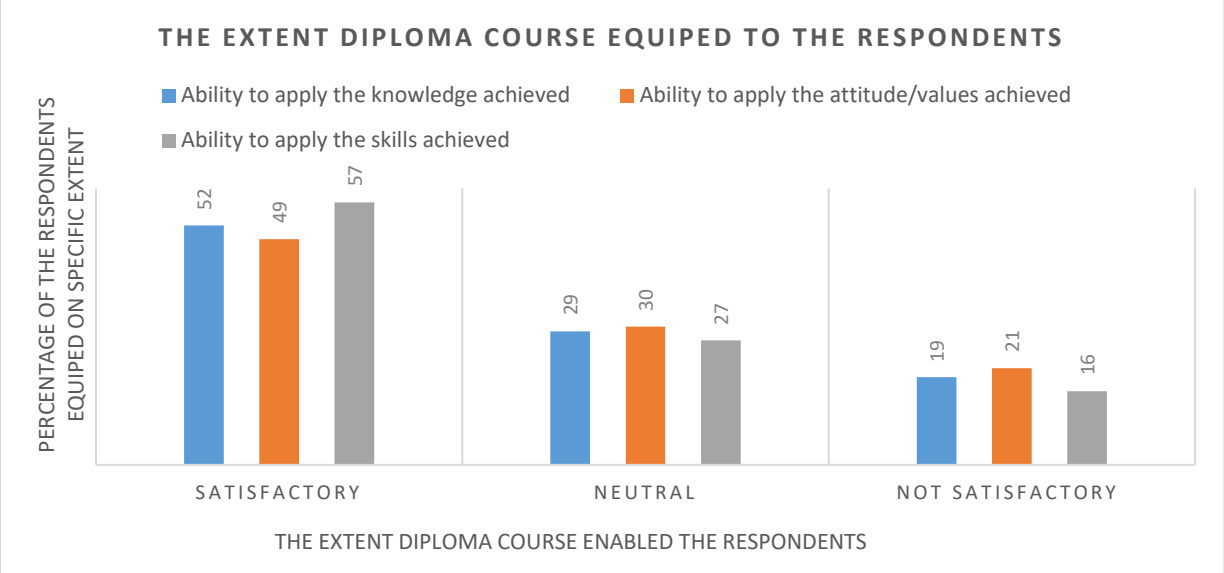

Figure 36: The extent diploma courses equipped to the respondents

Factors considered by the employers during recruitment of young staff

According to the most of the employer (47%) demonstrated technical skills are the most desired skills during recruitment of young staff (***See:*** *Figure 37*). Around two-fifth of the respondents reported academic degree and prior work experience during young staff recruitment. Around one-third of the total respondents reported technical diploma as considerable factor during recruitment. Besides, soft skills and academic result are reported by around a quarter of the total employers as considerable factors. Only 5 percent of the respondents reported recommendation by institute/known someone are considered during young staff recruitment. In discussion, employers stated that technical skills are very essential for the employee for performing their job, but only technical skills is not enough for them in an industry, there need some soft skills those enable employees to communicate, collaborate and present their work to the others. One of the employer said that academic degree along with technical skill is important for the fresh graduates. He added prior work experience is not mandatory, but advantageous for the fresh graduates. He said, *"Though prior work experience is not expected much form the fresh graduates, however, if anybody has that experience definitely it add values."*

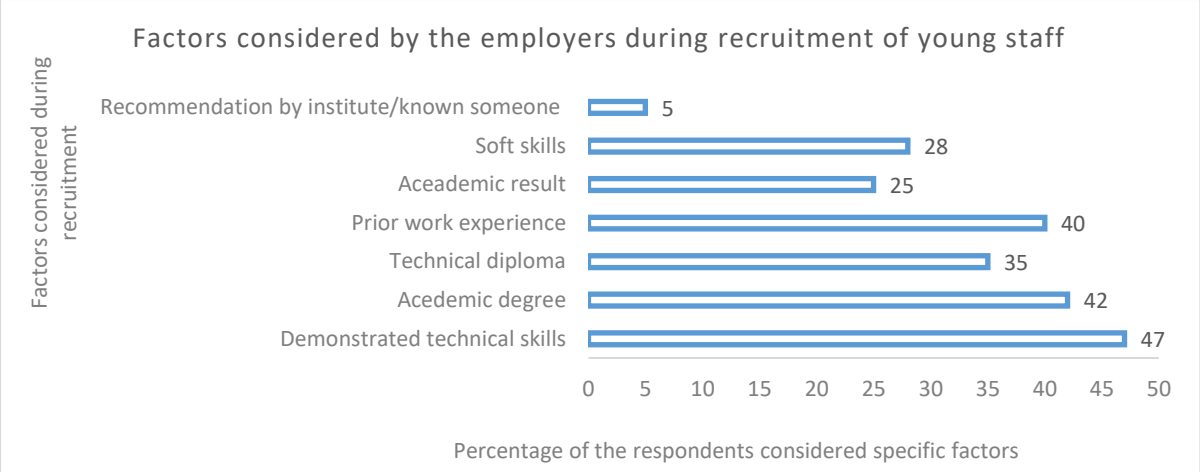

Figure 37: Factors considered by the employers during recruitment of young staff

Current and future job market driven skills

Employers were asked to give rating on current and future job market skills in a scale in a 10 point scale. According to them Professionalism/work ethics (9.8) is the most important skill for current and future job market followed by practical technical skills (9.6) (***See:*** *Figure 38*). Then they ranked team work/collaboration, critical thinking/problem solving, and decision making & leadership at rating scale 9.5, 9.3 and 9.2 respectively. After that oral and written communication skills in relevant language (9) got priority followed by the digital technology skills (8.8). Two others skills enlisted at the end of this list those are global/intercultural fluency, and career management with rating point 8.5 and 8.2 respectively.

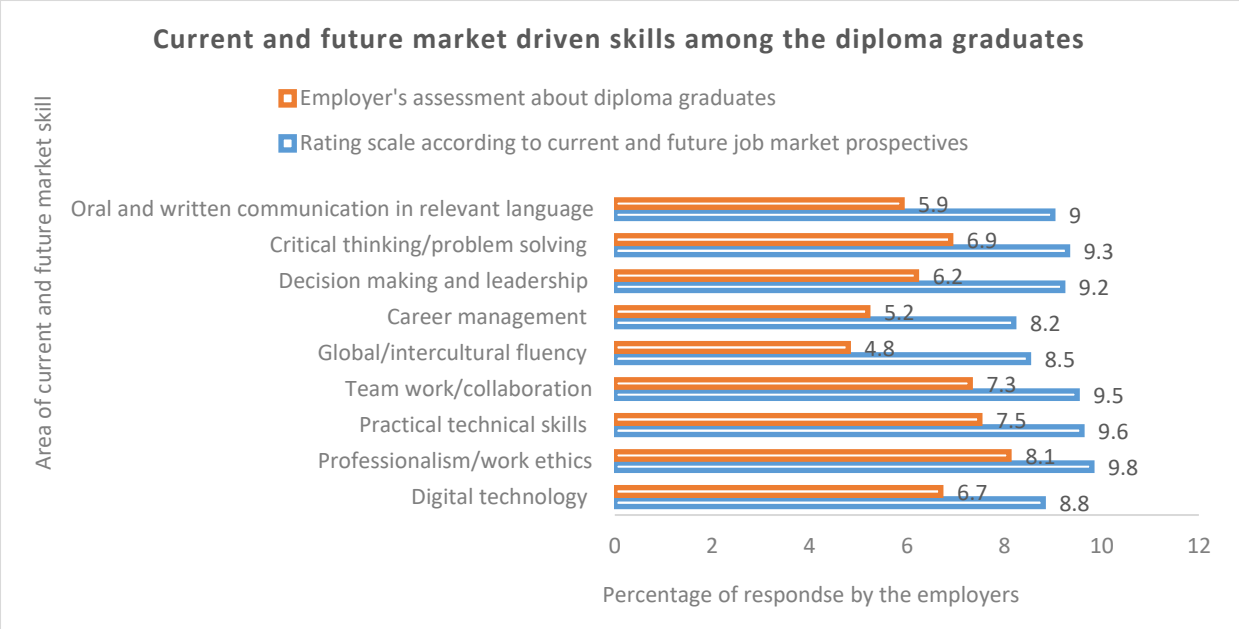

Figure 38: Current and future market driven skills among the diploma graduates

The employers also ranked diploma graduates skills by the rating scale that found that diploma graduates' most rated strength is their professionalism with 8.1 point. Then practical technical skills and team work/collaboration were ranked with 7.5 and 7.2 point respectively. Critical thinking/problem solving skill rated at 6.9 followed by the digital technology skills with the rating

of 6.7. Decision making and communication skills are rated at 6.2 and 5.9 respectively. The lowest rated skills of the diploma graduates are career management (5.2) and global/intercultural fluency respectively. Overall there found a skill gap among the diploma graduates in current and future job market context according to the employers assessment. During discussion, employers said that soft skills are essential for any job and demand of it is increasing globally day by day. One of the employer said,

> *"In 21st century we are connected globally and need to work in collaboration with others. Therefore we need communication and collaboration skills, intercultural literacy etc. Besides, critical thinking, problem solving, decision making, digital literacy etc. are considered as important skills for 21st century. So technical skill is no more enough to do better in career. We found that diploma graduates possess sound technical knowledge and skills, but they lack necessary soft skills those need to address by the polytechnic institutes."*

Employers' suggestions to improve diploma graduates' area of skills

The employers suggested some areas for improvement of the diploma graduates. The highest percentage (86%) of suggestions was made for improving problem solving skills (***See:*** *Figure 39*). Around three-fourth of the employers suggested for improving ICT skills and practical technical skills. Improving communication skills was suggested by 70 percent of the employer respondents. Around two-thirds of the respondents emphasized on improving theoretical knowledge of technology. Around three-fifth and two-fifth of the respondents suggested for improving English skills and numeracy skills respectively. All the employers emphasized on attaining soft skills those would enable the employer to collaborate with others in industry nationally and globally. Language, communication and collaboration skills, problem solving, ICT skills are considered as essential soft skills for the employees of 21st century.

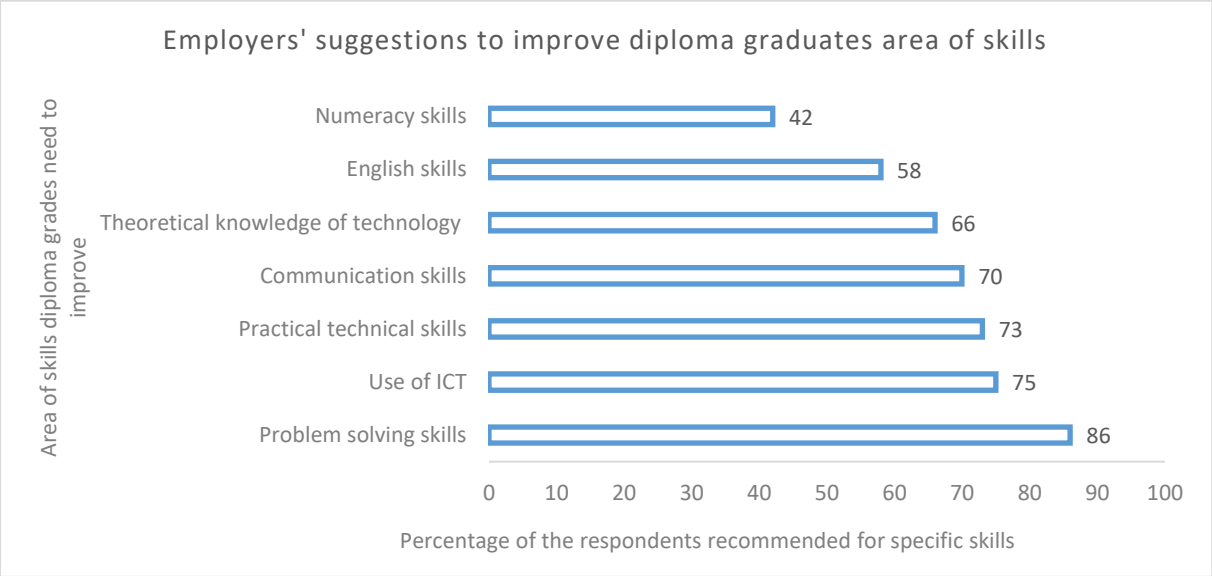

Figure 39: Employers' suggestions to improve diploma graduates' area of skills

4.4 EFFECTIVENESS AND EFFICIENCY OF THE DIPLOMA PROGRAM DESIGNED

This section of the findings presents the findings related to effectiveness and efficiency of the diploma program designed. Findings related to effectiveness and efficiency of the program was

measured through the satisfaction of diploma graduates, academic and practical teaching learning activities, internship experience, curriculum designed, job placement facilities for graduates, and collaboration with relevant industries. Findings related to these investigations are presented here:

Overall satisfaction of the graduates about diploma program

An overall satisfaction of diploma graduates about the diploma program they completed was investigated through a 10 point rating scale. The investigation found that the highest rated feature of diploma program is technical skills training in both public and private polytechnic institutes with rating point 6.9 and 6.2 respectively (***See:*** *Figure 40*). Overall relevance of the education is ranked in second position with rating point 6.8 and 6.1 in public and private institutes respectively. Only these two features got more than 6 points out of 10. Other features got below 6 points. The lowest rated feature of the diploma program is equipment and facilities in institutes for delivering the diploma program where the rating points are 4.5 and 3.2 for public and private polytechnics respectively. Overall rating about satisfaction of different features of diploma program found that public instates rated higher in all the features compare to that of the private institutes. Students said in focus group discussion that overall they were satisfied by the diploma course offered to them. However, equipment and facilities available for delivering the relevant skills found insufficient by them. The also said that there was lack of modern equipment and facilities including latest information and communication technologies. They also stated that there was lack of soft skills training in their institute that is very crucial in job market.

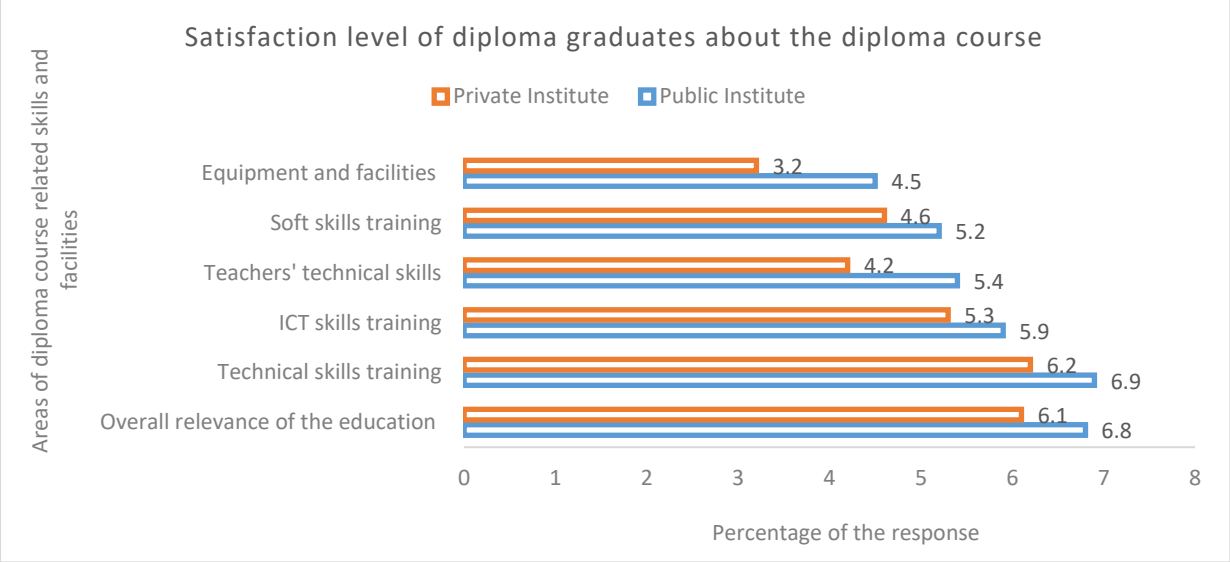

Figure 40: Satisfaction level of diploma graduates about the diploma course

Academic class and teachers skills

Most of the graduates reported that academic classes happened regularly in diploma program (***See:*** *Figure 41*). In case of teachers' knowledge and skills, around three-fifth of the graduates reported their satisfaction. In case of teachers' attitude, two-third of the respondents showed their satisfaction. The level of dissatisfaction regarding teachers' knowledge, skills and attitude ranges from 11 to 17 percent.

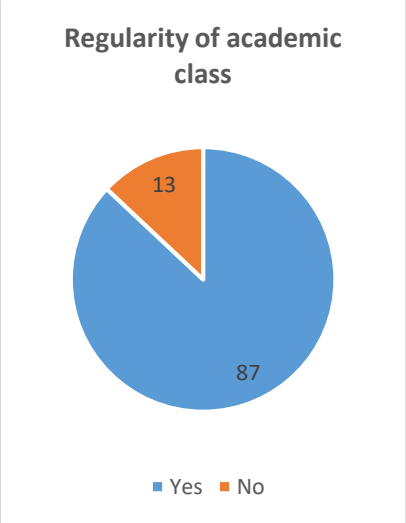

Figure 41: Regularity of academic class

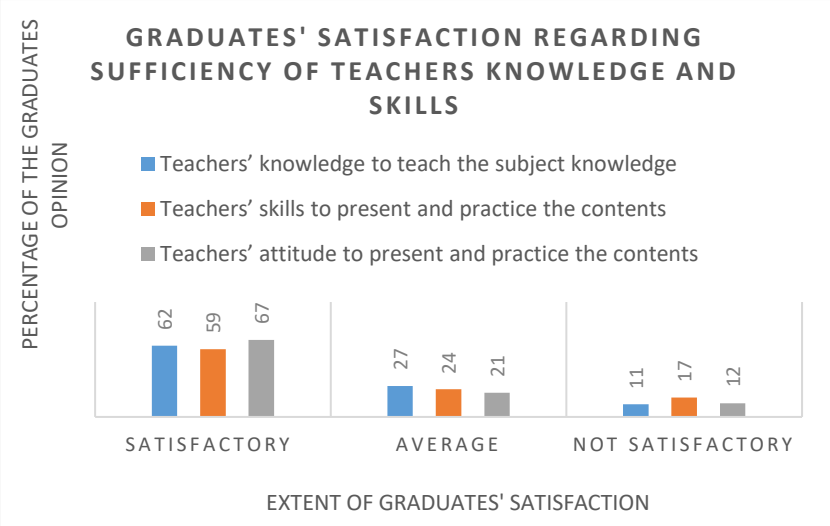

Figure 42: Graduates' satisfaction regarding sufficiency of teachers' knowledge and skills

Practical class and effectiveness

Four-fifth of total graduates reported that practical classes were happened regularly in polytechnic institutes (***See:*** *Figure 43*). More than half of the respondents were satisfied with their teachers' knowledge and experience in practical class. However, respondents satisfaction regarding the learning materials/equipment used in practical class found in lower rate. Regarding sufficiency of learning materials/equipment 37 percent of the respondents found satisfied and 39 percent of the respondents found dissatisfied (***See:*** *Figure 44*). In case of quality of the materials, 42 percent of the respondents were satisfied and 27 percent found dissatisfied. However, 24 to 31 percent of the respondents found neutral to give their opinion regarding practice class facilities. According to the graduate respondents in focus group discussion, practical sessions were very important to equip their skills. They found teachers had sufficient knowledge and skills about the contents and process of the sessions. However, there was lack of learning materials/equipment necessary for teaching those skills. Sometimes they found the materials are too old and modern equipment were absent. One of the respondents said,

> *"We were blessed that our teachers were very knowledgeable about their job. They knew how to demonstrate a skill to the learners. However, our institute lacked sufficient materials for demonstrating the skills. Moreover, the equipment available in the institute were too old fashioned and worn-out due to repeated use for many years. Modern equipment was very rare. So we had to use the old fashioned equipment, some of those are not used in current industry. Due to lack of modern equipment and technologies we could not learn how these work in modern industries."*

Trainers also admitted the fact in their interview. They stated that the equipment had in the institute were many years old and institute could not replace it repeatedly as there was involved sufficient that is dependent on government in public institutes. In private institutes, financial strength are not sufficient and government need provide necessary support to furnish with sufficient modern equipment.

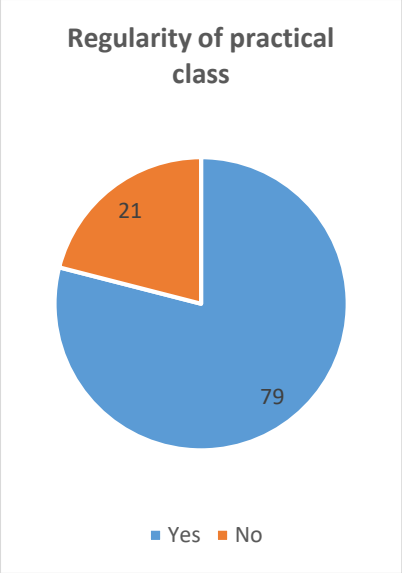

Figure 43: Regularity of practical classes during diploma course

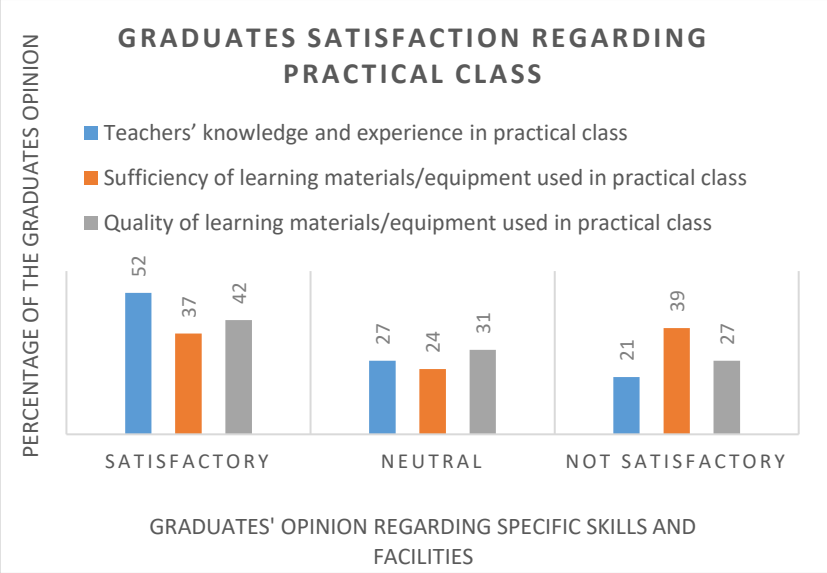

Figure 44: Graduates' satisfaction regarding practical class

Internship experience and its effectiveness

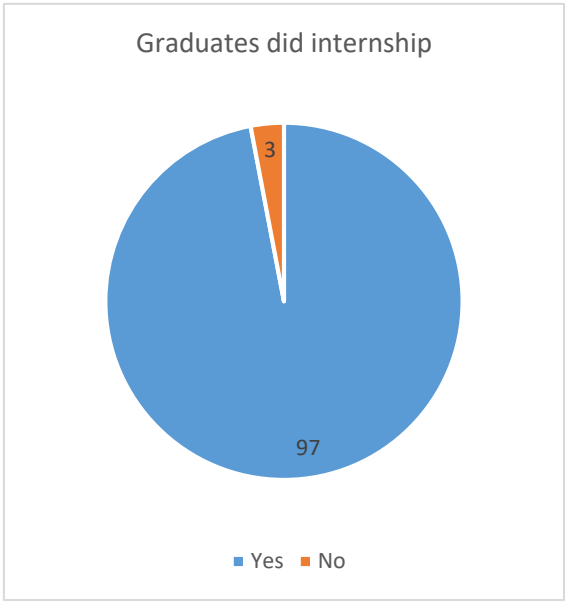

Figure 45: Percentage of the respondents did internship

Among all the graduate respondents, 97 percent reported that they did their internship as part of their diploma program (***See:*** *Figure 45*). However, getting opportunity in internship, its regularity and scopes were not equally satisfactory for the respondents. For example, around two-thirds of the respondents showed their satisfaction about sufficiency of internship opportunity in relevant industry and regular presence during internship (***See:*** *Figure 46*). Around three-fourths expressed their satisfaction about supervision and monitoring of internship activities. However, satisfaction regarding propriety of the training and scope of increasing employability skills was comparatively lower in rate. Around three-fifth of the respondents were satisfied with them. In FGD, the diploma graduates stated that sometimes their institutes did not arrange internship opportunity for them and they need to explore the scope by themselves that is very hard for a student who do not know the industry properly and have no link with anybody belong to the industry. They also reported that sometimes they need to do their internship in an industry that was not relevant to their specific technology. So that opportunity hardly helped them to equip their skills and create employability skills those need to resolve and institute should play main role for arranging proper internship opportunity. Institute heads also stated that they sometimes they cannot manage internship opportunity for all the students as there are many students in a batch. So then they request students to manage their own internship opportunity if

they have any connection with any industry. According to them, it is not imposed on students, rather a voluntary effort asked from them.

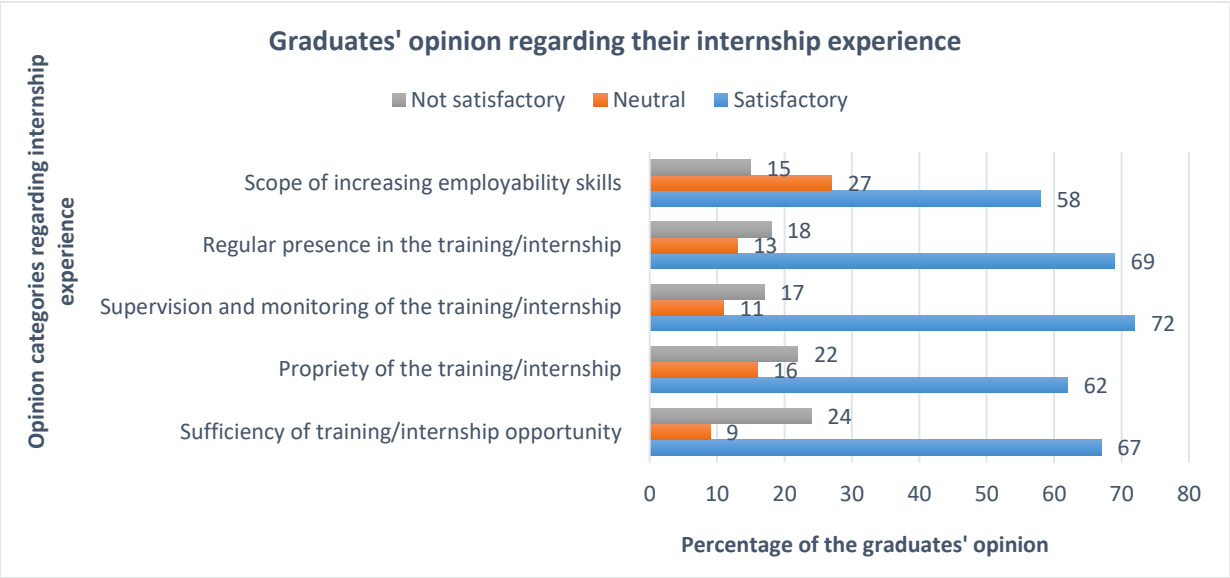

Figure 46: Graduates' opinion regarding their internship experience

Opinion regarding diploma course and curriculum

Graduate respondents' opinion regarding diploma course and curriculum showed that around 70 percent of respondents found theoretical part and practical part of the program satisfactory (***See:*** *Figure 47*). Around three-fourths of the respondents found assessment techniques and environment of examination center satisfactory while viva-voce of course assessment found satisfactory by 79 percent of the respondents. However, only 56 percent of the respondents were satisfied with the experiment report. In FGD, graduate respondents stated that the course design is quite relevant to the market demand. However, they found some gap between prescribed curriculum and implemented curriculum. For examples the said, the contents suggested in curriculum are not covered by the teachers in most of the time. Sometimes they found practical sessions got less priority though it was highly recommended curriculum. Moreover, they felt that practical skills should have more weight than written test in assessment.

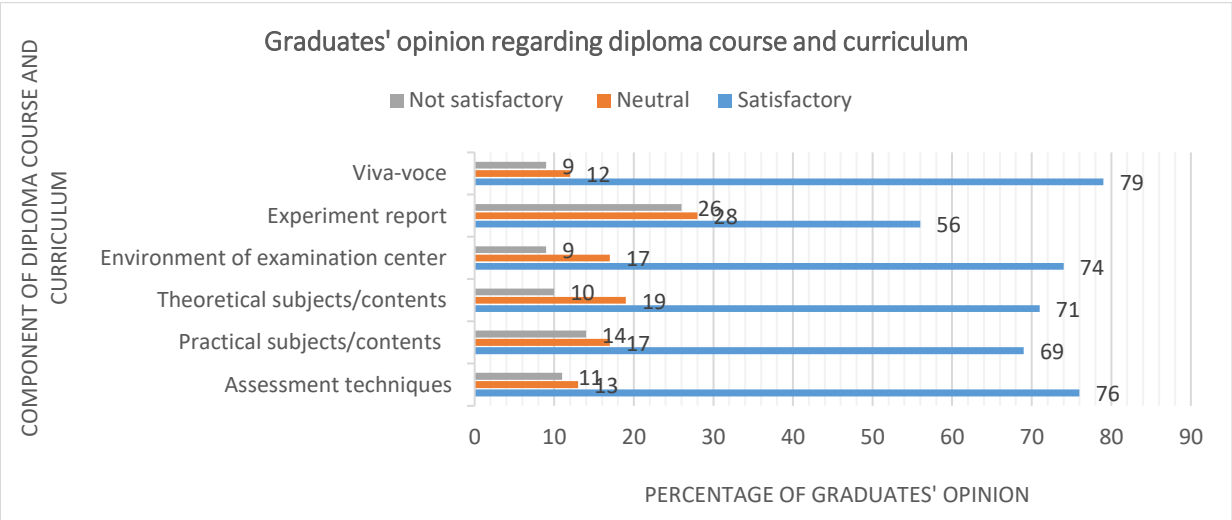

Figure 47: Graduate respondents' opinion regarding diploma course and curriculum

Job placement facilities in the institutes

According to the institute heads, 76 percent of the institute reached have job placement facilities (***See:*** *Figure 48*). However, when they graduates were asked only 26 percent respondents said that they found job placement support in their institutes. By institute type, only 16 percent of public polytechnic graduates found the facilities available in their institute, however, in private polytechnic 57 percent of the respondents found the facilities available in their institutes (***See:*** *Figure 49*). So there is a clear difference found in job placement facilities related statements between the institute heads and graduates. Institute heads stated that they had job placement service available for the students, however, students did not seek help most of the time. On the contrary, students stated that they even did not know that their institutes had any job placement service, so how would they seek the support from the institutes. Never teachers or institutes offered them the service. So availability of job placement service is not sufficient, rather need to inform the students properly and arrange relevant program by involving the students. One of the graduate respondents said, *"During my study period in polytechnic institute I never heard about any job placement service in the institute. It would be highly beneficial for students if institute would provide them job related support."*

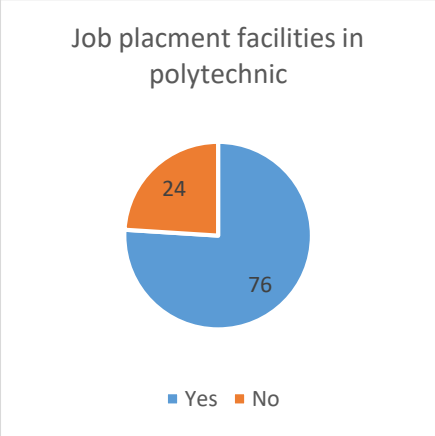

Figure 48: Job placement facilities in polytechnic institutes

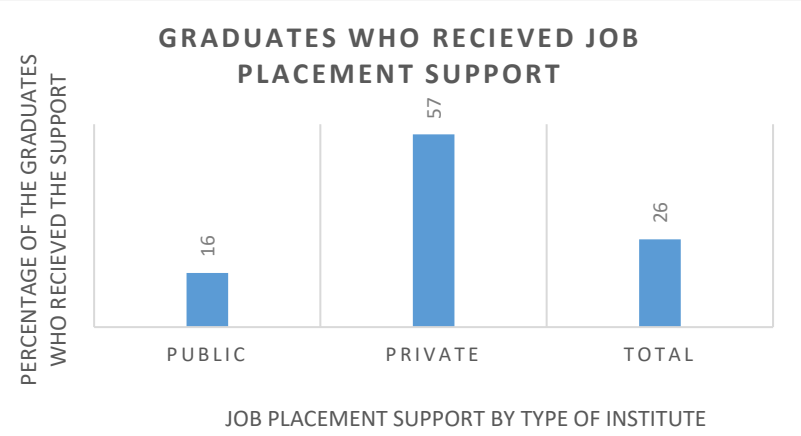

Figure 49: Graduates who received job placement support

Types of job placement service provided to the students

According to the institute heads, 84 reported that they share vacancy information with their students while only 28 percent students reported that they got vacancy information form their institutes (***See:*** *Figure 50*). 54 percent of the employers reported that they provide job advice to the students when 42 percent of the graduates stated that they got the service from the institute. For students' career counseling, 42 percent employers said that they arrange career seminar while 47 percent graduates replied that they found the support from their institutes. Among the employer, 36 percent opined that they arrange job fair for their students while 23 percent students reported that they found job fair arranged by their institutes. 82 percent of the employers reported that their teachers provide individual support to the students regarding job placement while 48 percent recognized that they got the support from their teachers (***See:*** *Figure 51*). According to the institute heads, 32 percent of them have employment partnership with industry for their students while 6 percent of the graduates reported that they found employment partnership of the institutes.

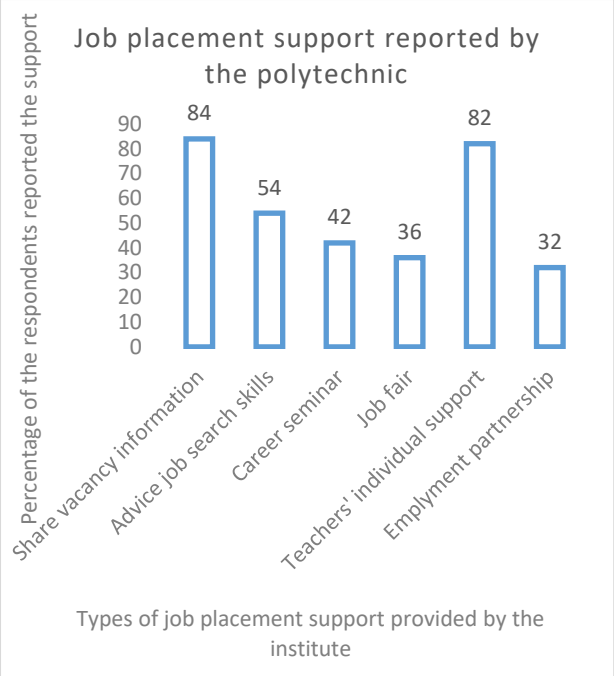

Figure 50: Job placement support reported by the polytechnic

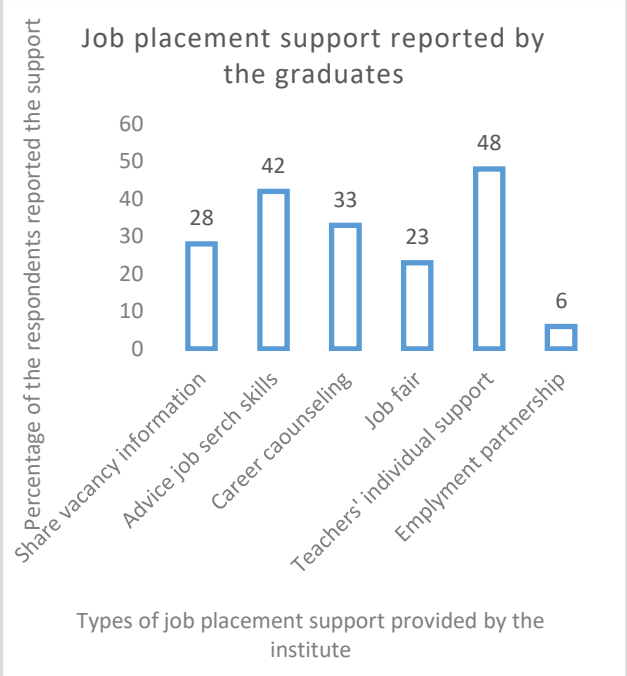

Figure 51: Job placement support reported by the graduates

the support but students are not well informed. Another reason could be provided information based on social desire by the respondents.

Industry collaboration

In response to the question regarding collaboration with industry, 68 percent of the institute heads reported that they have collaboration with relevant industries (***See:*** *Figure 52*). The types of collaboration includes workplace visit, guest lecture by the industry experts, apprenticeship opportunity, industry exposures for teachers and students, and curriculum revision. The most of the cause reported behind collaboration are workplace visit, guest lecture and apprenticeship exchange where the percentages are 89, 80 and 75 respectively (***See:*** *Figure 53*). Only 13 percent respondents reported collaboration for curriculum revision purpose. Both institute heads and trainers stated that they had collaboration with relevant industries. According one of the institute heads,

> *"Collaboration helps both institutes and industry by exchanging relevant experience, developing skilled human resource and ensuring their placement in industry. Though this collaboration institute can provide access to their students in industry to get firsthand experience, learn from the professionals, and be introduced with relevant industries. Moreover, institute can know about current market demand and revise their course accordingly. On the other hand, industries can work with the institutes to inform their HR requirement and get ready employees from the institutes that saves their cost for additional training purpose."*

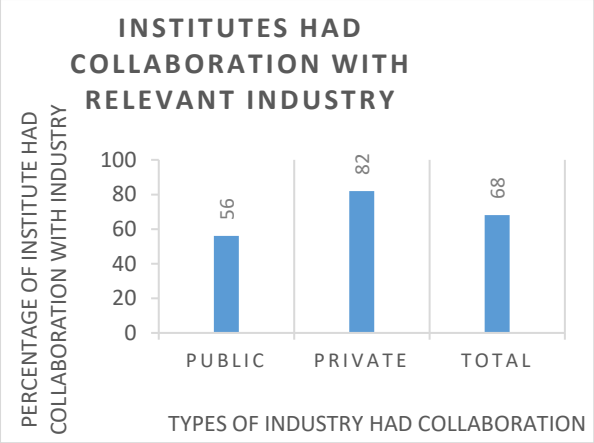

Figure 52: Institutes had collaboration with relevant industry

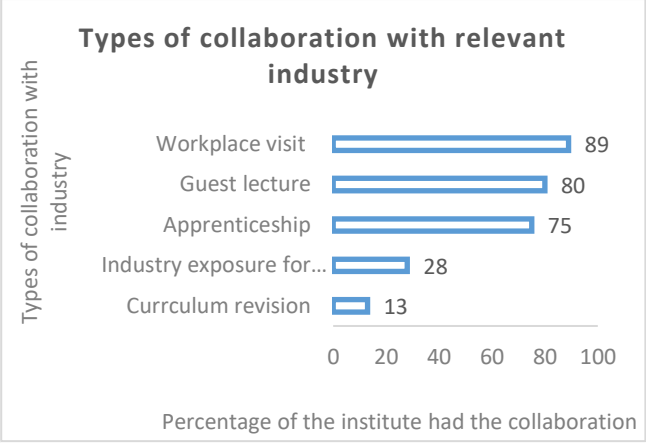

Figure 53: Types of collaboration the institutes had with relevant industries

Communication between employer and the institutes

In response to question regarding communication with polytechnic institutes, 17 percent of the employers reported that they communication with polytechnic institutes (***See:*** *Figure 54*). The purpose of their communications reported are staff recruitment, professional/personal relationship, inquiry about the job candidates from the teachers, students' industry attachment, guest lecture and curriculum review. Around half of the employers reported recruitment purpose behind their communication while 43 percent reported professional/personal relationship (***See:*** *Figure 55*). Inquiry about job candidates and students attachment in industry was reported by around one-third and two-fifth of the respondents respectively. Guest lecturing purpose is reported by 22 percent of the respondents and 9 percent reported curriculum revision for reason behind their communication with polytechnic institutes. During interview employers stated that there is some sort of communication between academia and industry for internship or recruitment purpose. However, they did not find it enough. According to them academia-industry collaboration could be from various ends. One of the employer said,

> *"There is huge scope of academia and industry collaboration that can be start from market demand survey and curriculum revision of the diploma program. Experienced industrialists and professionals can work as guest lecturer or students can visit industry for firsthand experience. Apart from internship and job placement opportunity, a regular exchange between industry and academia can be happen for mutual benefits of the relevant parties."*

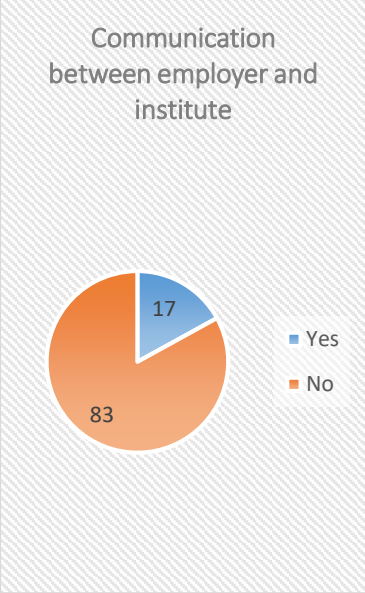

Figure 54: Communication between employed and institutes

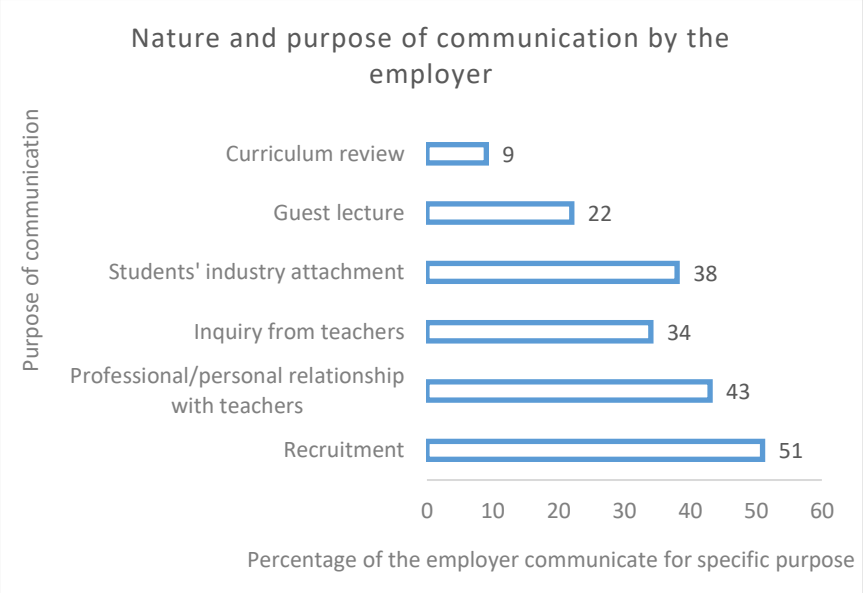

Figure 55: Nature and purpose of communication by the employers

Graduates' opinion regarding changes need in diploma program

Diploma graduates suggested different changes in the program to enhance its effectiveness and efficiency of the graduates considering job market demand. Around three-fourths of them suggested for inclusion of career guideline and support in the program (***See:*** *Figure 56*). Around two-thirds of the suggested effective collaboration with relevant industries. Enhancing presentation skills and communication skills were suggested by 63 percent and 47 percent of the respondents respectively. Among the respondents, 44 percent suggested foe increasing the scope of hands on practice of the skills and 37 percent suggested for emphasize on in-depth theoretical understanding of the technical concepts. In focus group discussion, graduate respondents suggested three specific changes those are regular and effective collaboration between polytechnic institutes and relevant industries for internship and job placement facilities, enhancing scope of hands on practice with modern equipment and facilities, and inclusion of soft skills in the program.

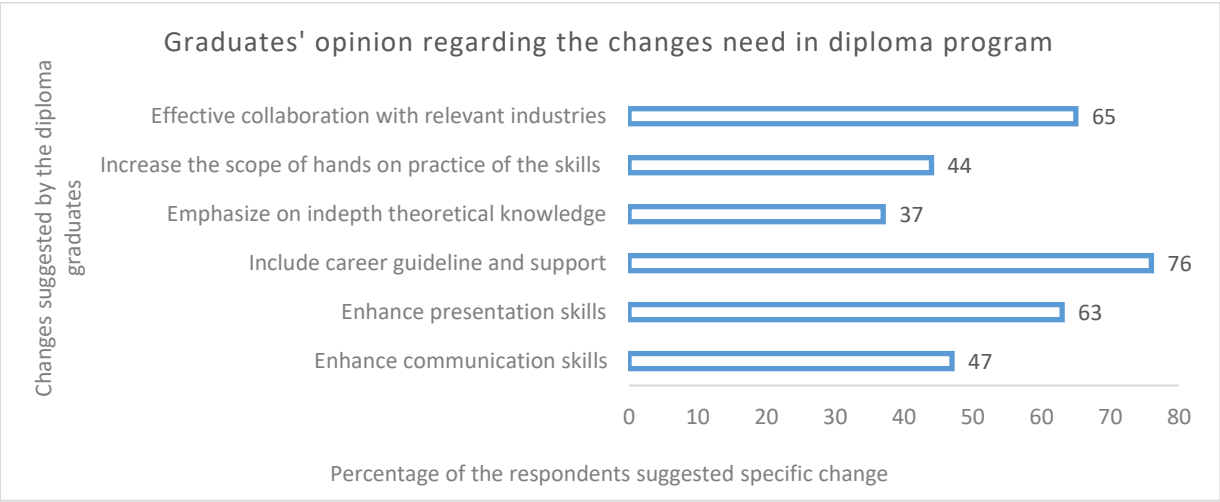

Figure 56: Graduates' opinion regarding the changes need in diploma program

Employers' suggestions regarding changes need in diploma program

Employers suggested different changes in diploma program considering current and future market demands. The suggestions are establishing effective linkage between academia and industry, emphasizing on hands on skills, curriculum revision considering the future skills demand, incorporating necessary soft skills training, emphasizing on communicative language learning, introducing industry collaboration cell in polytechnic institutes, introduce career guide and management cell, and establishing web based internship and job placement platform. Among the suggestions, hands on practice of skills, curriculum revision, academia-industry linkage and inclusion of soft skills were suggested by more than 70 percent of the respondents (***See:*** *Figure 57*). Other suggestions were also made by 59 to 68 percent of the respondents.

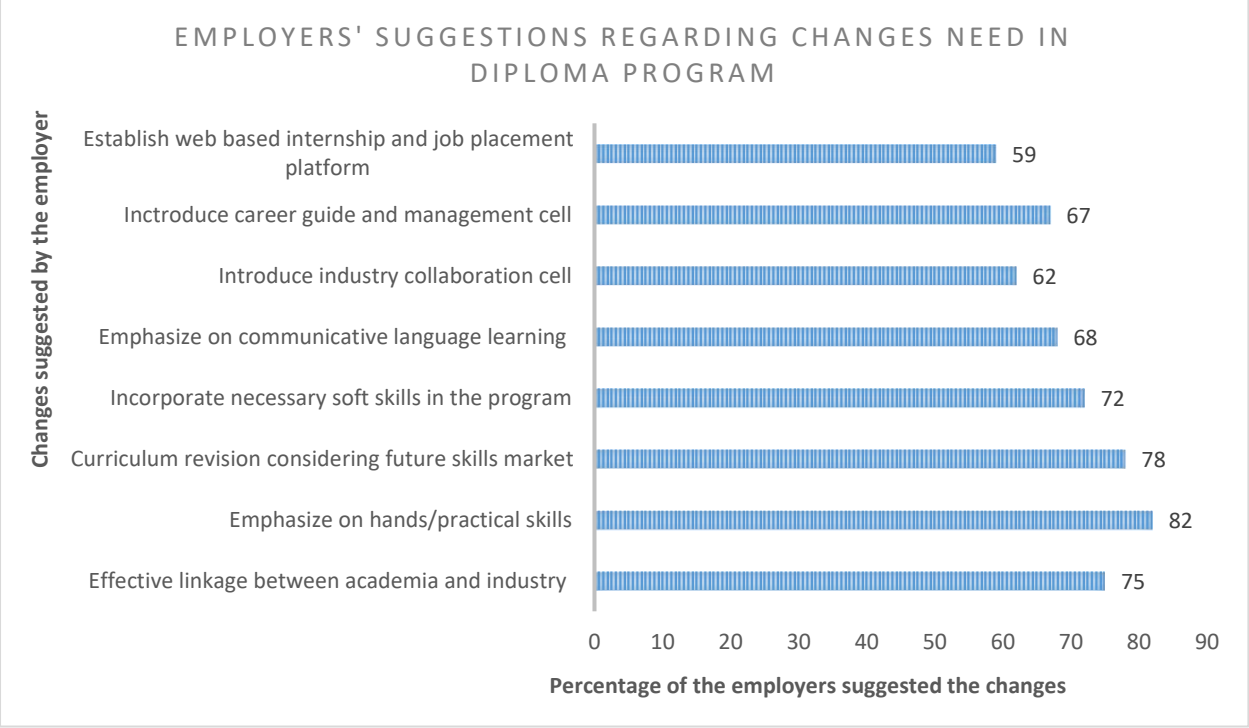

Figure 57: Employers' suggestions regarding changes need in diploma program

4.5 CHALLENGES THE DIPLOMA GRADUATES FACES REGARDING THEIR EMPLOYMENT

This section of the findings discussed the findings related to challenges in diploma program faced by the graduates regarding their employment and professional development. The detail of the findings are given below:

High rate of unemployment

Findings related to employment status of the graduate respondents showed that around two-fifth of the total graduates are unemployed that is one of the challenge for the diploma degree holders (***See:*** *Figure 20 & 21*). So, unemployment is a challenge for the diploma graduates when TVET is suggested for creating employment opportunity for the youth. Graduate respondents identified various reason behind their unemployment and among them lack of sufficient number of jobs compare to the diploma graduates, dissimilarities between expectation and available job, negative attitudes of the employer towards diploma graduates, and inefficiency of diploma degree designed

to properly equip the graduates with knowledge and skills are the main challenges (***See:*** *Figure 58*). These reasons need to be reinvestigated and resolved for development of this sector.

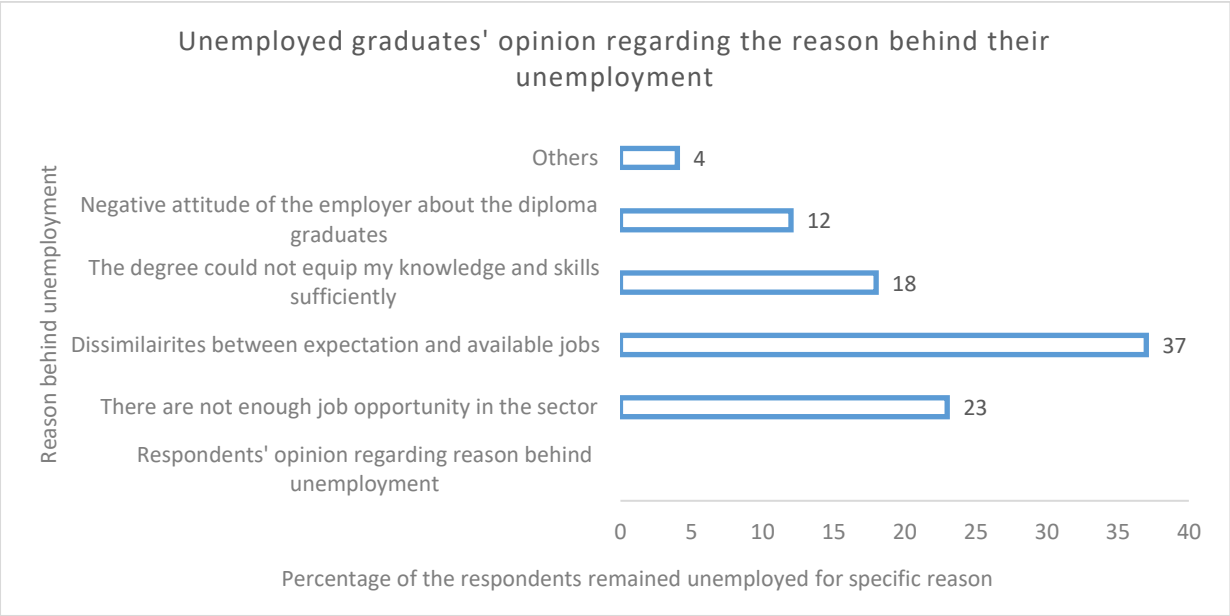

Figure 58: Unemployed graduates' opinion regarding the reason behind their unemployment

Other challenges the diploma graduates reported that they are backwatered and low paid compare to the general education graduates (***See:*** *Figure 59*). So their low paid employment and scope of development like other graduates make them demotivated. One of the graduate respondents said,

> *"We get ill treatment from the employers compare to the technical graduates from technical universities, or even from the general education graduates despite our sound technical knowledge and skills in our field. We are offered in lower position job and low paid job. Even in same job, we are offered less salary. This is a clear discrimination toward us that should be changed for development of the industry as well as for development of the diploma program."*

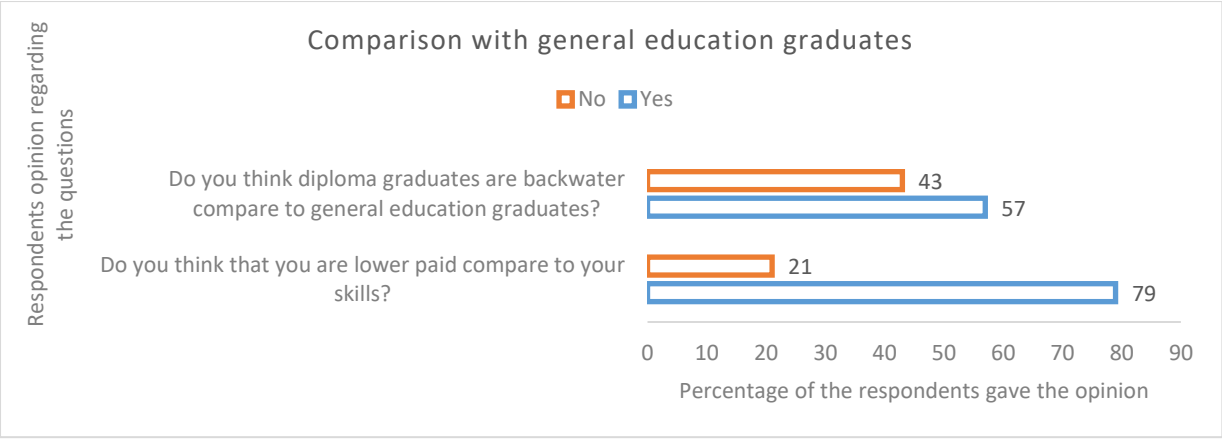

Figure 59: Comparison of diploma graduates with general education graduate

Skill gaps among the graduates

According to the employers' assessment about diploma graduates strength, they have shortage in oral and written communication skills in relevant language, critical thinking and problem solving,

decision making and leadership, career management, global/intercultural fluency and digital technology those are challenge for getting employment in current and future job market (***See:*** *Figure 60*). On the other hand, diploma graduates identified their skill gaps in the area of relevant technical skills, in soft skills, lack of in-depth knowledge and lack of sufficient preparation for recruitment.

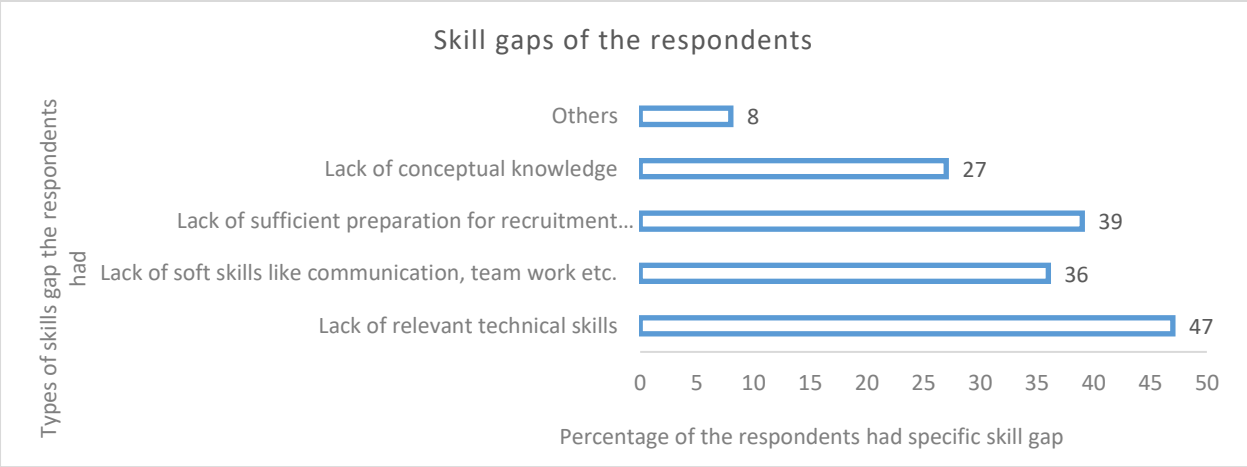

Figure 60: Skills gap of the graduate respondents

In focus group discussion, the diploma graduates mentioned some other challenges those are relevant to institutional arrangement for delivering diploma program and then support to the graduates after the program. The challenges they identified are:

- Polytechnic institutes lack sufficient quality materials for practical classes for learning different skills through hands practice by using those materials.
- There are many institutes those lack a proper internship management system with relevant industry and sometimes graduates need to manage their internship opportunity that is challenging for a young students.
- Except some renowned institutes, most of the polytechnic has no collaboration with relevant industry for internship and job placement. Thus both graduates and employer face challenge to find a perfect match for them.
- Another challenge is lack of analysis about future market trend so that students can choose proper technology for them and institutes can logically distributes the seats for different technology keeping an eye to the future skills needs.

Employers also mentioned about these challenges that hampers employment outcome of the diploma program. They added in an effective skill sector proper linkage between academy and industry is essential for mutual benefit. However, in our system academia-industry linkage is not effective enough where industry experts can exchange their experience with the institutes and students to shape the curriculum and human resource development plan through the diploma program. For the same reason industry suffers with skill mismatch and graduates fail to find their suitable employment opportunity.

CHAPTER FIVE: CONCLUSION

5.1 CONCLUSION

Based on the findings, it can be said that diploma in engineering program is serving the graduates as a valuable pathway for socio-economic mobility by providing the technical skills needed for employment in industry and service sectors. Most of the graduates in polytechnics are found to be graduates are from rural areas and the sector is male dominated.

Graduates' levels of satisfaction over the quality and relevance of polytechnic education and training is generally high. Graduates responded quite positively about the relevance of training contents and quality of technical skills trainings at polytechnics. The fact that the responses from graduates, who would be more aware of requirements of the real world of work, are consistent with the students' positive views suggests that training programs at polytechnics are indeed meeting the basic technical skills demand of industries, at least at the foundational levels. Employers' opinion also corroborates this. Practical technical skills are found to be one of the areas that employers of polytechnic graduates value highly.

At the same time, more efforts are urgently needed in modernizing facilities and equipment of polytechnics, updating teachers' technical skills, nurturing soft skills such as communication skills and problem-solving skills, and strengthening ICT skills for work. Conditions of facilities and equipment at polytechnics are seen as least satisfactory by graduates. Teachers' technical skills are also rated less satisfactory.

Despite the generally positive responses towards the quality and relevance of training programs, graduates seem to see weaknesses in the institutions' capacity of training delivery. Polytechnics are often deprived of investment in modern equipment and tools for training in spite of the rapid evolution and advancement of technologies in today's industries. Many of the polytechnic teachers are also severely underinvested in terms of continuous professional development and exposures to the latest technologies. Employers also want to see more improvement in practical skills of polytechnic graduates. MoE should continue its efforts towards upgrading the infrastructure for polytechnics, expanding training and industry exposure experience for teachers, and incorporating a greater range of practical skills training. Soft skills such as communication skills and problem-solving skills are seen by students and employers as another area for improvement in polytechnic training. The nature of today's technical works increasingly requires workers to be team workers, efficient communicators, and active problem solvers. In addition to traditional technology-focused subjects, polytechnics should also teach students some basic soft skills that would make them more productive workers. MoE should enhance the quantity and quality of soft skills training at polytechnic institutions.

After completing polytechnics, graduates would have to face daunting employment prospects as job search performance among polytechnic graduates has been considerably below expectation. Only about a third of the polytechnic graduates would land a full-time or part-time job within two years of graduation. It would be far below the expectation of polytechnic students who chose to enroll in polytechnics with the hope that technical diploma qualification will help them find good jobs in future. Apparently technical diploma certificate would not be adequate in many cases to find the kind of jobs that polytechnic graduates are typically looking for. As a result, 29 percent of polytechnic graduates straight moved on to further education and training without first trying to find jobs. As such, job search would be an uphill battle especially for students who have no or

few reliable family networks in urban areas where most of technical jobs exist. As a consequence, around one-third of the graduates would remain jobless even after two years of graduation. Two years of unemployment would render whatever skills they learned in polytechnics outdated and rusted. Furthermore, unemployment is significantly more common among graduates who went back to rural areas where jobs that require technical skills are fewer.

Female polytechnic graduates are faring far worse than their male peers in job placement outcomes. The government's efforts to increase the number of female enrollment in TVET has so far resulted in a steady increase in the share of females in polytechnics; however, the employment status of female polytechnic graduates seems to offer no comfort. Around 40 percent of female polytechnic graduates remain unemployed after three to five years of graduation, which is considerably higher than among male graduates. Male and female graduates are equally likely to look for work, but would face completely different job prospects. This would be extremely discouraging for girls who might consider taking technical training for their post-secondary education, and betray the image of technical training as a quicker way to employment.

To make matters worse, job options for female graduates appear to be rather limited compared to males as around a third of wage-employed female graduates found jobs in education and training institutions, which is three times higher than among wage-employed males. Female students are also more likely to rely on informal personal and family networks and on the institutions for job search. They are far less likely to find jobs through open advertisements than their male counterparts. In this sense, not only they are less likely to find jobs within more limited options, but also their job searches are more likely to be subject to pure chances in terms of how reliable their family network is or how capable their institution is of supporting them.

Once stuck in unemployment, prolonged joblessness seems to haunt many of the polytechnic graduates. This is an extremely worrying sign. It appears to be indicating a challenging scenario that Bangladesh is about to encounter by producing a generation of unemployed educated youths. Even after spending two and five years after completing polytechnics, around 40 percent of graduates still remain unemployed, respectively, while the share of employed graduates remains constant, indicating that many of the unemployed graduates have shifted to further education and training in the meantime. Most of them are not unemployed because of job changes. Such prolonged unemployment would make youth lose hope in job search and degrade their hard-earned skills, which would make their chance of finding jobs even slimmer. However, they seem less willing to explore different occupations or lower paying jobs that do not meet their expectations. Also, the idea of going into self-employment seems to have fallen off their mind. The main perceived reason for their remaining unemployed is a shortage of good jobs in their localities, and they seem to remain confident about their technical skills. As graduates of post-secondary education, they seem to maintain certain high expectations about the kinds of work they would do and the levels of income they would accept. Many of them also reported they would consider pursuing further education and training to improve the chance of employment, which would further stretch out the period of their de facto unemployment and would create greater financial pressure on their families. Many of the unemployed polytechnic graduates seem to be deep in limbo where their hard-earned education qualifications are not leading to jobs that they thought they would be eligible for, but they are yet to be willing to compromise on their expectations.

For those who are fortunate enough to be wage employed, the majority are working as technical staff in private enterprises of varying sizes in a wide range of industries, particularly in

manufacturing and construction businesses. If polytechnic graduates manage to land themselves wage jobs, they seem to be working in positions that are suitable for polytechnic graduates (i.e. technicians, engineers, and professionals). They typically start their career as assistant engineer/technician and move up the ladder. In this sense, polytechnic institutions are successfully supplying skilled professionals to fill intended positions in the labor market.

Manufacturing businesses absorb the highest share of wage-employed polytechnic graduates, followed by construction enterprises. There are the growing industry sectors in Bangladesh economy today. Polytechnics are demonstrably a valuable supply source of technical skills needed in such booming industries. Firms in ICT business – another emerging industry in service sector – are also employing a good share of polytechnic graduates, both male and female. It is noteworthy that most of the employment for polytechnic graduates are found in private for-profit enterprises while employment in public entities are rare. While this is undoubtedly a disadvantage for polytechnic students in term of available job options, it also makes the role of polytechnics unique and distinct as a supplier of skills for industries. This would only strengthen the case for furthering the partnership between polytechnics and industries and integrating industries' demands in training programs in more substantive manners.

Among the employed, female polytechnic graduates are at a disadvantage relative to their male peers in terms of qualify of employment. There are stark gender differences among polytechnic graduates over the entire range of employment conditions and entitlements, including stability of contract, wage level, and wage increases. Female graduates are more likely to be put on less secure contracts, including part-time and contractual employment rather than full-time permanent employment. Wages are also suppressed for female graduates. Female polytechnic graduates are on average earning only 75 to 80 percent of income of male polytechnic graduates of the same age without controlling occupations. This is by no means limited to polytechnic graduates, and is a prevailing feature of the Bangladeshi labor market. However, if remunerations are to be based on the principle of merit and individuals' work performance, highly trained female workers with sound technical skills should be remunerated more equally as highly trained male workers. Discrimination against females' technical skills would not only discourage female graduates in workplace performance but also send secondary school students and their families a strong negative signal that skills training for females will not be worthwhile investments.

Self-employment as an alternative strategy for employment have yet to prove to be a viable option for polytechnic graduates. Advocates of TVET often claim that technical skills would open up a new possibility of self-employment for unemployed youth. While this success story does come true for some of the technical training graduates, the likelihood of becoming self-employed appears to be minimal. Only four percent of the graduates are found to be self-employed. Even among the unemployed, only a handful are considering going into self-employment as an alternate option. What makes self-employment unviable for polytechnic students are not immediately clear; however, one reason would be a lack of access to capital. Another plausible reason would be a lack of business skills among polytechnic graduates. Polytechnic curriculums do have a course on entrepreneurship; however, it does not seem to be imparting adequate practical skills for building and managing businesses.

A third of the polytechnic graduates move on to enroll in other education institutions, typically universities and faculties of engineering to pursue higher-level qualifications; an engineering diploma from polytechnics may not be an adequate qualification for some industries. Completion

of the four-year diploma course at polytechnics makes graduates eligible to apply for universities. It is evident from the finding that a substantial proportion of polytechnic students are using polytechnic education as a stepping stone towards admission in universities. Around 29 percent of the graduates did not engage themselves in job search and moved straight to the next academic career. One of the common coping strategies for unemployed graduates is to pursue additional education and training opportunities. It is also noteworthy that a significant part of the 'employed' polytechnic graduates are considering obtaining higher education degrees in technical and engineering fields.

Taken together, it seems to indicate that polytechnic diploma is no longer seen by many as terminal qualification for many technical professionals. Rather, be it for job search or for career promotion, modern industries in Bangladesh today are increasingly demanding their technical staff to have higher education degrees in relevant technical fields. Whether such pressure for higher qualifications is stemming from excessive labor market competition (i.e. oversupply or mismatch of skills) or from technological advances is not immediately clear. What is clear is the fact that around a third of the polytechnic students will move ahead with higher education after graduation, and career guidance at polytechnics would need to take account of the entire ranges of options available to students, including not only job market but also possible higher education options most suitable for students' aspirations and capacity.

5.2 RECOMMENDATIONS

This study has generated much insights and evidences that shed lights on the strength and weaknesses of polytechnic education in relation to graduates' skills acquisition and employment. Based on those, this final section discusses and sets forth 10 recommended policy alternatives and educational strategies which would enhance the quality and relevance of training and ultimately, the job market outcomes of graduates.

- Place graduates' employment firmly and squarely at the center of efforts for improvement of the polytechnic system. First and foremost, employment prospects of polytechnic graduates need to be improved if polytechnics are to continue to be a meaningful career pathway for students. The employment- centered approach would encompass the entire spectrum of polytechnic system's actions, including governance structure, institutional planning, monitoring and evaluation, curriculum design, teacher management, industry linkage, teaching facility and equipment, and job placement services; and should gear them strategically towards achieving better employment outcomes. The current poor employment performance, if left unaddressed, may pose a serious, even existential, threat to the polytechnic system. Polytechnics cannot afford to continue producing unsatisfied graduates, and needless to say, joblessness takes a heavy toll on individuals and the system alike. Unemployed trained youths are human capital gone wasted and harmful to the economic growth as well as individuals' wellbeing and quality of life. The polytechnic system needs to be more thoroughly committed to making its training relevant to the industry needs and being more accountable to the employment outcomes of its students.

- Give greater emphasis on higher-order cognitive skills and soft skills training such as problem-solving skills and communication skills in pedagogy and curriculum in polytechnics; embracing fully competency-based training should be a priority to pave the way for a more flexible demand-driven curriculum. More and more employers in different industries in Bangladesh are coming to view the soft skills of employees as a critical asset for the

productivity of their workplace and see that Bangladeshi youth are in general not well prepared in soft skills. This survey also found that soft skills are one of the areas that employers want to see improved. It is recommended that the Board and polytechnics introduce in their curriculum special training programs specifically with an aim to impart essential soft skills to students (e.g. communication, team work, problem solving, critical thinking, etc.). To respond to the skills needs of industries, it would be beneficial if Bangladesh's polytechnic system fully embraces the competency-based training model. The BTEB has introduced National Technical and Vocation Qualification Framework (NTVQF), but the implementation has been lagging. Steady transition to NTVQF based training courses up to the diploma level should be one of the high priority agenda for Bangladeshi TVET system.

- Invest more to upgrade the technical and teaching skills of teachers as well as equipment and facilities. These are areas where students and graduates are least satisfied with and where employers would like to see more improvement. Improvement of employment outcomes cannot be accomplished without ensuring the quality and relevance of education and training imparted in polytechnics. Partnership with industries may well play a role in increasing the opportunity for teachers to have industry exposure to the latest technologies. This becomes even more important when the majority of teacher do not possess working experience in industries as found in this survey. Teacher training for polytechnic teachers, both pre-service and in-service, should be strengthened to improve their pedagogical skills. TVET teacher training policies as well as roles of Technical Teacher Training College (TTTC) have to be reviewed. More financial resources from the government are apparently needed to modernize facilities and equipment to keep up with the basic requirements of modern industries. To diversify sources of financing, MoE and polytechnics should consider possibilities of 'revenue generation' as part of the activities of polytechnics through the provision of life-long training and skills assessment to workers in their localities. Special attention should be paid to soft skills training. More than ever before, in the face of rapidly evolving technologies and globalized business operations, the success of technical experts is defined by the mastery of soft skills that allow them to work effectively and deliver solutions. A new curriculum can be developed and implemented to introduce soft skills development programs in polytechnics.

- Further strengthen partnership with industry in an effort to improve the quality of education and promote graduates' employment. Repeated recommendations have been made countless times about the importance of forging strong partnership with industries. This report also finds yet another evidence of weak industry collaboration and engagement. Most of polytechnics have only a small number of partners, and some do not even have a single partner. Most of the employers, despite having hired polytechnic graduates before, do not have any regular communication, let alone formal partnership, with polytechnics. Industry partnerships are widely known to be extremely useful to ensure the relevance of training programs. Furthermore, industry partners are also potential employers. As found in this survey, establishing and maintaining regular communication channels with them would likely contribute to enhancing the chances of polytechnic graduates finding jobs with those employers.

- Expand and improve job placement support services to students at the institution level. Under the STEP, most of the participating polytechnics have introduced employment cells or career support centers in their institutions that are responsible for supporting students through the job

search process. However, they are still at a nascent stage, and still obscure in terms of their role and presence. It is found that most of the services provided so far have been counseling and advisories. While those will undoubtedly benefit students, more systematic and institution-based support services are yet to take root in many of the polytechnics. For instance, institution-wide actions such as organization of job fairs and career seminars, partnering with industries for preferential job placement, and establishment of alumni networks are still not frequently done, but would have a substantive impact on raising institutions' capacity to support students. Moving forward, polytechnic institutions should emphasize on how they can institutionalize employment cells and job placement support services at the institution level. In particular, public polytechnic institutions have a lot of work to do.

- Strengthen graduate tracking programs at the institutional level to support more systematic and active job placement support. Tracing the whereabouts and job status of former students is essential for designing and implementing functional high-quality job placement support strategies for polytechnics. Proper identification and analysis of the employment pattern and history of past graduates would offer valuable clues as to what the best strategies might be for the future graduates. At present, job placement services offered at polytechnics are not adequately based on evidences due to the lack of systematic collection of employment data from previous cohorts of graduates. Employment cells should introduce and institutionalize a graduate tracking mechanism. Already some of the private polytechnics have such a system in place where staff in charge of the employment cell maintains and update regularly a database of graduates and their current status mainly through contacting them over phone periodically.

- Institutionalize periodic tracking surveys of polytechnic graduates at a national level by Directorate of Technical Education. Many countries have established periodic graduate tracking programs for their technical and higher education systems. The central skills development agency has a critical role in ensuring the availability of relevant public knowledge about how skills training rendered by polytechnic institutions are benefiting the labor market. To do this, it is essential that updated systemic data are available that demonstrate how diploma graduates are faring in the labor market and how employers are viewing the skills of the graduates. This study was a pilot in this sense which provided a snapshot of graduates' employment outcomes, and should be continued under the MoE. Conducting periodic graduate follow-up surveys and establishing a graduate database should be part of the regular task of DTE. Information obtained through the follow-up surveys would be the evidence base for designing of courses and strategizing job placement services. Tracking can be done in different ways with different cost implications. Detailed efforts made in this study are one of the costly ways; however, such detailed data collection does needs to be done on a regular basis. Cost-effective methods such as telephone survey or email survey should be explored as the way to establish a sustainable and regular graduate follow-up mechanism.

- Forge stronger ties with industry communities who would accept female technical specialists and technicians to boost job outcomes for female graduates. While male graduates struggle with job search, female graduates are bearing the full brunt of unfriendly job market environment. The disappointing state of female graduates' job placement that this survey

found call for tailored and targeted interventions to uplift the employment outcomes of female students. Given the differences in job search strategies between male and female students, job placement support for female students may well be somewhat different from that for male students. Female students are more likely to find jobs through networks (i.e. through personal and institutional references to potential employers). Polytechnics have a bigger role to play to refer their female students to companies which are receptive to the hiring of female technical workers. More companies need to be brought into partnership with polytechnics for finding posts for female graduates. In this case establishment of a web based internship and job placement platform can support the purpose as well as reduce the cost and labors.

- Provide special training programs on entrepreneurship and business management to encourage entrepreneurship for polytechnic students. Without a doubt, starting a business is not for everyone. Nonetheless, the near absence of self-employment among polytechnic graduates is indicative of the lack of appetite for running one's own business as well as lack of practical knowledge and skills needed to be an entrepreneur and manage business operations. Expanding self-employment and entrepreneurship is certainly one of the ways to achieve greater job creation and a vibrant economy through skills development. A range of skills and know-how are useful for potential entrepreneurs, including skills such as how to identify business opportunities, raise funds, market your services, and manage accounts, etc. These skills would be of significant values not only for graduates who would start up businesses soon after graduation but also for those who may become entrepreneurs after gaining some years of work experience. Current programs for entrepreneurship at polytechnics are not so conducive or practical. DTE/BTEB, working with the partners, should develop and implement practical entrepreneurship training programs for polytechnic students.

- Further strengthen the evidence-base in technical education to drive evidence-based discussion and policy making towards more and better employment. This study has answered many questions; however, there are still a lot of evidence gaps to be filled. Knowledge about teaching practices and teacher competencies at public and private polytechnics are generally lacking. It would be necessary to conduct comparative analysis with employment opportunities and skills segments for graduates from other types of institutions such as general academic stream, colleges, and universities. More in-depth analysis on types of skills that employers are seeking from technicians and engineers would also be essential for future efforts to improve employment outcomes. A much better understanding of the skills demand and influencing factors is needed to analyze the reasons for high graduate unemployment despite the persistent claim of skills shortage in industries. Job markets are often imperfect, and knowledge on job market frictions and ways to alleviate them would be extremely useful. Insight into career progression and mid-career training opportunities for professionals, engineers and technicians would be crucial to design suitable training programs for upskilling needs and mid-career trainings. Moving forward, further investigations in the technical education sector are warranted to build a stronger evidence-base to steer policy discussions to the improvement of polytechnic education and graduates' employment outcomes.

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