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Tracer Study

BANGLADESH: COMPUTER AND SOFTWARE ENGINEERING TERTIARY EDUCATION IN 2018

SEPTEMBER 2019

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COMPUTER AND SOFTWARE
ENGINEERING TERTIARY
EDUCATION IN 2018**

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FOREWORD

Bangladesh was the fastest growing economy in 2018 in Asia, in large part due to its ready-made garment industry, which is the world's second largest after the People's Republic of China. Many reasons explain the rise of the Bangladeshi ready-made garment industry, among which are the hardworking Bangladeshi women and low labor costs. Yet it is education and skills development that have been instrumental to success. Access to primary and secondary education has improved remarkably to meet the basic requirements for entering the ready-made garment industry. Since 1978, leaders in the sector have gained experience through overseas skills development training, such as with Desh Ltd. (Bangladesh) and Daewoo Corporation (Republic of Korea). The returning skilled leaders left Desh Ltd. and started their own garment businesses by bringing in technologies and production systems customized to the Bangladeshi workforce.

Now, Bangladesh needs more leaders and stronger human capital to diversify its growth engines in order to achieve the long-term goals of Vision 2041. Several industries have strong endowments to growth, such as food processing (crustaceans), pharmaceuticals, leather-based products, footwear, automobiles, and bicycles. These industries are identified as priority industries in the southwest, and more nuanced industries will be identified through an upcoming Asian Development Bank (ADB) study focusing on the Northeast Bangladesh Economic Corridor.

The information technology and information technology-enabled services (IT/ITES) industries require skilled human resources to unlock their potential. This will provide the foundation for take-off, which, for now, is falling short. As envisioned in Digital Bangladesh, the IT/ITES industries can adopt the latest technologies across different industries and should grow hand in hand with other drivers of growth.

Access to quality higher education must rise to develop future industry leaders in IT/ITES. While the gross enrollment rate of tertiary education in Bangladesh has more than doubled from 7.7% in 2007 to 17.6% in 2017, this is still below the lower-middle-income country average of 24%. Demand for higher education in Bangladesh will surely increase as the economy expands; thus, the question now is what higher education fields should Bangladesh prioritize for investment. The IT/ITES industries need skilled graduates who can work up to global standards.

This tracer study, which aims to improve the labor market outcomes of tertiary graduates of computer science and engineering and/or institutes of information technology in Bangladesh, will help in the preparation of a new higher-education project in the country to be funded by ADB, the Improving Computer and Software Engineering Tertiary Education Project. While that project selected only four universities, this tracer study covered an additional five universities in Dhaka. I hope that the study findings will prove informative and improve computer science and engineering and/or institutes of information technology beyond the nine universities included.

In addition, ADB is producing a series of tracer studies in South Asian countries for evidence-based policy and practice, and this tracer study in Bangladesh is the second in the series and serves as a source of quality evidence. It is my sincere hope that this series of tracer studies will spark productive policy discussions to find solutions on the learning crisis and youth unemployment in South Asia, as well as in other parts of Asia and the Pacific.

Hun Kim
Director General
South Asia Department, ADB

PREFACE

The Government of Bangladesh, in its Vision 2021 strategy, aims to develop an informed, knowledge-based, technology-oriented, and gender-equitable learning system for all. In line with this vision, the government, under its Digital Bangladesh program, aims to unlock the potential of the information technology and information technology-enabled services (IT/ITES) industry in the country, by equipping young talent pools with up-to-date and industry-relevant knowledge and skills. As such, this tracer study provides evidence to inform and design better policy interventions for IT/ITES education and training.

Building on the country's strong economic growth in recent years, the government aims to expand and diversify its economic base by using digital technologies to boost the IT/ITES industry and take advantage of new digital and high-tech innovations. This, in turn, is expected to provide decent jobs to youth and help the economy ascend to higher development. Such objectives require revisiting and developing the current IT/ITES system. Understanding global and local market trends, as well as identifying foundations in the industry that need to be developed, are critical to upholding the vision of Digital Bangladesh.

This tracer study is the second in a collection of quality tracer studies in South Asian countries published by Asian Development Bank (ADB). This study tracks the graduates of computer science and engineering and/or institutes of information technology (CSE/IIT) from nine universities in Bangladesh. It assesses the employability of the graduates; examines access to and quality and relevance of the CSE/IIT university programs; and identifies possible areas for improvement.

The nine universities in Bangladesh were selected based on university ranking, capacity, and proximity to information technology (IT) parks in order to process the Improving Computer and Software Engineering Tertiary Education Project funded by the ADB. The nine universities—four public, four private, and one international university—are (i) Bangladesh University of Engineering and Technology, (ii) University of Dhaka, (iii) Jahangirnagar University, (iv) Jashore University of Science and Technology, (v) Ahsanullah University of Science and Technology, (vi) BRAC University, (vii) Daffodil International University, (viii) East West University, and (ix) Islamic University of Technology.

Ryotaro Hayashi, Social Sector Economist, Human and Social Development Division (SAHS), South Asia Department, ADB; Kairon Shayne Garcia, ADB consultant (Philippines); Bijon Islam, Chief Executive Officer, Light Castle Partners, Bangladesh; and Fableeha Choudhury, Light Castle Partners, Bangladesh, prepared the study. The report benefited from the guidance of Gi Soon Song of ADB. ADB peer reviewers were Elisabetta Gentile, Economist, Economic Research and Regional Cooperation Department; and Kirsty Charlotte Newman, Senior Education Specialist, Sustainable Development and Climate Change Department. Minhaj Mahmud, Senior Research Fellow, Bangladesh Institute of Development Studies; Amitabh Lahiri, ADB consultant (India); Akihiro Soji, Japan International Cooperation Agency Expert; Matin Abdullah, Associate Professor, BRAC University; and Syed Akhter Hossain, Professor and Head of CSE Department, Daffodil International University, also provided valuable comments. Alfredo P. Garcia of SAHS provided administrative assistance.

Sungsup Ra

Director

Human and Social Development Division
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ABBREVIATIONS

ADB	Asian Development Bank
AUST	Ahsanullah University of Science and Technology
BUET	Bangladesh University of Engineering and Technology
CSE/IIT	computer science and engineering and/or institute of information technology
DIU	Daffodil International University
EWU	East West University
ICT	information and communication technology
IT/ITES	information technology and information technology-enabled services
IIT	Institute of Information Technology
IUT	Islamic University of Technology
JUST	Jashore University of Science and Technology

CURRENCY EQUIVALENTS

(as of 27 May 2019)

Currency Unit – taka (Tk)

Tk1.00 = [\$ equivalent]

\$1.00 = Tk84.00

EXECUTIVE SUMMARY

Bangladesh was the fastest growing economy in Asia and the Pacific in 2018. Sustaining this momentum requires new engines of economic growth other than its ready-made garment industry. The government sees tremendous opportunity in the information technology and information technology-enabled services (IT/ITES) sector by upholding the vision of Digital Bangladesh from 2010. Bangladesh has strengths to realize this vision. These include a large domestic market, young talent pools, and relatively low labor costs.

However, the government has been struggling for a policy mix that can unlock the potential of the IT/ITES industry in Bangladesh. Although the IT/ITES industry has been growing, expansion could have been faster if solid foundations had been developed. For this, while infrastructure such as high-speed internet and office space is indispensable, it is a skilled workforce that adds value to IT/ITES products and services.

This tracer study was commissioned by the Asian Development Bank (ADB) along with employer surveys in the Bangladesh IT/ITES industry. Data were collected in 2018 by an independent survey firm, and this report presents the key findings. The findings are expected to better inform policy and project design, which can foster the development of sound computer science and engineering and/or institute of information technology (CSE/IIT) programs in the higher education system. This would help support IT/ITES industry development by developing professionals, managers, and leaders in this industry.

The tracer study, initiated to help close the evidence gap between demand and supply in the Bangladesh IT/ITES industry, has three objectives: (i) assess the employability of CSE/IIT graduates in nine universities, (ii) understand access to and quality and relevance of the CSE/IIT university programs, and (iii) identify possible areas for improvement.

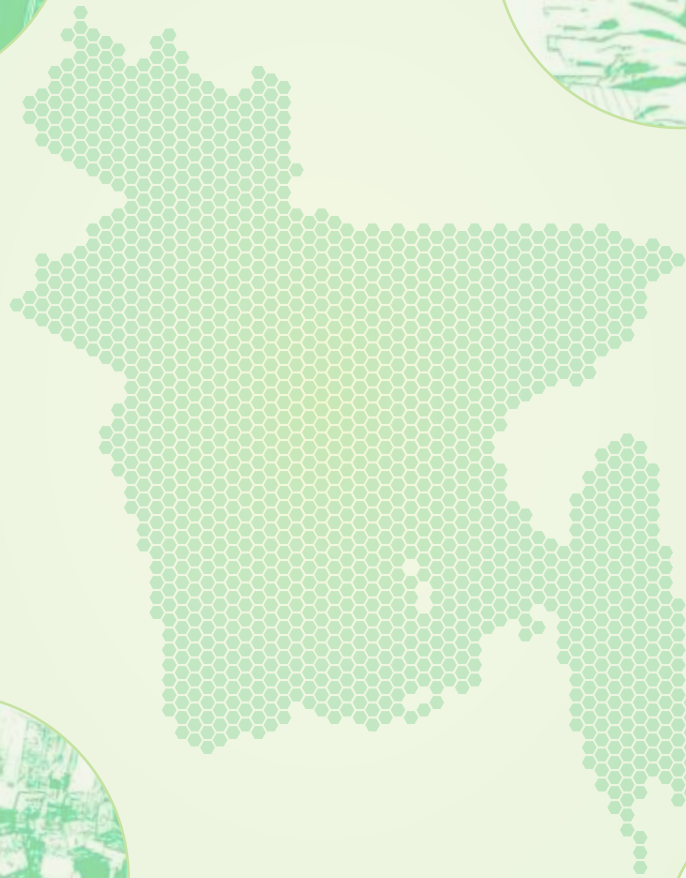
The nine universities are (i) Bangladesh University of Engineering and Technology, (ii) University of Dhaka, (iii) Jahangirnagar University, (iv) Jashore University of Science and Technology, (v) Ahsanullah University of Science and Technology, (vi) BRAC University, (vii) Daffodil International University, (viii) East West University, and (ix) Islamic University of Technology. The findings were derived from the quantitative survey results tracking 1,216 graduates during 2013–2018 and triangulated with qualitative interviews consisting of focus group discussions and key informant interviews. A quantitative employer survey was also conducted on IT/ITES private firms in Dhaka.

The tracer study produced three key findings:

- (i) ***Investing in CSE/IIT higher education in Bangladesh could be instrumental in developing the IT/ITES ecosystem.*** The demand for CSE/IIT graduates from the IT/ITES industry is strong, as evidenced by a 77.1% job placement rate for its graduates. This is higher than the overall university graduate job placement rate of 40.0% (BIDS 2018). Most employed graduates found jobs in private IT/ITES firms as full-time professionals, and CSE/IIT graduates are considered the human capital backbone of IT/ITES industry development in the country. However, secondary sources suggest the scale of the IT/ITES industry is not large compared to the ready-made garments sector, and with IT/ITES industries in competing countries such as India, Viet Nam, and the Philippines. Access to quality CSE/IIT programs needs to be expanded.
- (ii) ***The employability of CSE/IIT graduates varies considerably between genders; and across job search periods, universities, and locations.*** Despite the nature of white-collar jobs, which should not present any barriers to women's involvement, female participation is quite limited among the nine surveyed universities. Enrollment of women in CSE/IIT programs was around 21.5% during 2013–2018, and the female graduate job placement rate was 58.6%, 23.6 percentage points lower than that of male graduates. The survey findings imply that family commitments and security concerns among employers, as well as social stigma, collectively hinder female participation in CSE/IIT programs and IT/ITES industry jobs.

It is also worthwhile to note that only 20.6% of graduates found jobs within 3 months of graduation. Geographically, the IT/ITES industry is heavily concentrated in the Dhaka area. Jashore University of Science and Technology, located outside Dhaka, has been challenged by a low job placement rate of 57.6%. Even in Dhaka, while graduates from the Islamic University of Technology and the Bangladesh University of Engineering and Technology enjoyed a job placement rate higher than 90% with a good starting gross monthly salary, job placement rate and wage levels varied considerably in other universities. By university, the job placement rate ranged between 57.6% and 92.4%, and starting gross monthly salary ranged from 25,342 taka (Tk) to Tk51,938 per month. The differences are likely related to the quality of students and teachers and the relevance of schools' CSE/IIT programs.

- (iii) ***There could be solutions in the short-, medium-, and long-term perspectives.*** In the short run, more internship opportunities and quality career guidance will improve labor market outcomes of CSE/IIT graduates. In the medium term, increasing faculty exposure to the industry and recruiting quality academic staff will improve the quality and relevance of CSE/IIT programs, because up-to-date skills are critical. It is also important to invest in developing state-of-the-art infrastructure, such as learning space and equipment. Soft skills development also needs to be integrated into the curriculum and teaching, to strengthen problem-solving and communication skills. Lastly, in the long run, universities can venture into nurturing start-ups and incubators that could lead in shaping the future of the Bangladesh economy. A postgraduate entrepreneurship program can also be established to support university graduates with work experience in industries.



1. INTRODUCTION

A. Country Context

Bangladesh is now among the world's fastest growing economies. Its economy grew more than 6% annually from 2011 and reached 7.9% in fiscal year 2018, the fastest in Asia and the Pacific in that year (ADB 2019a). Garment sector exports drove stable and strong economic growth, helped by stronger consumption and public infrastructure investment (IMF 2018).

Yet sustaining this economic growth requires diversifying the economic base from the ready-made garment sector. The ready-made garment sector employs 4 million Bangladeshis and had exports of \$30.6 billion in fiscal year (FY) 2018 and \$34.1 billion in FY2019. This represented more than 80% of the country's \$36.7 billion total exports in FY2018 and \$40.5 billion in FY2019 and was the second largest in the world after the People's Republic of China. Rising wage levels, however, might threaten this performance over time. While technological advances are unlikely to replace garment jobs immediately (ADB 2018b), because of intensive labor processes, new technologies such as sewing robots might affect the strategic location of basic apparel production in Bangladesh in the future. The Government of Bangladesh is trying to preempt such threats through exploration of new engines of economic growth being created by the fourth industrial revolution fueled by new digital and high-tech innovations.

The Digital Bangladesh program aims to make a significant economic contribution to the economy from information technology

and information technology-enabled services (IT/ITES).

The program has been an integral part of the national development strategy since 2010. Vision 2021, meanwhile, includes developing an informed, knowledge-based, technology-oriented, gender-equitable learning system for all. The economic rationale for investing in development of the information and communication technology (ICT) is multifold, including an increase in total factor productivity, lower transaction costs, and greater transparency. With relatively low wages coupled with more than half of the population below the age of 25, the government expects the IT/ITES industry to become a magnet for decent jobs for youth, and to help the economy “leapfrog” to higher development by achieving an ambitious \$5 billion in ICT exports by 2021.

Specifically, a series of government policy measures aim to boost the IT/ITES industry.

The government prepared a strategy and road map to boost the IT/ITES industry (Government of Bangladesh 2017). Among other things, the government is keen to establish IT parks. With World Bank support, the Sheikh Hasina Software Technology Park in Jashore was inaugurated in December 2017, and Banghabandu Hi-Tech City in Kaliakoir prepared to become operational. There are also plans to establish IT parks in other parts of the country, and tax incentives are provided to attract IT/ITES industries to the IT parks. While technology park development is not always successful (Rodriguez-Pose and Hardy 2014), the government is also eyeing technology entrepreneurship development through the Startup Dhaka initiative.

Growing IT/ITES revenues in Bangladesh are roughly estimated at around \$1 billion to \$2 billion, which is not enough to lead the economy.

For instance, in FY 2019, India's IT/ITES market is \$181 billion, contributing to 7.7% of gross domestic product. Viet Nam and the Philippines, about as big as Bangladesh geographically but with fewer people, earned nearly \$100 billion and \$25 billion IT/ITES-related revenues including hardware in 2018, respectively. These countries are at different stages of development and have taken decades to reach this level, but these are the competing countries that Bangladesh should bear in mind. While accurate and precise data on Bangladesh's IT/ITES revenue is hard to obtain, \$1–\$2 billion is less than 1% of gross domestic product, and significantly less than \$30.6 billion from ready-made garment exports in FY2018. Furthermore, only 0.3% of Bangladesh's labor force is employed in the ICT sector (Government of Bangladesh 2018a). While the country's IT/ITES industry is growing fast, its economic size is far from sufficient to serve as the next growth engine.

The depth and breadth of the IT talent pool is limited, a possible binding constraint on IT/ITES industry development.

The ADB-funded Southwest Economic Corridor Study in Bangladesh (2017) found challenges in the IT/ITES industry due to the limited availability of skilled human resources. Fundamental educational competencies need further strengthening for the IT/ITES industry (ADB 2016), particularly math, English, and problem-solving skills using computers (OECD 2019). Other projects support short-term ICT training programs, but the job placement rate is not high compared with other trades, such as welding, refrigeration, and air-conditioning (World Bank 2015). Similar patterns are observed in other countries: a recent tracer study in Sri Lanka (ADB 2018a) found that vocational graduates from the ICT sector struggled most to get jobs in priority industries such as construction, light engineering,

tourism, and ICT. This implies the need to develop ICT professionals and leaders in tertiary education. Support for entrepreneurship could be effective if it is combined with skills training and follow-up support (Kluve et al. 2019), but rigorous evidence is limited to understand the effectiveness of ICT-related start-up supports.

B. Higher Education Context in Producing IT Professionals

Employers in the Bangladesh IT/ITES industry look for professional employees with bachelor's degrees and above, which is in short supply.

A survey conducted by Daffodil International University (DIU) in 2018 made it clear that employers are looking for undergraduates (44.3%) or postgraduates (37.8%) as employees of the IT/ITES industry (DIU 2019). Access to higher education measured by the gross enrollment rate has increased steadily from 10.5% in 2009 to 17.6% in 2017.¹ Total higher education enrollment was estimated at 3.3 million in 2016, which could rise to 4.6 million in 2026 (Government of Bangladesh 2018b). Access has been strengthened by an increase in private universities operating under the Private University Act 1992 (amended in 2010), but remains below 20% gross enrollment rate, at which point the ICT industry growth gains momentum (ADB 2017).

The number of highly skilled university graduates in IT/ITES is limited, particularly women.

Around 10,000 ICT-related graduates are produced per year by more than 95 universities and 200 polytechnic or technical institutes (Hossain 2016). This is more than the industry demand of about 5,000 per year, but the IT/ITES industry has struggled to find quality graduates (Lahiri 2019). Although the IT/ITES industry offers white-collar jobs, which should not hold any barriers to women's involvement, female students enrolling in computer science

¹ See UNESCO Institute of Statistics. Data for the Sustainable Development Goals <http://uis.unesco.org/country/BD> (accessed 2 May 2019).

and engineering and/or institute of information technology (CSE/IIT) programs account for about one-quarter or less of total CSE/IIT enrollments, at least among the surveyed nine universities. The Daffodil International University also corroborates the limited presence of female employees in the IT/ITES industry, at around one-fifth (DIU 2019). Bangladesh significantly underutilizes the female labor force (Farole and Cho 2017), certainly a missed opportunity.

The quality of CSE/IIT programs needs significant revision by introducing more hands-on practice in curriculums.

But rigid academic governance stands in the way. Faculty members need to be trained in modern approaches in technology education. Hands-on practical sessions are critical for core technical competencies such as problem-solving skills. However, practical sessions constitute less than 30% of course time in public universities, and even less in private universities. This figure is quite low compared to leading universities in India, Singapore, and the United States, where theory and practical credit distribution could be nearly 50:50 (Lahiri 2019). The limited quality of education is also evinced in the 2019 IT Engineers Examination scores wherein six developing countries in Asia participated. Bangladesh's passing rate was 11.5% only, after Viet Nam (37.9%), the Philippines (20.9%), and Myanmar (14.6%). Still, it surpassed the scores of Mongolia (6.5%) and Thailand (9.4%).² Bangladesh has been increasing its scores in recent years.

Weak academic-industry linkage is another challenge.

Multi-stakeholder collaboration, including academic-industry links, have dragged down innovation capacity in Bangladesh (World Economic Forum 2018). Gaps have always existed between university and industry in any country,

but the gaps are quite large in Bangladesh, positioned at 125 out of 140 countries on this multi-stakeholder collaboration. More faculty members have higher qualifications, such as a doctor of philosophy (PhD), but faculty members lack exposure to industry practices and do not necessarily catch up with technology trends. Joint research with industry is seldom conducted in the IT/ITES industry and interactions are restricted to basic communications, such as job fairs, events, and internships. The skills mismatch is particularly salient for web developers (DIU 2019).

Evidence is limited to assess employability of CSE/IIT university graduates.

According to a tracer study conducted by the Bangladesh Institute of Development Studies (BIDS 2018), job placement rates of university graduates in Bangladesh was 40.0% overall, with around Tk30,000 nominal monthly salary (around \$357), but engineering graduates achieved a 67.7% job placement rate. The job placement rate of polytechnic graduates was 37%, because 33% of graduates continued training and education (World Bank 2017). However, these are rather general labor market outcomes of university graduates, and a lack of evidence stands in the way of identifying areas for enhancing the employability of CSE/IIT graduates.

This study, initiated to close the evidence gap, is structured as follows. Section 2 discusses data and methodology. Section 3 investigates employment outcomes followed by other labor market outcomes, such as wages and benefits, as well as the employed sector in section 4. After reviewing employment and labor market outcomes in CSE/IIT university programs, section 5 examines access to employment and education. Section 6 looks into the quality and relevance of education, and section 7 concludes.

² See Information Technology Examination Professionals. Fundamental Information Technology Engineer Examination. <http://itpec.org/statsandresults/examination-statistics.html> (accessed 2 May 2019).

2.

DATA AND METHODOLOGY

A. Scope and Objectives

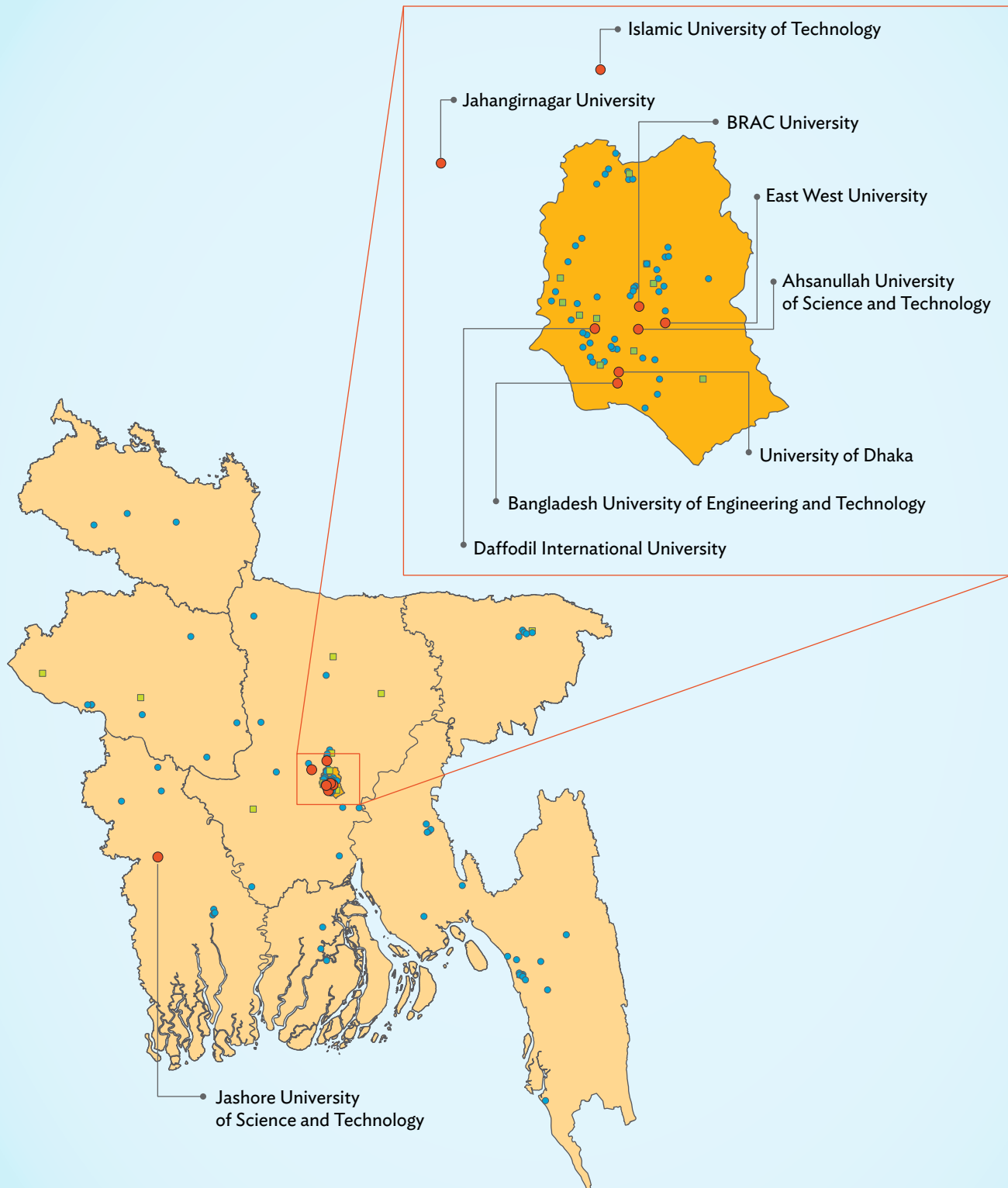
This tracer study, initiated to help close the evidence gap between demand and supply in the Bangladesh IT/ITES industry, has three objectives. First, it aims to assess the employability of CSE/IIT graduates from nine universities in Bangladesh. Second, it intends to understand the access, quality, and relevance of CSE/IIT university programs. Third, it seeks to identify possible areas for improvement in order to increase the labor market outcomes of CSE/IIT tertiary education graduates in Bangladesh. The nine universities included four public, four private, and one international university. These are (i) Bangladesh University of Engineering and Technology, (ii) University of Dhaka, (iii) Jahangirnagar University, (iv) Jashore University of Science and Technology, (v) Ahsanullah University of Science and Technology, (vi) BRAC University, (vii) Daffodil International University, (viii) East West University, and (ix) Islamic University of Technology. All universities except Jashore University of Science and Technology are located in the Dhaka area. The survey followed up on CSE graduates, except for University of Dhaka and Jahangirnagar University, where graduates of the IIT were followed up. Appendixes 1–10 briefly describe and summarize the institutions and key findings from the quantitative tracer studies for each university.

B. Sampling

A mixed-methods research design was adopted. The quantitative survey tracked the CSE/IIT graduates from the nine universities through computer-assisted telephone interviews. While this report focuses on tracer study findings, results from the Bangladesh IT/ITES employer survey, conducted concurrently with the tracer study, are also used to strengthen the arguments. The key-person interviews and focus group discussions were conducted as a qualitative survey. The quantitative and qualitative surveys were conducted by a professional survey firm in Bangladesh recruited under ADB technical assistance.

This study has some limitations, which include that the sample is not representative of all CSE/IIT graduates in Bangladesh. The nine universities were selected purposively based on university ranking, capacity of university, and proximity to IT parks. This is because findings of this tracer study aim to inform the ADB-funded Improving Computer and Software Engineering Tertiary Education Project.³ Bangladesh had around 130 universities in 2016, and more than 110 universities have CSE departments or IITs. These universities are located across the country, but mostly around Dhaka, as noted on the Map. The selected nine universities are not representative samples in Bangladesh but provide evidence on challenges and opportunities of leading CSE/IIT programs in Bangladesh.

³ The sector assessment, including problem tree, will be available in the Appendix of the Report and Recommendation of the President to the Board of Directors for the proposed project, which describes potential interventions to address the issues. For further details, please refer to ADB. Bangladesh: Improving Computer and Software Engineering Tertiary Education Project. <https://www.adb.org/projects/50140-002/main>.

Map: Location of Universities in Bangladesh**Course:**

● CSE or IIT or both ■ No CSE nor IIT ● CSE or IIT or both (9 universities)

CSE = computer science and engineering, IIT = Institute of Information Technology.

Note: The longitude and latitude of the universities are generated based on the address of universities in Universities of Bangladesh published by the University Grants Commission of Bangladesh (2018c).

Other limitations include difficulty in following up migrants, mostly from premier universities, to get their feedback. Enrollment, completion, and drop-out in the universities, as well as institutional analysis of the universities, were beyond the scope of this tracer study. Nevertheless, this tracer study would provide useful information for academic staff and nonacademic staff of higher education institutions with CSE/IIT curriculums in Bangladesh. This tracer study can also help the Ministry of Education, University Grants Commission, and university management to identify areas for improvement.

(i) Quantitative Survey

In 2018, the quantitative survey followed up 1,216 CSE/IIT graduates from the nine universities. The quantitative survey was conducted from 6 July 2018 to 16 August 2018 with a response rate of 57.6%. Interviews were conducted by phone, and responses were recorded using tablets. In total, 2,110 interviews were attempted, which covered almost all the CSE/IIT graduates from the nine universities during the period of investigation. Therefore, there is no bias selecting respondents, but this declined to 1,216 because of nonresponse. While a single cohort tracer study is straightforward for analysis (Schomburg 2016), this tracer study had to cover multi-cohorts of graduates, given the limited number of graduates from CSE/IIT per year. While admission year varied, the tracer study focused on people who completed graduation during 2015–2017. However, because of the small number of graduates, migration, and nonresponses, the graduate cohort was extended to 2014 for the Islamic University of Technology and the East West University; and to 2013 for Jahangirnagar University, Jashore University of Science and Technology, and Ahsanullah University of Science and Technology. Analysis was conducted with Stata, a statistical software package.

Equal allocation sampling was used, but actual sample size varied across universities.

CSE/IIT graduates were randomly selected from each university based on the equally assigned target number of 140. However, it was difficult to meet the target sample size for CSE/IIT graduates at University of Dhaka, Jahangirnagar University, East West University, and Islamic University of Technology, where total population sizes were below 200. The Islamic University of Technology was particularly challenging, because many students came from countries in the Organization of Islamic Cooperation and returned home after graduation. The tracer study oversampled from Bangladesh University of Engineering and Technology to meet the target sample size of 1,260, but it ended up with a sample size of 1,216 (Table 1). The graduates of Bangladesh University of Engineering and Technology were oversampled because this university was selected as one of the four universities under the ADB-funded Improving Computer and Software Engineering Tertiary Education Project.

Table 1: Sample Distribution by University

University	Sampling Population	Target Sample Size	Actual Sample Size
BUET	414	140	203
DU	190	140	123
JU	165	140	121
JUST	200	140	144
AUST	163	140	142
BRACU	418	140	140
DIU	217	140	140
EWU	169	140	111
IUT	174	140	92
Total	2,110	1,260	1,216

AUST = Ahsanullah University of Science and Technology, BUET = Bangladesh University of Engineering and Technology, BRACU = BRAC University, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Note: The sampling population includes all the graduates during the period of investigation.

Source: Asian Development Bank.

Meanwhile, a telephone-based, quantitative employer survey was conducted on 853 IT/ITES firms in Dhaka from 23 July 2018 to 15 September 2018. Face-to-face

interviews with IT/ITES firm representatives was conducted concurrently with the telephone-based survey, for a response rate of 65%. The sampling population consisted of member companies in the Bangladesh Association of Software and Information Services, the Bangladesh Computer Samity, the Bangladesh Association of Call Center and Outsourcing, and Internet Service Providers Association Bangladesh, totaling 2,741 individual companies. The employer survey focused on the recruitment process and demand for IT skills in IT/ITES industries, among other things. While a separate study will be available for findings, relevant key points are also highlighted in this tracer study to reinforce the findings.

A series of focus group discussions (35 in total) looked at differing employment status by gender. This included employed

and unemployed graduates by gender as well as teachers and professors at Bangladesh University of Engineering and Technology, University of Dhaka, Jashore University of Science and Technology, and East West University. Feedback was also solicited from students who would graduate soon, while graduates planning to go abroad were also surveyed.

(ii) Qualitative Survey

The key-person interviews were conducted for heads of CSE/IIT to identify their challenges. Questions related to CSE/IIT

demand and female participation in CSE/IIT helped in understanding access to CSE/IIT. The curriculum, pedagogy, assessment, job placement support, migration, and international partners were discussed to improve the quality and relevance of the CSE/IIT programs. Discussions were transcribed and used to triangulate the findings from the quantitative study.

3.

EMPLOYMENT OUTCOMES

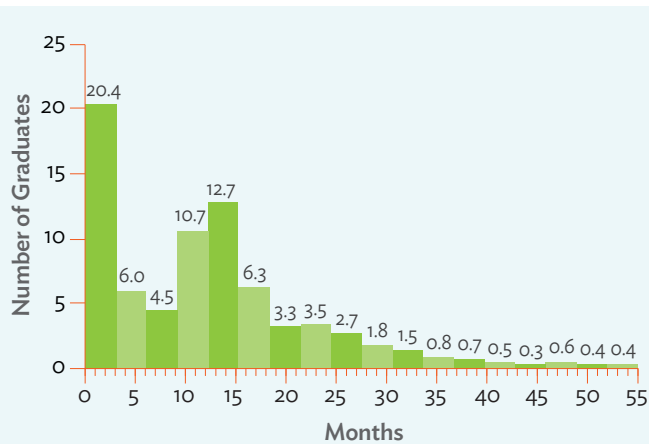
A. Overall Job Placement Status

Overall, job placement after CSE/IIT graduation was 77.1% for 2013–2018 graduate cohorts.⁴ The remaining 22.9% were still looking for jobs or not seeking jobs. If job placement rate was divided by the length of job search, 20.4% of the graduates were employed within 1–3 months after graduation; 6.0% were employed within 4–6 months; 4.5% were hired within 7–9 months; 10.7% were employed within 10–12 months after graduation; and 35.5% found

their jobs more than a year after graduation (Figure 1). The second peak of job placement after 1 year is possibly explained by an intensive recruitment season. The overall employment rate after graduation was 86.2%.⁵

The majority of employed graduates worked full-time. Among the 77.1% of employed graduates; 91.5% landed full-time jobs; 5.9% part-time; and the remaining either took a temporary or seasonal job, chose to run a family business, or were self-employed (Figure 2).

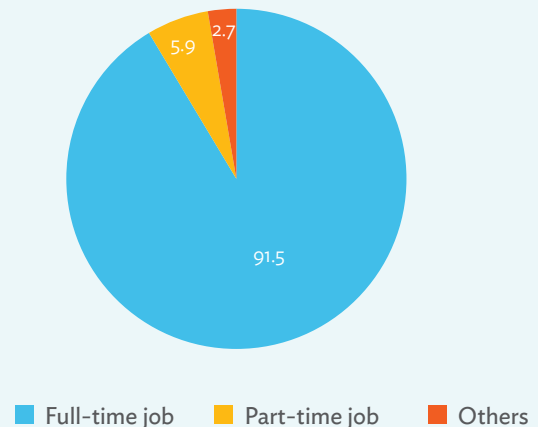
Figure 1: Length of Initial Job Search after Graduation, 2018 (%)



Notes: 1. Total number of graduate-respondents is 1,216.
2. Length of job search is measured by the number of months between the date graduates were first employed and the date of their graduation.

Source: Asian Development Bank.

Figure 2: Type of Job Placement, 2018 (%)



Notes: 1. Total number of graduate-respondents is 938.
2. "Others" include self-employed, temporary or seasonal job, and family business.

Source: Asian Development Bank.

⁴ Job placement rate after graduation is calculated by the number of graduates who said they were employed or self-employed after graduation divided by the total number of respondents. The tracer study covered 2015–2017 graduates across all nine selected universities. If the sample is restricted for graduates from 2015 to 2017, job placement rate is 75.1%, only 2 percentage points lower than the job placement rate of the entire sample. Study figures therefore use all samples from 2013 to 2018. This is a conservative figure against sampling population because adjusted job placement rate by weight is 79.3%. The weight is the inverse of sampling probability, which is actual sample per university divided by the total sampling population by university. The difference is 2.2 percentage points, which is considered minor. Therefore, the figures discussed in this report are all raw figures without adjustment.

⁵ Employment rate after graduation is computed by the number of graduates employed divided by the total graduates minus voluntary unemployed (unemployed graduates who did not look for a job).

Active job seekers who are among those not in jobs numbered only about half of the graduates.

Of the 22.9% of graduates not employed, 46.0% were not actively seeking employment. About 52.3% of those graduates not looking for jobs indicated that they moved on to further education or training (Figure 3), and others included those who did not want to work (16.4%) or were abroad (13.3%).

B. Job Placement Status by University

Graduates from the Islamic University of Technology and Bangladesh University of Engineering and Technology achieved more than 90% job placement rate.

Islamic University of Technology graduates' job placement rate was the highest at 92.4%, closely followed by the Bangladesh University of Engineering and Technology at 91.1%. BRAC University (87.1%) and East West University (83.8%) exceeded 80%, as shown in Figure 4. On the other hand, CSE graduates from Jashore University of Science and Technology had the lowest job placement rate (57.6%) among the nine universities, challenged by the geographical location outside Dhaka.

Bangladesh University of Engineering and Technology, BRAC University, Islamic University of Technology, and East West University attained employment rates greater than 90%.

Since some of the bachelor's graduates move on to a master's degree, it is also worthwhile checking employment rate, which removes people not in the labor force, such as continuing further education and training, from the denominator. Bangladesh University of Engineering and Technology graduates' employment rate led at 97.9%, closely followed by BRAC University at 96.8%, Islamic University of Technology at 94.4%, and East West University at 92.1%. While similar to their job placement rate ranking, Jashore University of Science and Technology struggled most among the nine universities at 65.4% and was the only university

Figure 3: Reasons for Not Looking for Work, 2018 (%)

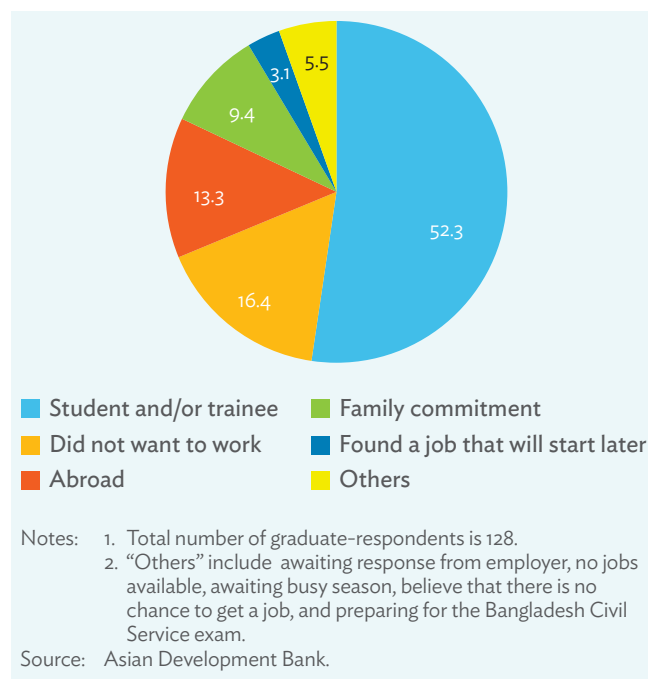
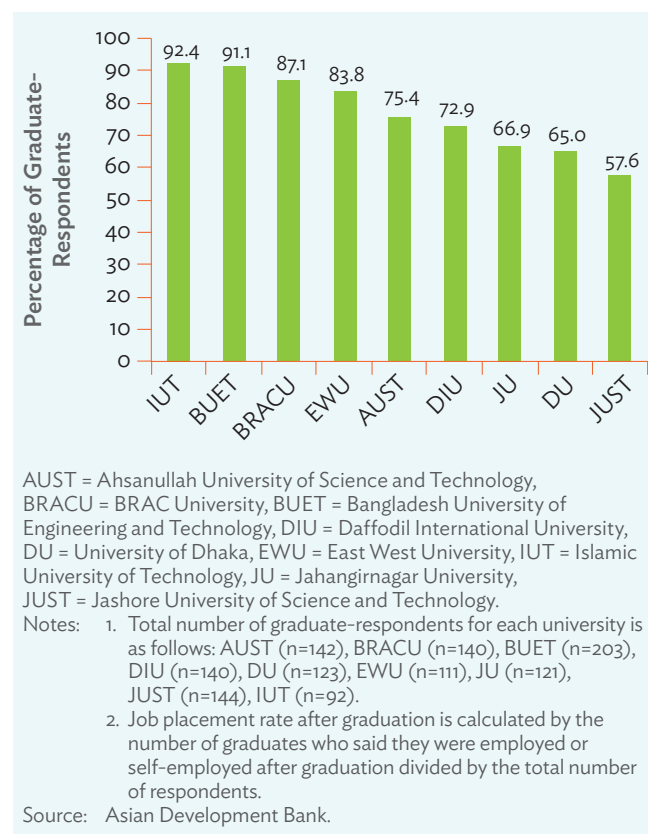


Figure 4: Job Placement Rate by University, 2018 (%)



with an employment rate below 70% (Figure 5). While IIT provides more practical courses than CSE departments, graduates from IIT at University of Dhaka and Jahangirnagar University also struggle to find employment opportunities, compared to other universities in the Dhaka area with CSE departments.

C. Job Placement Status by Gender

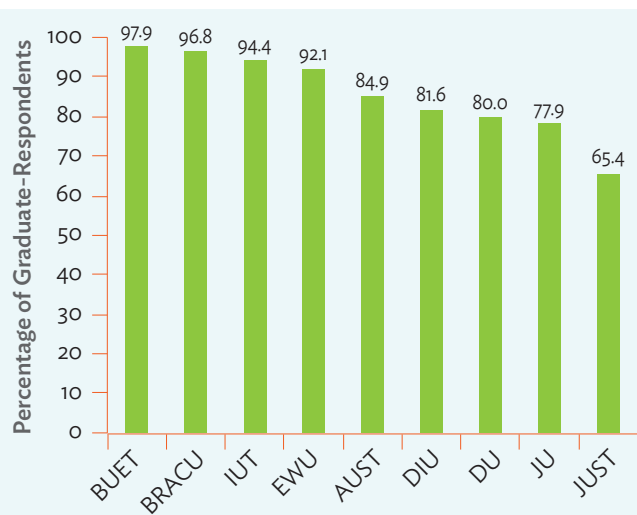
Job placement was lower among females than males, suggesting gender disparity in the IT/ITES industry. The job placement rate of female graduates was 58.6%, 23.6 percentage points below the male rate (Figure 6). This gender disparity in job placement rate is more serious than the overall figure. The study conducted by

the Bangladesh Institute of Development Studies (2018) found that overall female job placement rate was 18.4 percentage points lower than that of males. This is driven by family commitments such as being a homemaker. Women also tended to stay in Bangladesh, rather than going abroad.

Job placement among female graduates who could apply CSE/IIT skills in their job was also lower than that of males. Only 51.0% of female graduates were employed where the skills they learned from the university was relevant to their job, compared to 71.4% of males (Figure 7).

In addition to family commitments, employers might have been concerned about women's security during recruitment. For instance, the employer survey indicated that

Figure 5: Employment Rate by University, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

- Notes:
1. Total number of male respondents is 955 and female respondents is 261.
 2. Total number of graduate-respondents for each university is as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).
 3. Employment rate after graduation was computed by the number of graduates placed in jobs divided by the total number of graduates minus voluntary unemployed (i.e., unemployed graduates who did not look for a job).

Source: Asian Development Bank.

Figure 6: Job Placement Rate by Gender, 2018 (%)



- Notes:
1. Total number of male respondents is 955 and female respondents is 261.
 2. Job placement rate after graduation is calculated by the number of graduates who said they were employed or self-employed after graduation divided by the total number of respondents.

Source: Asian Development Bank.

working location (39.1%) and security issues (31.1%) moderately or greatly influenced their decision in recruiting female employees (Figure 8). Family constraints and commitment (32.8%) were also a great or moderate consideration, which is consistent with female graduates' feedback under the tracer study.

Other factors considered to affect to a great or moderate extent employers' decision in recruiting female employees are lack of required vocational or professional skills (30.3%), maternity leave (28.6%), dedication to work (24.0%), high turnover rate (22.9%), inability or reluctance to take on challenges (21.1%), and absenteeism (15.8%).

Figure 7: Job Placement Rate by Gender and Relevance, 2018 (%)

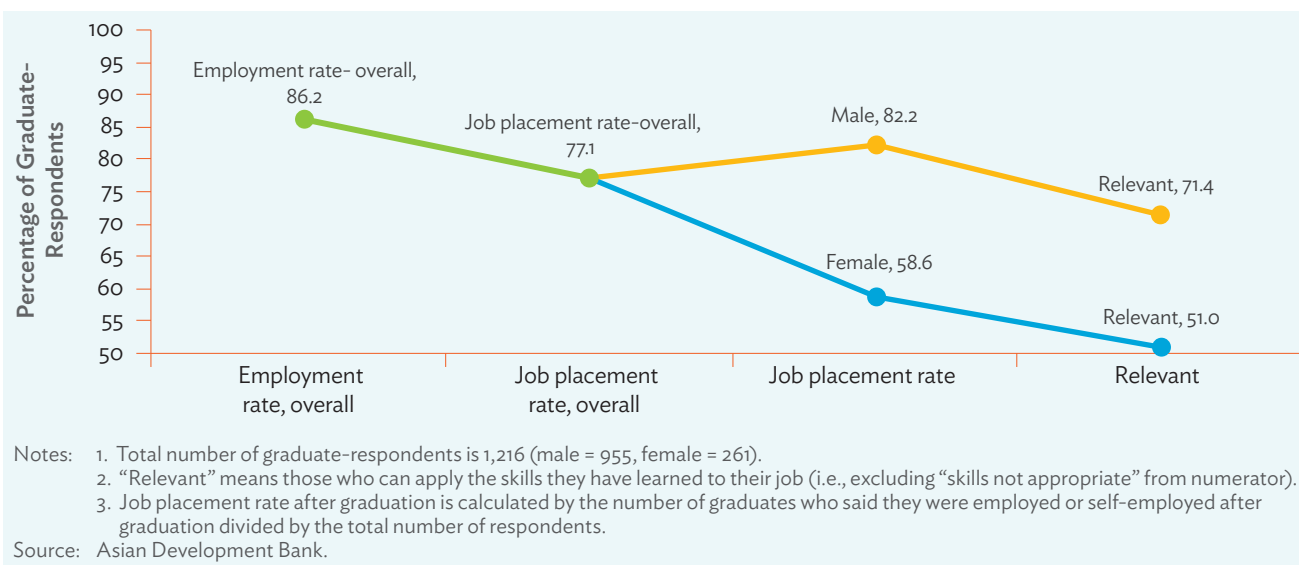
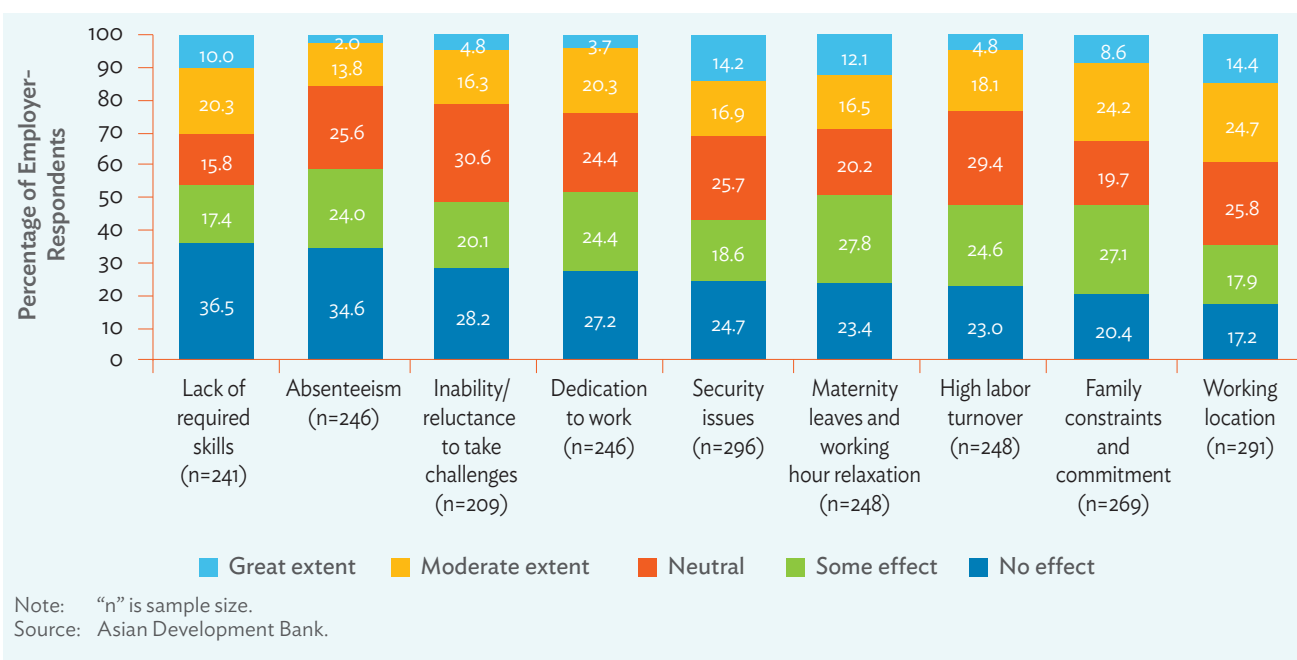


Figure 8: Factors Influencing Female Employment, 2018 (%)



D. Job Placement Status by Year

The chance of getting a job increased as time elapsed after graduation. In fact, the job placement rate was 86.2% in 2015, 74.3% in 2016, and 70.1% in 2017 (Figure 9). This implies that the longer the time from when students graduated, the more likely they are to find a job. The results of the key-person interview pointed to the need to strengthen academic-industry linkages to cope with the rapidly changing industry demand and improve the employability of their graduates soon after graduation.

In 2017, about a quarter of employers indicated that they did not hire first-time job seekers who had graduated from school or university. Although IT/ITES employers are clearly looking for university graduates, 13.8% of employers from the employer survey indicated that first-time job seekers coming from university or other higher-education institution were not prepared at all or moderately unprepared for the job (Figure 10). In addition, 62.0% of employers

believed that new graduates lacked job-specific skills and competencies. This is by far larger than lack of work experience (21.2%), poor attitude (10.4%), and limited basic education (6.5%).

Figure 9: Job Placement Rate by Graduating Year, 2018 (%)

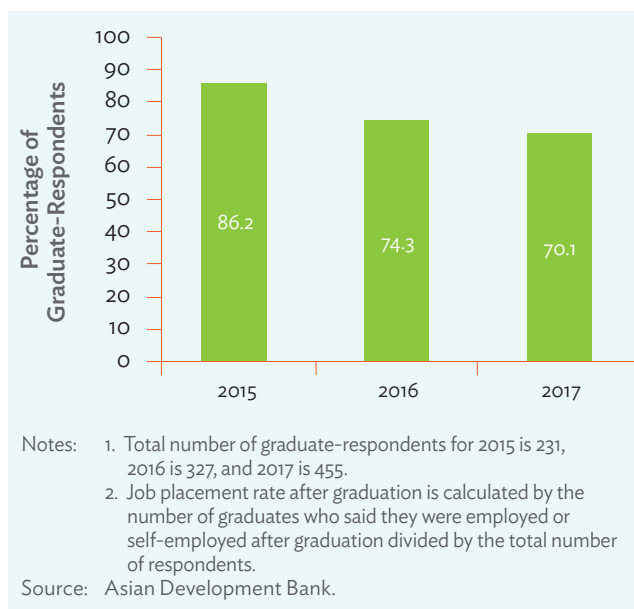
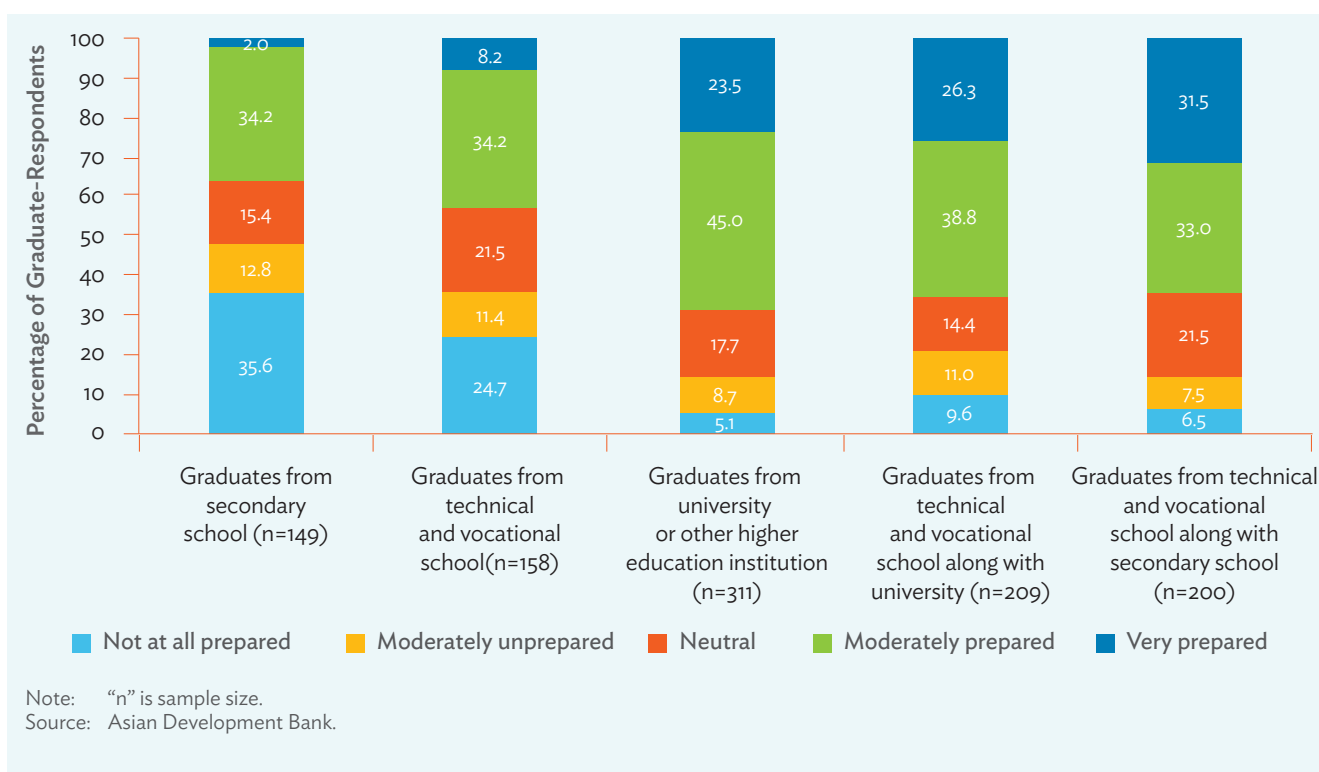


Figure 10: Job Preparedness of First-Time Job Seekers as Perceived by Employers, 2018 (%)



4.

LABOR MARKET OUTCOMES

A. Overall Labor Market Outcomes

The monthly nominal salary was Tk38,780 (\$462) on average but had large variations across graduates of different universities. The graduates of Islamic University of Technology had the highest mean salary of Tk51,938 (\$619); followed by the Bangladesh University of Engineering and Technology, and University of Dhaka with above Tk40,000. The mean salary of Jashore University of Science and Technology was Tk25,342 (\$302), which

reflected the challenges of a university located outside Dhaka.

Among the sectors, monthly nominal salary was highest in the education sector at Tk40,237 (\$479). The graduates from the University of Dhaka received the highest mean salary in the sector amounting to Tk51,250 (\$611). This, however, is exceeded by the mean salary of Tk52,591 (\$627) of graduates from the Islamic University of Technology working in the IT/ITES service sector (Table 2).

Table 2: Monthly Income of Currently Employed Graduates by University and Sector, 2018 (taka)

University	Overall			IT/ITES Service			Education/Teaching			Others		
	n	Mean	Standard Deviation	n	Mean	Standard Deviation	n	Mean	Standard Deviation	n	Mean	Standard Deviation
IUT	81	51,938	15,215	44	52,591	14,919	29	47,759	9,690	8	63,500	25,984
BUET	176	46,128	26,275	117	44,650	22,334	47	47,606	31,209	12	54,750	39,192
DU	75	44,200	13,542	70	43,786	13,773	4	51,250	9,465	1	45,000	N/A
EWU	75	39,213	22,009	48	40,813	23,087	5	39,000	11,402	22	35,773	21,703
JU	70	37,500	14,075	28	41,500	17,234	32	34,375	11,446	10	36,300	9,511
AUST	99	36,995	16,363	69	36,667	17,197	20	37,475	13,461	10	38,300	17,186
BRAC	109	34,009	16,578	88	34,534	15,098	10	32,800	19,595	11	30,909	24,998
DIU	85	26,021	14,469	54	22,070	13,528	5	32,600	24,037	26	32,962	11,424
JUST	69	25,342	10,359	30	22,667	11,102	17	25,712	9,346	22	28,705	9,410
Overall	839	38,780	20,089	548	38,622	19,413	169	40,237	20,882	122	37,471	21,930

AUST = Ahsanullah University of Science and Technology, BUET = Bangladesh University of Engineering and Technology, BRACU = BRAC University, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IT/ITES = information technology and information technology-enabled services, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology, N/A = not applicable.

Note: "Others" include agriculture, forestry and fishing, mining and quarrying, manufacturing, electricity, gas, steam and air-conditioning supply, water supply, sewerage, waste management and remediation activities, construction, wholesale and retail trade, transportation and storage, accommodation and food service activities, financial and insurance activities, real estate activities, professional, scientific and technical activities, administrative and support service activities, public administration, defense, and compulsory social security, human health and social work activities, arts, entertainment and recreation, activities of households as employers, undifferentiated goods and services producing activities of households for own use, and activities of extraterritorial organizations and bodies.

Source: Asian Development Bank.

Almost half of employed graduates were professionals in the private sector. Overall, 89.5% of employed graduates were in the private sector, 6.2% in the government sector, 2.9% in nongovernment organizations, and 1.5% were self-employed (Figure 11). While almost half of graduates (49.0%) became professionals, only male graduates (5.7%) were able to secure senior professional positions (Figure 12).

Most employed graduates (72.6%) eventually found jobs in IT/ITES industries, while a sizable 16.1% were employed in the education sector (Figure 13). This is encouraging, and CSE/IIT graduates are serving as a human capital backbone of the IT/ITES industry. The nine universities in this tracer study included top-ranking universities and some of their graduates chose paths to become researchers after graduation.

Figure 11: Sector of Employment in First Job, 2018 (%)

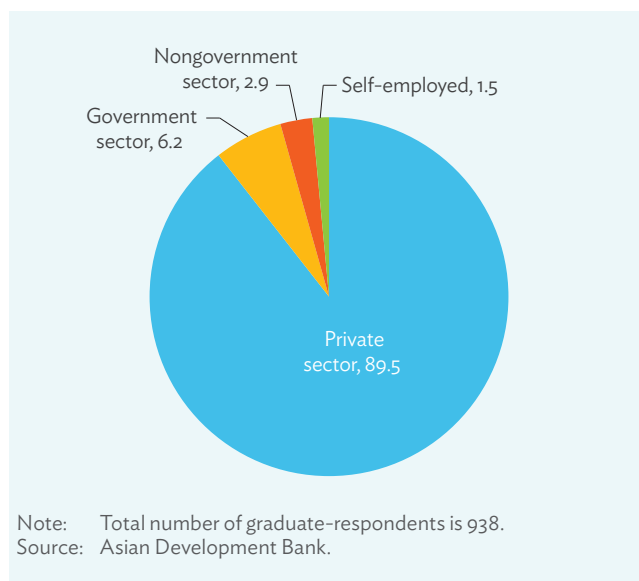


Figure 12: Designation in Organization in First Job, 2018 (%)

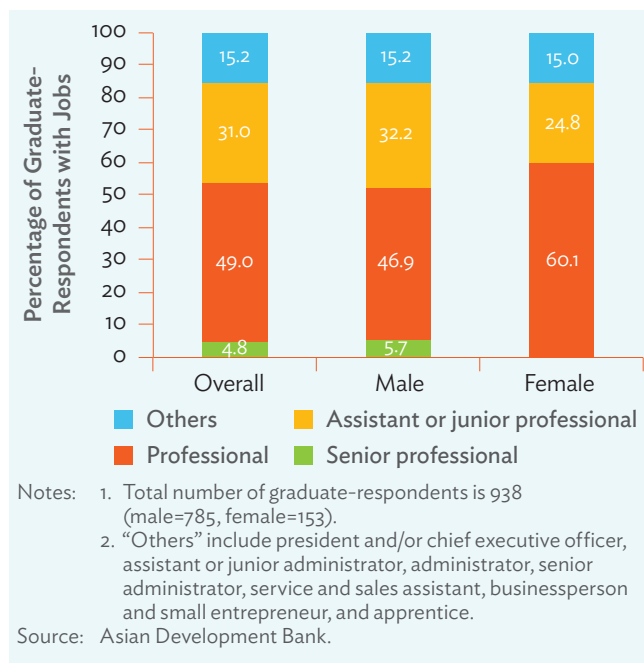
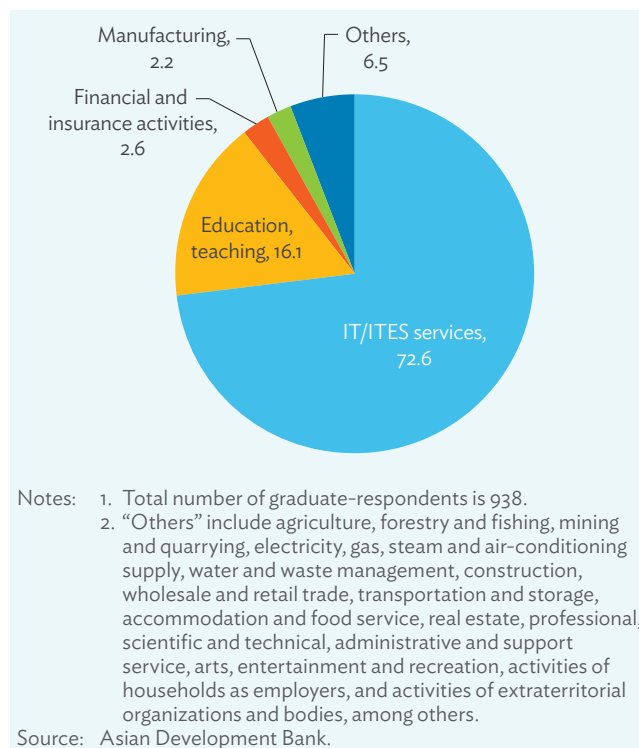


Figure 13: Type of Organization in First Job, 2018 (%)



Currently, 89.5% of employed graduates are paid employees.

The rest includes self-employed or those who are running household businesses (3.9%) or not working (6.6%). Among the employees, 75.8% cited good salary as the primary reason for staying in their current job. Employees also indicated good working conditions (60.1%), good prospects for career progress (41.2%), relevance to their areas of study (27.3%), company's prestige (21.2%), own interest (21.5%), and good location (19.4%) as their reasons to stay in current jobs (Figure 14).

B. Wage Employment

In general, employees have formal and long-term contracts.

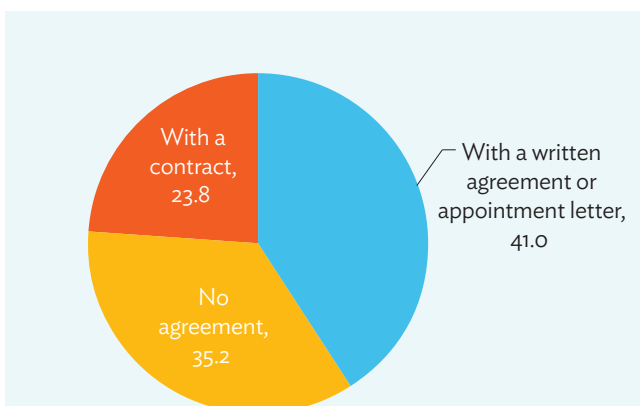
Approximately 64.8% of employees had a formal arrangement with their employers through a contract or written agreement (Figure 15). Formal agreements were mostly common in companies with at least 51 employees and were observed across different sectors: IT/ITES services (65.7%), education or teaching (61.5%), financial and insurance activities (67.6%), and manufacturing (46.2%). Furthermore, 86.5% of the employees were hired to fill permanent or long-term positions (Figure 16).

Figure 14: Primary Reasons for Choosing to Stay as an Employee, 2018 (%)



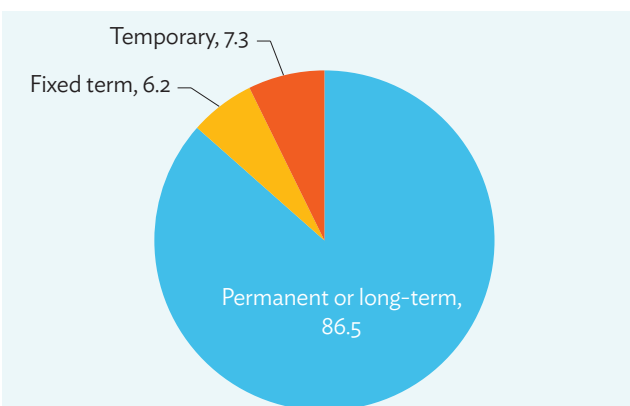
Notes: 1. Total number of graduate-respondents is 839.
 2. Respondents were asked to choose a maximum three reasons for choosing their current job.
 3. "Others" include reasons such as listening to somebody's recommendation, ability to work from home, transportation provided to their homes, allows for work-family balance, flexible working hours, receiving no offers, to get experience, and government job.
 Source: Asian Development Bank.

Figure 15: Type of Employment Agreement with Employers, 2018 (%)



Note: Total number of graduate-respondents is 839.
 Source: Asian Development Bank.

Figure 16: Term of Job Agreement, 2018 (%)



Note: Total number of graduate-respondents is 839.
 Source: Asian Development Bank.

Employers were also keen on enhancing their employees' skills with structured training.

About 56.0% of employees indicated that their company provided structured training outsourced to professional training providers to upgrade and retain their employees' skills. Around 47.0% of employees indicated that training conducted by employers was to enhance basic practical or technical skills, while 41.9% indicated that training also provided basic business or technical knowledge of the job (Figure 17). It is also worthwhile to note that 40.4% had trainings on advanced practical or technical skills for the job.

In addition to their salary, the majority of employees received other work benefits.

They were entitled to some mandatory benefits in their present jobs such as sick leave and maternity leave. However, only 30.8% received overtime pay, although employees worked an average of 42.4 hours a week. Furthermore, only around half of employee had health insurance (51.1%), an employees provident fund (49.0%). A limited number of employers offered gratuity pay (32.9%) and pension (27.2%) as shown in Figure 18.

Figure 17: Type of Training Provided by Employer to Current Employees, 2018 (%)

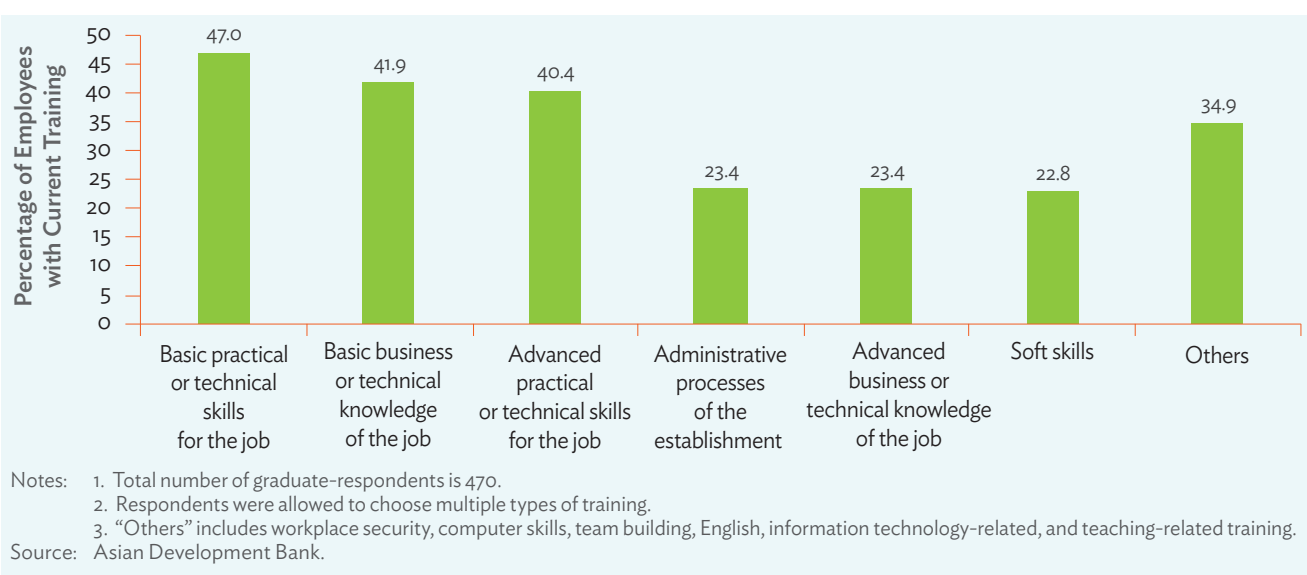
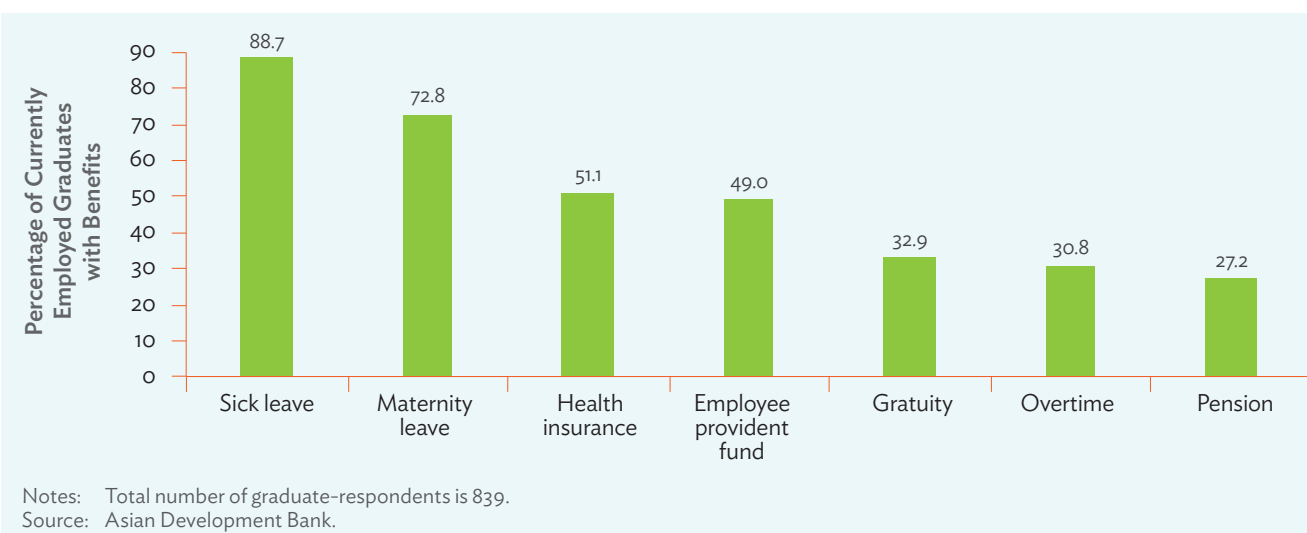


Figure 18: Formal and Informal Employees' Benefits, 2018 (%)



However, a gender wage gap exists, with males consistently earning more than females. The starting gross monthly salary of male employees was 12.9% higher than female employees, while the gender pay gap appeared to be higher in self-employed graduates, as males earned 53.4% more than females (Table 3).

Meanwhile, starting gross monthly salary across sectors was almost similar. On average, graduates who work in the education sector received the highest starting monthly salary at Tk40,237 (\$479); followed by those who work in the software industry at Tk39,772 (\$474); financial and insurance activities at Tk38,986 (\$464); and IT consultancy at Tk38,364 (\$457) (Table 4).

Table 3: Monthly Income of Currently Employed Graduates by Gender, 2018 (taka)

Current Employment	Male		Female		Overall	
	Mean (median)	Standard Deviation	Mean (median)	Standard Deviation	Mean (median)	Standard Deviation
Employed	39,513 (40,000)	20,185 (n=703)	34,993 (30,000)	19,214 (n=136)	38,780 (38,000)	20,089 (n=839)
Self-employed	52,530 (20,000)	91,777 (n=33)	34,250 (14,500)	44,169 (n=4)	50,554 (20,000)	87,652 (n=37)

Note: Figures in parentheses with “n” are the sample sizes.

Source: Asian Development Bank.

Table 4: Monthly Income of Currently Employed Graduates by Sector, 2018 (taka)

Current Employment	Employed		Self-employed	
	Mean (median)	Standard Deviation	Mean (median)	Standard Deviation
IT/ITES services	38,622 (37,000)	19,413 (n=548)	37,891 (19,000)	44,081 (n=32)
Software	39,772 (40,000)	19,327 (n=457)	42,040 (20,000)	48,098 (n=25)
IT consultancy	38,364 (38,000)	18,356 (n=33)	32,250 (32,250)	39,244 (n=2)
Networking	26,448 (20,000)	17,691 (n=29)	22,000 (19,000)	16,713 (n=4)
Other IT/ITES services	32,959 (30,000)	19,305 (n=29)	9,000 (9,000)	N/A (n=1)
Education and teaching	40,237 (40,000)	20,882 (n=169)	—	—
Financial and insurance activities	38,986 (35,000)	17,126 (n=37)	—	—
Manufacturing	34,346 (27,500)	31,319 (n=26)	—	—
Others	37,898 (35,000)	19,811 (n=59)	131,600 (20,000)	211,170 (n=5)

— = no observation, IT = information technology, IT/ITES = information technology and information technology-enabled services, N/A = not applicable.

Notes: 1. Figures in parentheses with “n” under the standard deviations are total number of respondents.

2. For “employed”, “Other IT/ITES Services” include hardware, internet service provider, call center and outsourcing, drug companies, lectures, project management, and shipping line representation. “Others” include agriculture; forestry and fishing; mining and quarrying; manufacturing; electricity; gas; steam and air-conditioning supply; water supply; sewerage; waste management and remediation activities; construction; wholesale and retail trade; transportation and storage; accommodation and food service activities; financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; public administration; defense and compulsory social security; human health and social work activities; arts; entertainment and recreation; activities of households as employers; undifferentiated goods and services producing activities of households for own use; and activities of extraterritorial organizations and bodies.

3. For “self-employed”, “Others” include wholesale and retail trade, activities of households as employers, and e-commerce.

Source: Asian Development Bank.

C. Self-Employment

Graduates became more interested in setting up a business after gaining work experience.

Initially, only 14 of 938 employed graduates (1.5%) were self-employed and mostly provide IT/ITES services (78.6%). But it appears that their work experience stirred graduates' will to run their own business. Looking at employment status as of survey date, the number for self-employed increased to 37 (3.9%). Specifically, among the initial 98.5% paid employees after graduation, 90.7% remained employees. Yet, 2.6% started to run their own businesses; 3.5% were not working but looking for work; and the remaining 3.2% were neither working nor looking for work. On the other hand, among the 1.5% previously self-employed, 92.9% continued running their own business, while 7.1% chose to become employees (Figure 19).

Of those currently self-employed, 91.9% started their own businesses, and 8.1% had already started with an established business.

Half of graduates who established their own businesses did so on their own, while the other half mostly set up the business with friends. However, as shown in Figure 19, the self-employed accounted for only 1.5% of total employed graduates, which is fairly small. Yet, some graduates with an entrepreneurial spirit started their own businesses, mostly in IT/ITES industries.

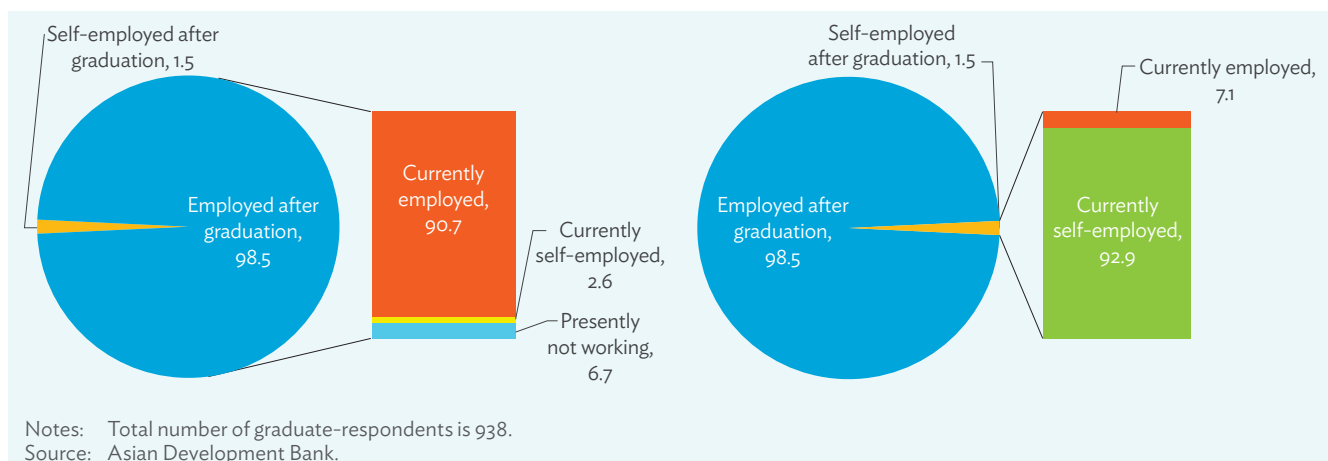
Around 41.2% of self-employed graduates had clear business plans in starting their small businesses, and some were quite successful.

While about 35.3% set up their businesses out of a desire for their own enterprise, 8.8% wanted to manage their own time, 8.8% believed they could earn high income, and 2.9% had no other opportunities. Most of the businesses were relatively small, with only two to five employees, and almost a quarter of businesses were solely operated by the owner. Nevertheless, businesses earned an average of Tk139,243 (\$1,658) monthly in 2017.⁶ Consequently, average gross monthly earnings of the owners, amounting to Tk50,554 (\$602), were 30.4% higher than the average starting monthly salary of employees, equivalent to Tk38,780 (\$462) as shown in Table 3. However, it should be noted that the median gross monthly earnings of employees were twice the median gross monthly earnings of self-employed businessmen. Furthermore, most of these businesses provide IT/ITES services and gross monthly earnings are the highest in the software industry at Tk42,040 (\$501), as presented in Table 4.

Businesses were small, and self-employed graduates faced many challenges.

Among the self-employed, 32.4% pointed to difficulties in access to financing; 24.3% of businesses faced electricity problems; and 18.9% faced problems related to telecommunications and transportation, and business licensing and permits.

Figure 19: Transition to Work after Graduation, 2018 (%)



⁶ Gross monthly income generated by businesses ranged from Tk15,000 to Tk600,000, and only 12 observations were above the median of Tk90,000.

5.

ACCESS TO EMPLOYMENT AND EDUCATION

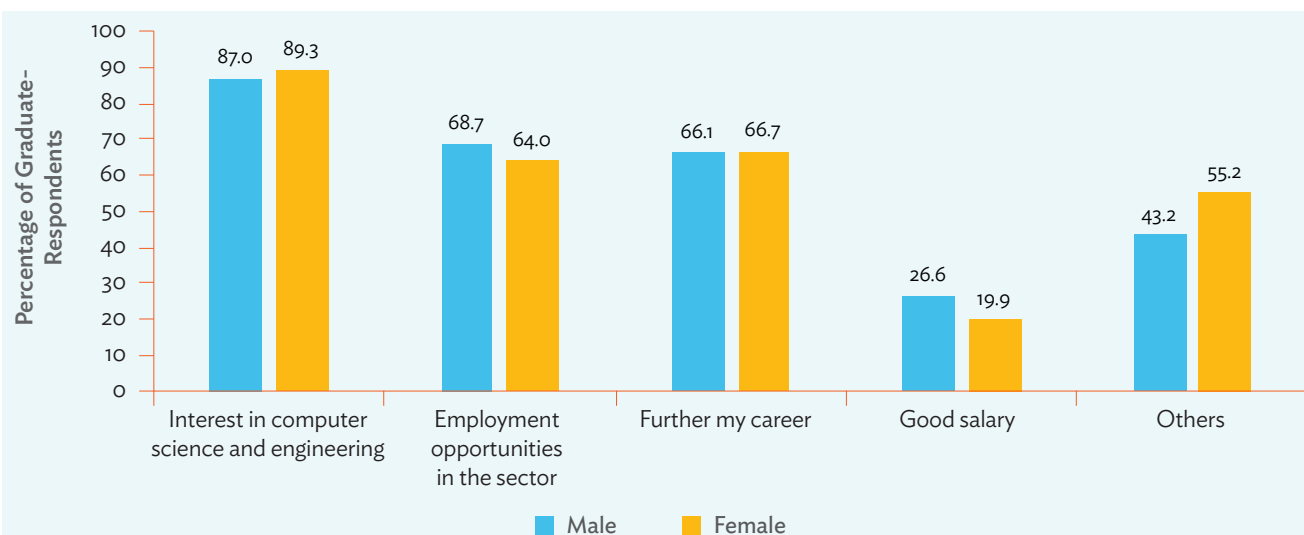
A. Graduates' Motivation

Graduates engaged in CSE/IIT because of their interest in this subject, as evident in Figure 20. However, graduates also felt there are increased opportunities for employment and career development if they chose CSE/IIT programs. Good salary was not necessarily the major selection criterion. While motivation was similar for males and females, participation of women in CSE/IIT courses remained low. Only 21.5% of total graduates from 2013 to 2018 were female, as opposed to 78.5% male.

B. Financing

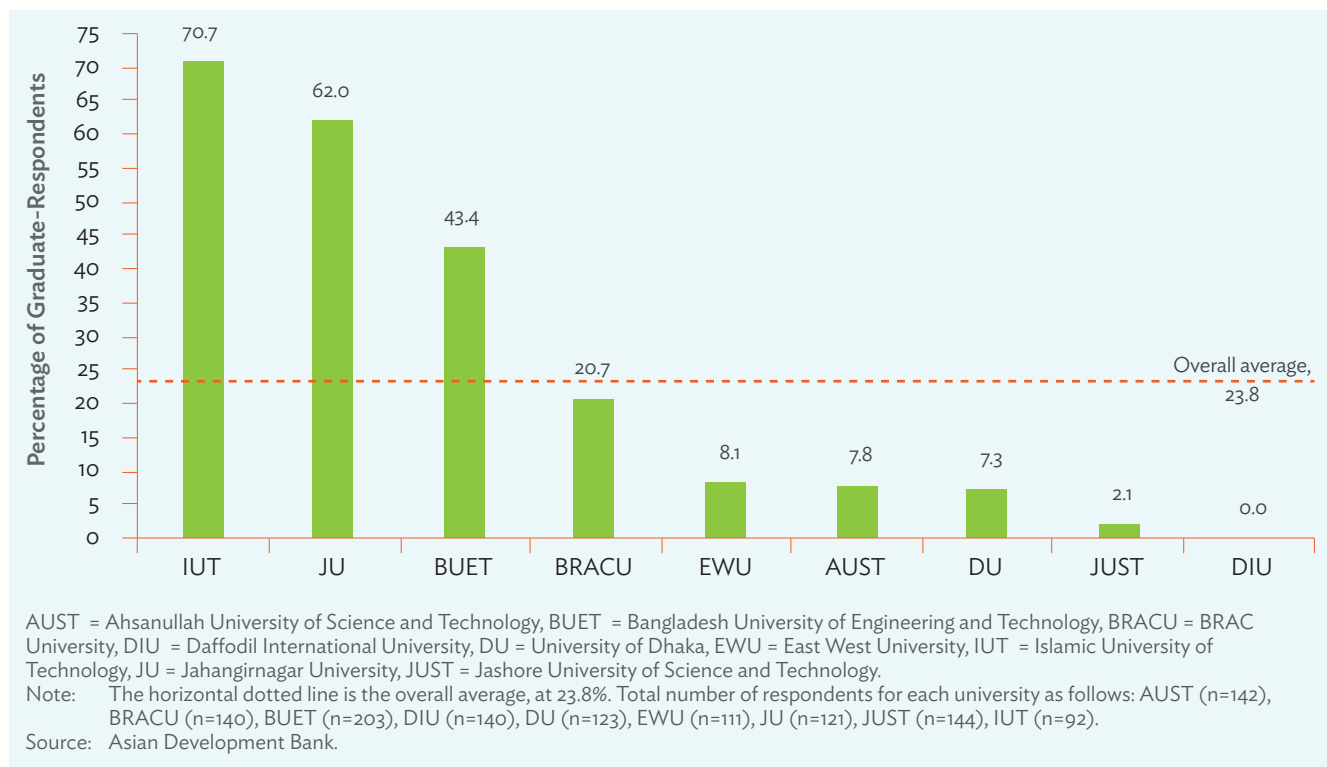
Only 23.8% of graduates received a stipend or scholarship. Among the nine universities, the Islamic University of Technology had the most graduates (70.7%) who received a stipend or scholarship, followed by Jahangirnagar University (62.0%), and Bangladesh University of Engineering and Technology (43.4%). All respondents from Daffodil International University said they received no stipend or scholarship (Figure 21). On the other hand, among the 76.2% who did not receive a scholarship, most (65.3%) said no stipend

Figure 20: Reasons for Choosing Course by Gender, 2018 (%)



Notes: 1. Total number of graduate-respondents is 1,216 (male=955, female=261).
 2. Respondents were asked to choose a maximum of three reasons for selecting the course they studied.
 3. "Others" included reasons such as parents were in the same field, foreign jobs or migration potential, interest or influence of friends and family, observed role models, and not getting a chance elsewhere.

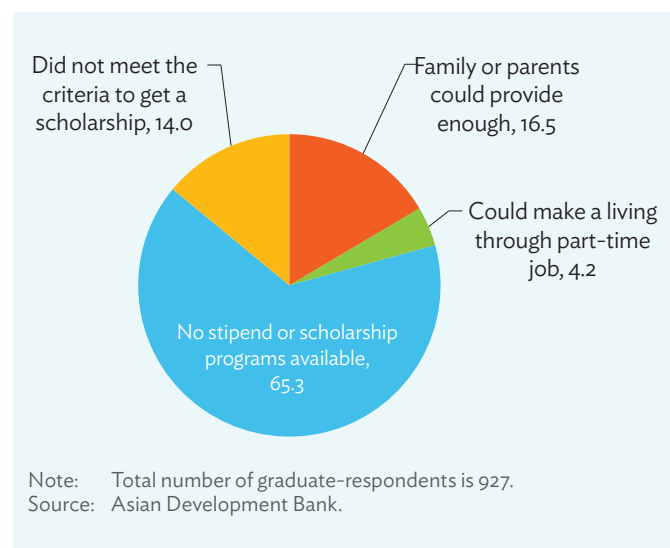
Source: Asian Development Bank.

Figure 21: Recipients of Stipend or Scholarship, 2018 (%)

or scholarship program was available in their university. Others said their family or parents could provide enough (16.5%), they did not meet the criteria to get a scholarship (14.0%) or could make a living through a part-time job (4.2%) as shown in Figure 22. The average stipend or scholarship was only Tk362 (\$4) per month.

C. Job Search Strategies

Using the internet is the most popular job search strategy for graduates. In fact, 36.7% of employed graduates looked for their work through online job matching sites, but traditional media advertisements were still useful to 16.1% of them. Other less popular job search strategies among the employed included their informal network of family and/or relatives (7.8%) or friends (6.8%), social media (6.6%), and on-campus job fairs or recruitment (5.1%), as presented in Figure 23. The influence of university career guidance office is limited (3.9%).

Figure 22: Reasons for Not Receiving Scholarship or Stipend, 2018 (%)

Yet, employers in the IT sector do not necessarily rely on the internet for recruitment. Employers often use private employment services (58.1%) and job fairs (58.1%) to recruit staff (Figure 24). While partnership with schools and training institutes (54.9%) is also often used, only 15.1% of

employers have regular contact and collaboration or partnership with universities, primarily for recruitment (Figure 25). Recruitment also appears to be the top reason for employers to partner with the nine universities considered in the tracer study. Half of the employers had collaborated with other universities other than those surveyed

Figure 23: Job Search Strategies of Employed Graduates, 2018 (%)

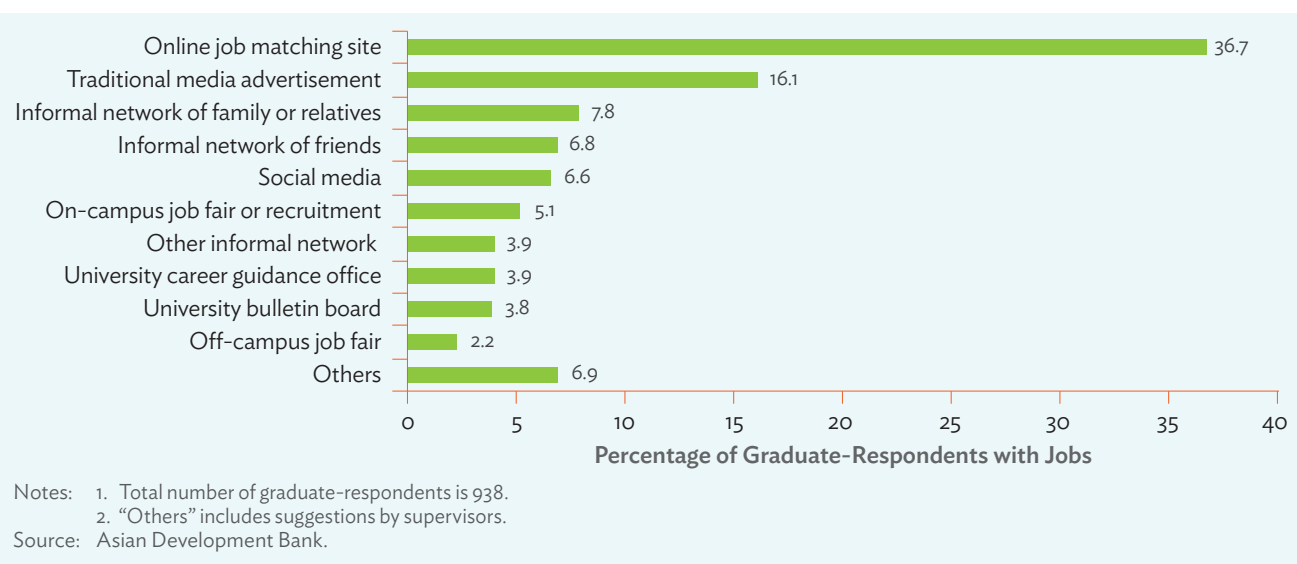
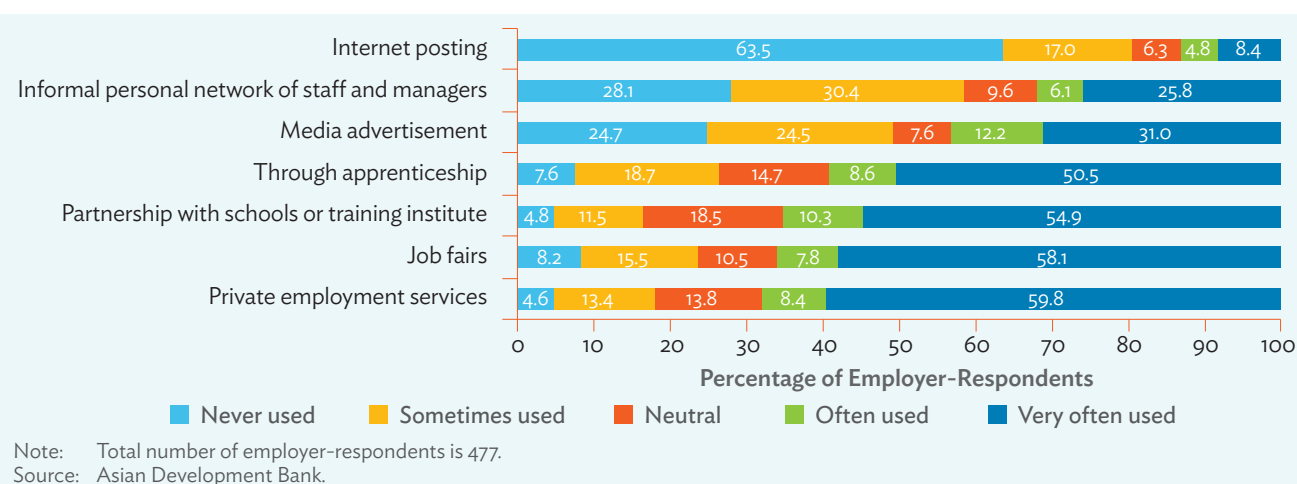


Figure 24: Employer Recruitment Practices, 2018 (%)



(Figure 26). In addition, focus group discussion participants pointed out that universities had alumni associations in which graduates could create networks to help them look for jobs.

Job search support was also available in universities. About 64.6% of graduates

indicated that their universities provided job fairs. Furthermore, 52.7% said teachers provided individual career counseling to students. Respondents in focus group discussions corroborated the latter finding. They added that their teachers provided counseling on research and networking activities.

Figure 25: Employer Collaboration with Universities, 2018 (%)

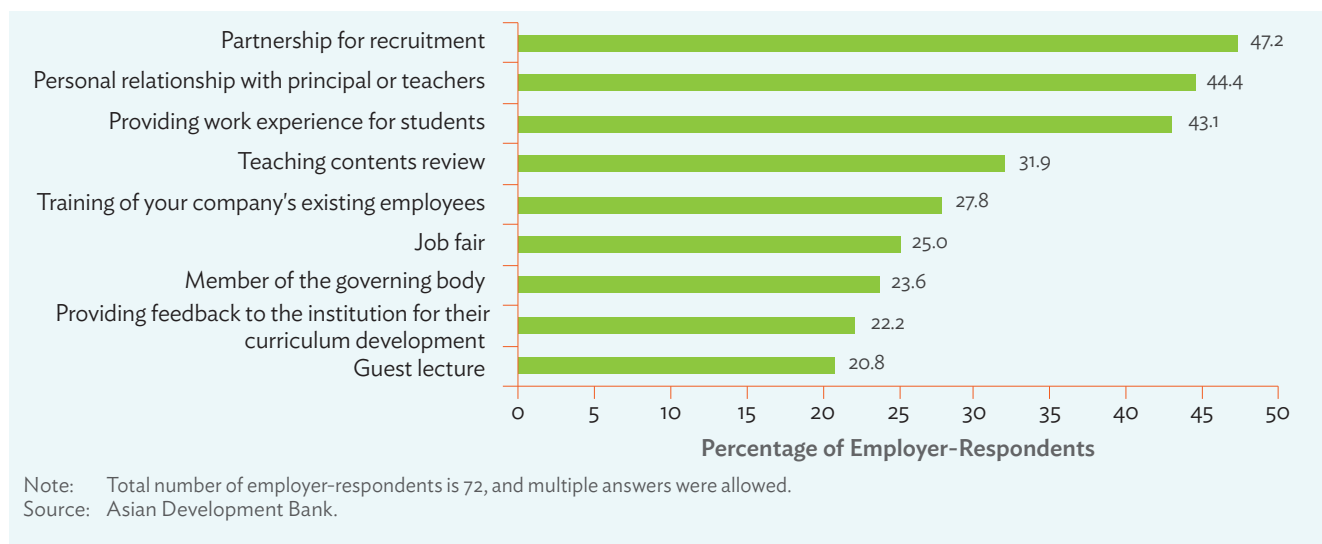
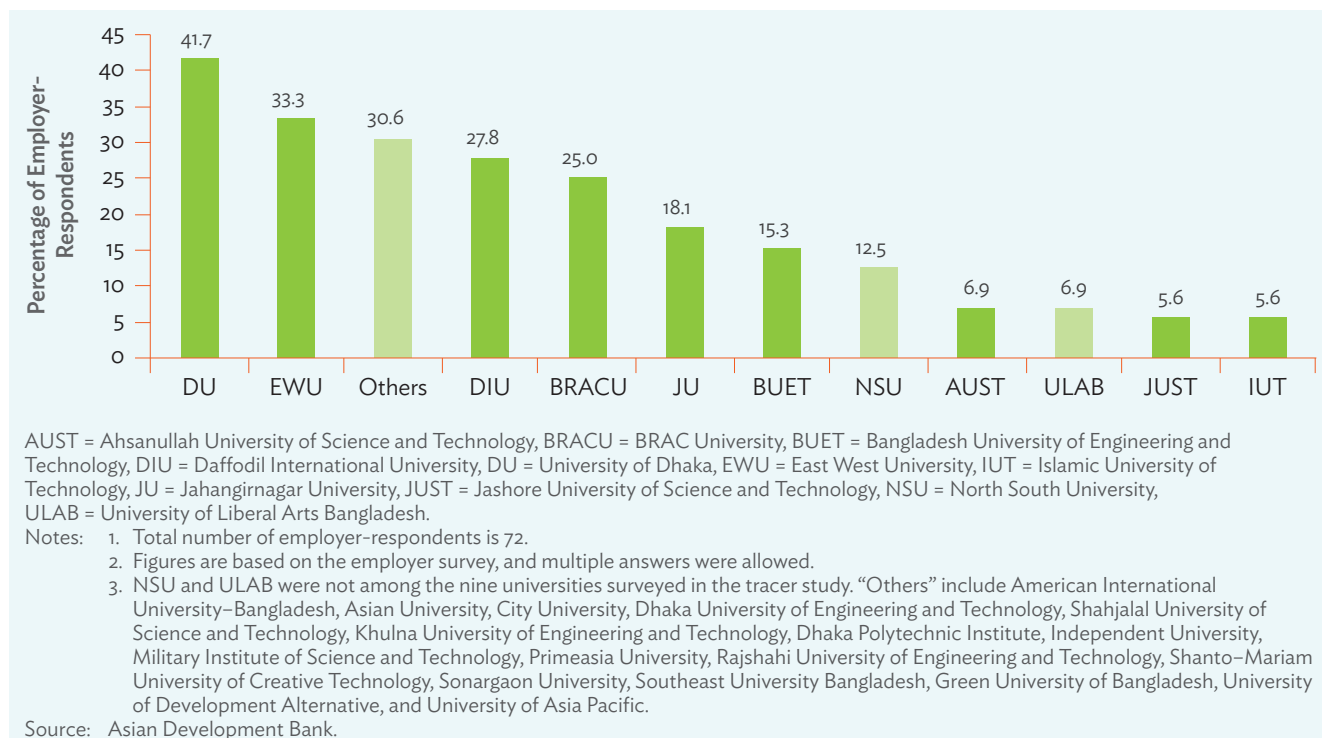


Figure 26: Universities Having Partnerships with Employers from Information Technology Sector, 2018 (%)



D. Job Search Challenges

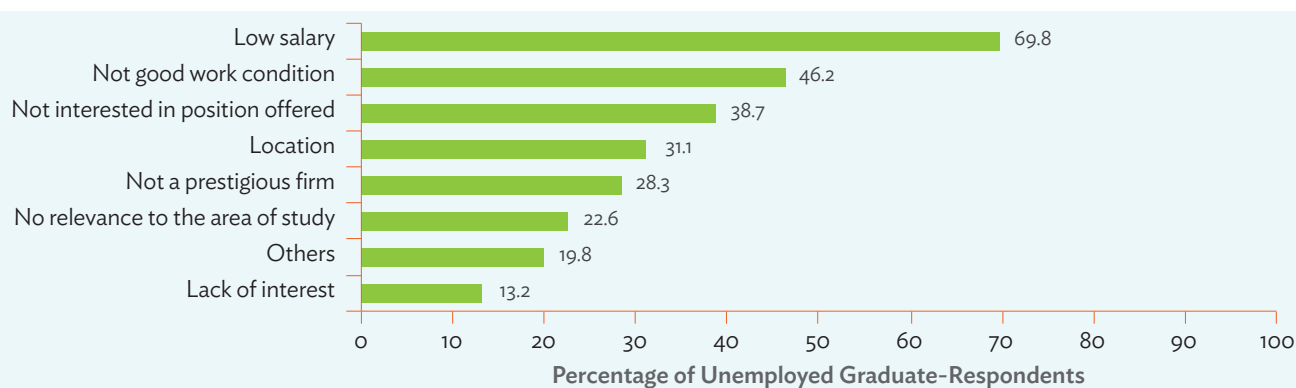
Among the unemployed who looked for work, 62.1% got a job offer but did not accept it because of unsatisfactory working conditions.

These unemployed graduates applied in 17 jobs on average, and 4 interviews had been conducted since graduating from university. Although 78.0% of unemployed job seekers considered it very important to find a job, most did not accept the offers due to low salary (69.8%), not good working conditions (46.2%), and no interest in the position offered (38.7%) as shown in Figure 27.

E. Further Education and Training Prospects

Some graduates were inclined to take another university education or technical and vocational education and training course in the future. Regardless of job placement status, more than 60% of graduates planned to enroll in another course in the future. By university, Daffodil International University had the highest proportion of graduates planning to enroll in another course (Figure 28). Access to overseas

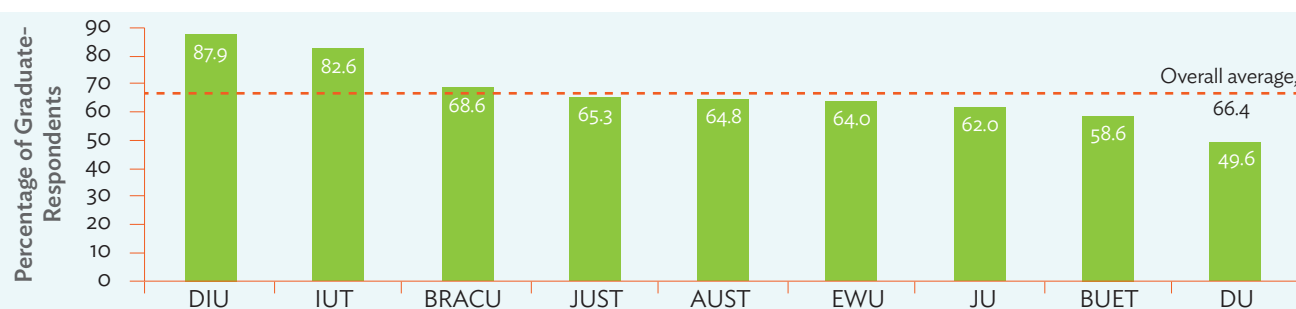
Figure 27: Reasons of Unemployed Graduates for Not Accepting at Least One Job Offer, 2018 (%)



Notes: 1. Total number of graduate-respondents is 106.
2. "Others" include being advised by parents and/or spouses not to take the job, family commitments, health issues, no desire to work, going to start job or self-employment, plan to go abroad, family problems, and desire for government job.

Source: Asian Development Bank.

Figure 28: Graduates' Plans to Enroll in Another Course in the Future, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Notes: 1. Total number of graduate-respondents for each university are as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

2. The horizontal dotted line is the overall average (66.4%).

Source: Asian Development Bank.

job opportunities was a key motivation for graduates with jobs, but for those not working, earning higher income was the incentive (Figure 29).

Even graduates not participating in the labor force hoped to advance their careers

(36.5%) through further education (Figure 30). The majority took courses highly related to their course (63.5%), as shown in Figure 31. More specifically, 71.8% took a postgraduate course at a university, while others took short-term and long-term training courses at vocational schools, professional courses at

Figure 29: Reasons for Plans to Enroll in Another Course among Employed and Unemployed Graduates, 2018 (%)

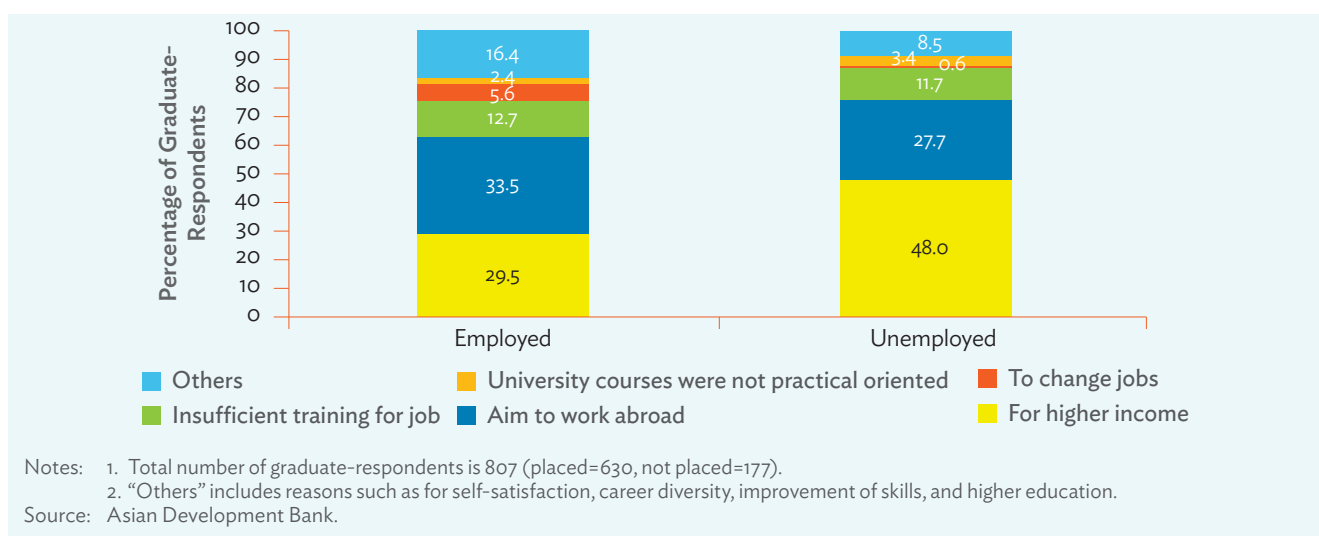


Figure 30: Reasons for Pursuing Another Education Course after Graduation, 2018 (%)

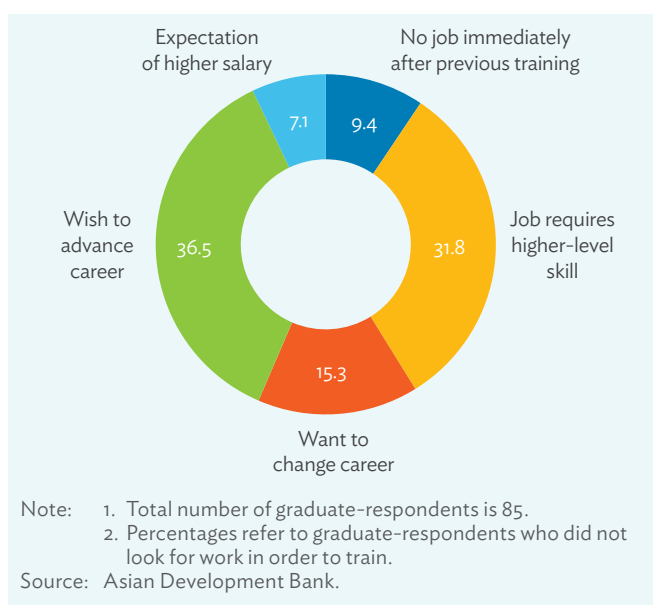
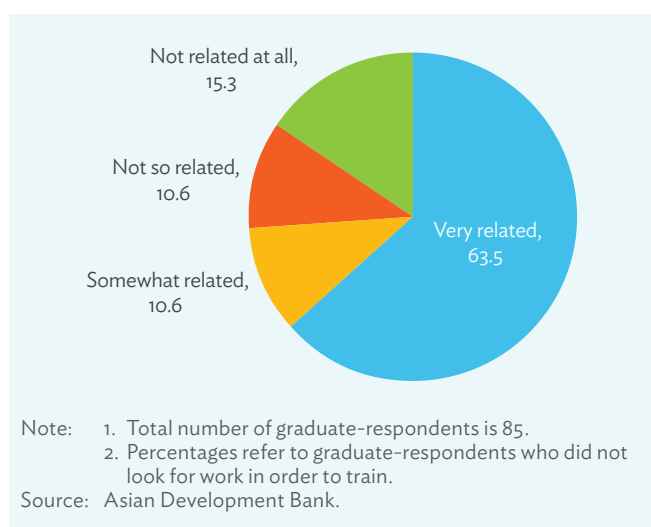
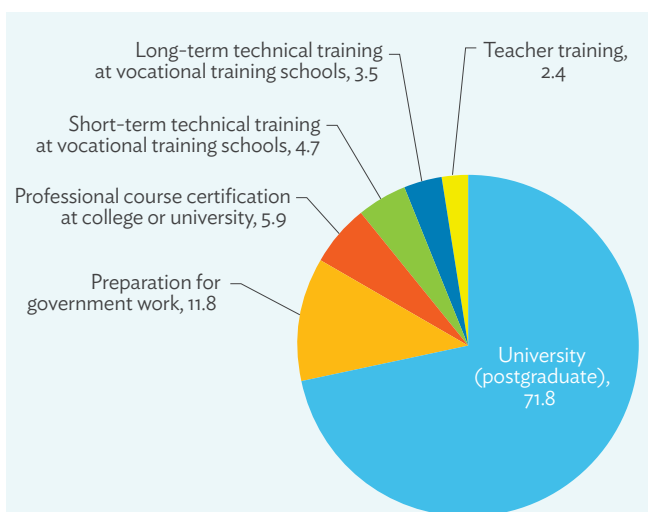


Figure 31: Relevance of Further Course or Training Taken to Information Technology or Computer Science and Engineering, 2018 (%)



universities, or were preparing for government work (Figure 32). This implies demand for postgraduate courses, but the completion rate of postgraduate courses, if it exists, is known to be low, for example, in the Bangladesh University of Engineering and Technology. The support mechanism, such as a stipend, to continue further education needs to be developed. ICT vocational training courses supported by development partners and government also need to be introduced for relevant graduates.

Figure 32: Type of Education or Training Graduates Undergo after Graduation, 2018 (%)

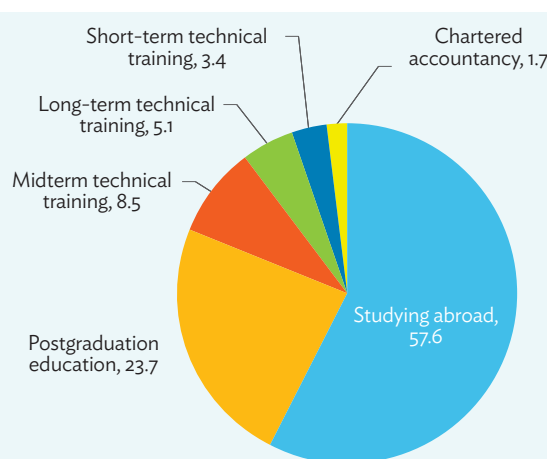


Note: 1. Total number of graduate-respondents is 85.
2. Percentages refer to graduate-respondents who did not look for work in order to train.

Source: Asian Development Bank.

Most of the 46.2% who did not look for work due to reasons other than being a student or trainee also planned to study again. Among them, 57.6% were sure to pursue further education and training, and most were planning to study abroad (Figure 33). The remaining 20.6% considered the possibility of studying, while 19.2% had no such plan.

Figure 33: Type of Further Education or Training Programs Favored by Students or Trainees, 2018 (%)



Notes: 1. Total number of graduate-respondents is 59.
2. Percentages refer to graduate-respondents who favored further education and training programs.
3. Short-term training is for less than 6 months; midterm training is around 6 months; and long-term training is for 1 year or more.

Source: Asian Development Bank.

6.

QUALITY AND RELEVANCE OF EDUCATION

A. Overall Quality and Relevance

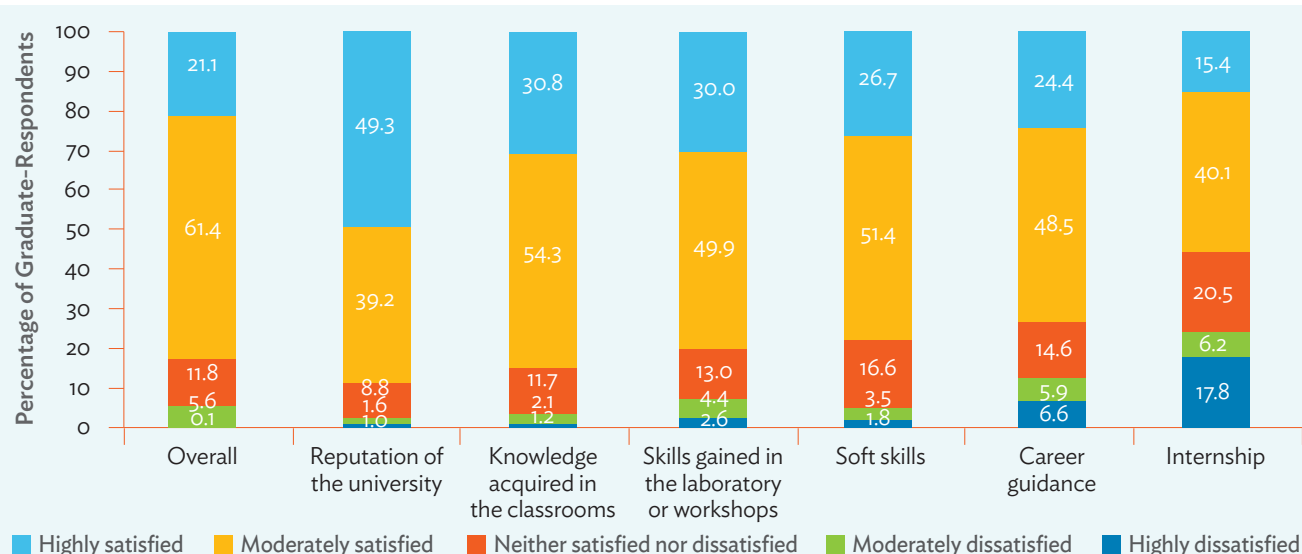
Areas for improvement exist despite graduates' high satisfaction with CSE/IIT education. More specifically, students were satisfied with university reputation, knowledge, and practical and soft skills gained. Figure 34 shows, however, that some graduates were not satisfied with career guidance (6.6% highly dissatisfied) and internship (17.8% highly dissatisfied), which is consistent with the areas for improvement that graduates pointed out through qualitative interviews. According to a majority, it is highly necessary for universities to improve education programs to ensure up-to-date practical skills; enhance training on soft skills (e.g., communication, presentation, leadership, teamwork); develop their internship and career guidance programs; improve their facilities; and

ascertain that the teachers were qualified to teach in their area (Figure 35).

CSE/IIT programs can be adjusted to teach a more adequate level of skills for the labor market.

In general, while CSE/IIT education was relevant to jobs after graduation, some jobs required either a higher or lower set of skills. For instance, 88.8% of graduates from the IIT in University of Dhaka said that their jobs required a lower level of skills, while 25.5% from Daffodil International University graduates said that their job required higher-level skills (Figure 36). East West University has 44.1% of graduate whose skills are not applicable. Although it was not directly implied in the responses, skills mismatch might have had wage implications as graduates might have been well overqualified or underqualified for jobs.

Figure 34: Graduates' Satisfaction with University Education, 2018 (%)



Note: Total number of graduate-respondents is 1,216.
Source: Asian Development Bank.

Figure 35: Areas for Improvement in the University Education Program, 2018 (%)

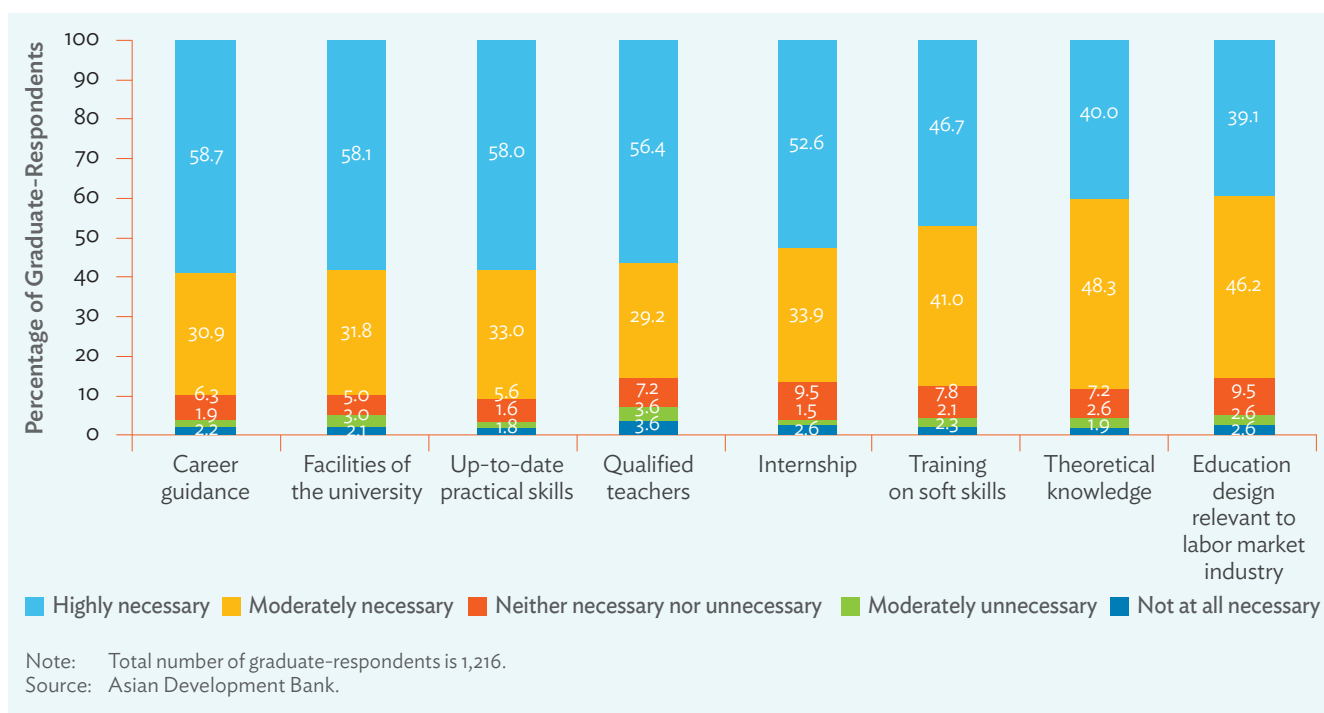
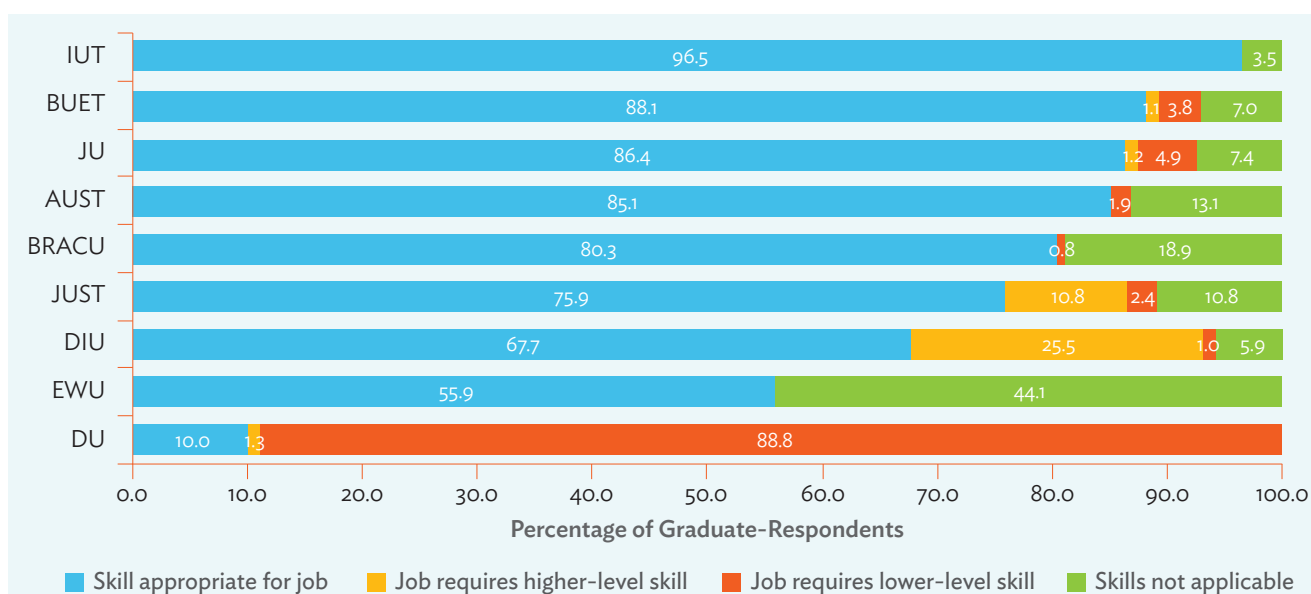


Figure 36: Relevance of Information Technology or Computer Science and Engineering Programs to First Job after Graduation, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

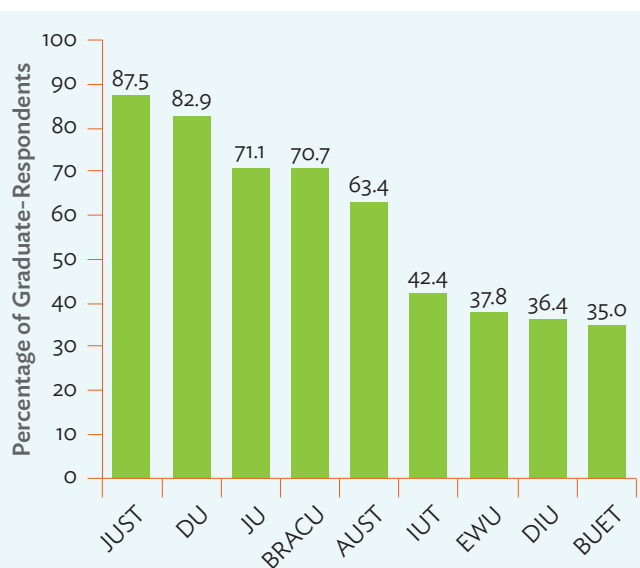
Note: Total number of respondents for each university as follows: AUST (n=107), BRACU (n=122), BUET (n=185), DIU (n=102), DU (n=80), EWU (n=93), JU (n=81), JUST (n=83), IUT (n=85).

Source: Asian Development Bank.

B. Infrastructure

Graduates also pointed out that it was highly necessary for universities to improve facilities. Jashore University of Science and Technology (87.5%), University of Dhaka (82.9%), Jahangirnagar University (71.1%), and BRAC University (70.7%) were the top four universities with the highest proportion of graduates saying this was highly necessary (Figure 37). Participants from the focus group discussion backed this finding and suggested that additional hard infrastructure, such as computer laboratories and data centers, would be of great support.

Figure 37: Proportion of Graduates Saying Facility Improvements Are Highly Necessary, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Note: Total number of respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

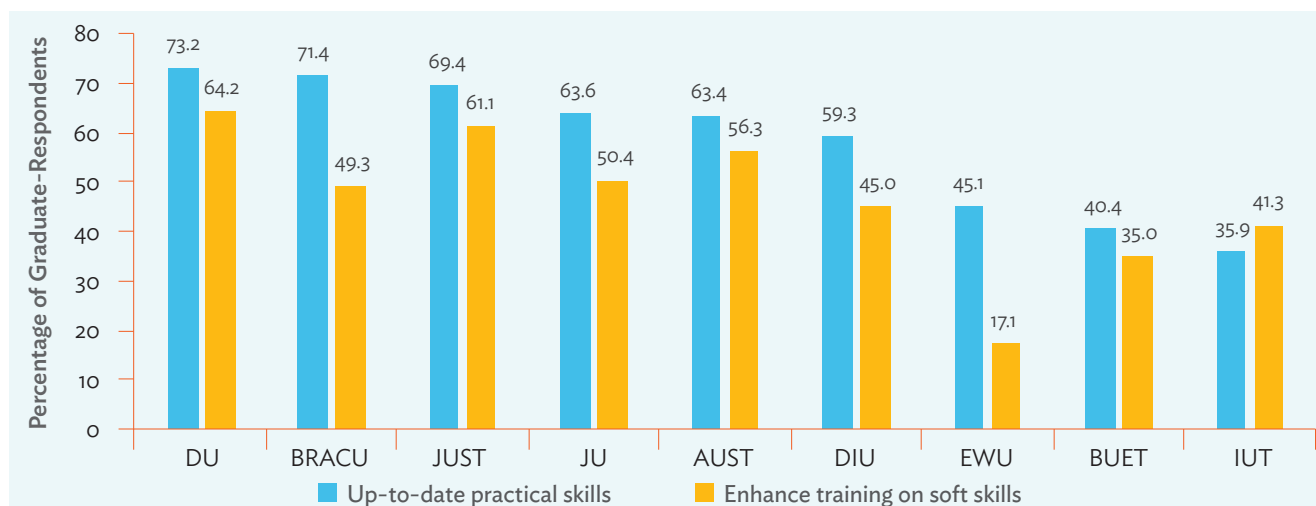
Source: Asian Development Bank.

C. Skills Training and Teachers' Qualifications

Practical skills and soft skills can be enhanced. About 73.2% of University of Dhaka graduates considered it highly necessary for the IIT to ensure their practical skills were up to date. This is closely followed by BRAC University (71.4%) and Jashore University of Science and Technology (69.4%). In University of Dhaka, 64.2% of graduates said training on soft skills should also be enhanced, followed by Jashore University of Science and Technology (61.1%) and Ahsanullah University of Science and Technology (56.3%) (Figure 38). Moreover, a substantial portion of employers also believed that universities should focus more on ICT use (51.1%), problem-solving skills (49.6%), communication skills (45.3%), team working skills (36.7%), and management skills (33.9%), among others (Figure 39).

Graduates also said that qualified teachers were strongly needed in their universities. University of Dhaka (88.6%), BRAC University (85.7%), and Jahangirnagar University (71.9%) had the three highest proportions of graduates saying teachers in their universities needed to enhance qualifications (Figure 40). Similarly, University of Dhaka had the most graduates reporting that teachers were absent for more than 3 days a month during the course (Figure 41). The findings from the focus group discussion also suggested that the lecturer's inadequate computer and ICT skills and lack of experience or up-to-date training are challenges to be addressed. This is evident in the huge proportion of students saying that theoretical knowledge is necessary to be enhanced (88.2%), practical skills are needed to be up-to-date (91.0%), and their education program should be designed in parallel with labor market industry needs (85.4%).

Figure 38: Graduates' Assessment of Practical Skills and Soft Skills Gained, 2018 (%)

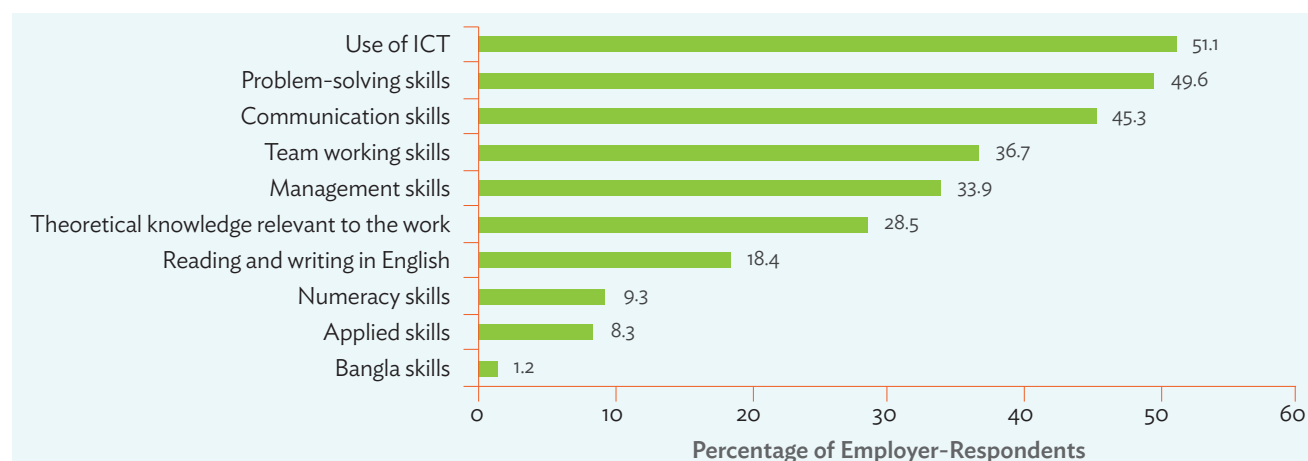


AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Note: Total number of respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

Source: Asian Development Bank.

Figure 39: Skill Areas Where Universities Need More Focus, 2018 (%)

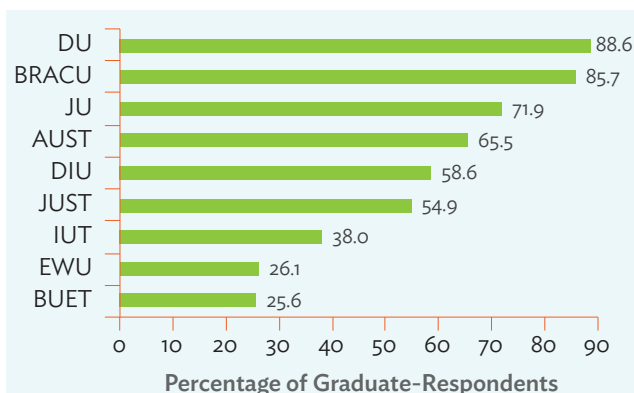


ICT = information and communication technology.

Note: Total number of employer-respondents is 853, and multiple answers were allowed.

Source: Asian Development Bank.

Figure 40: Proportion of Graduates Saying Qualified Teachers Are Highly Necessary, 2018 (%)

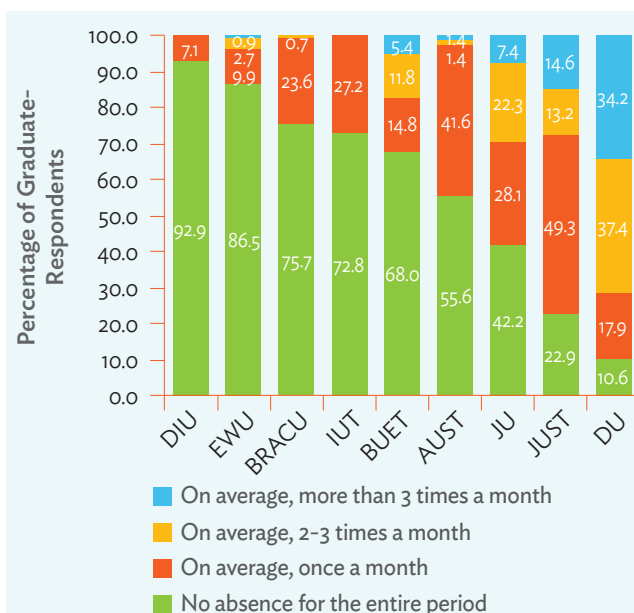


AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Note: Total number of graduate-respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

Source: Asian Development Bank.

Figure 41: Frequency of Teacher Absences, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

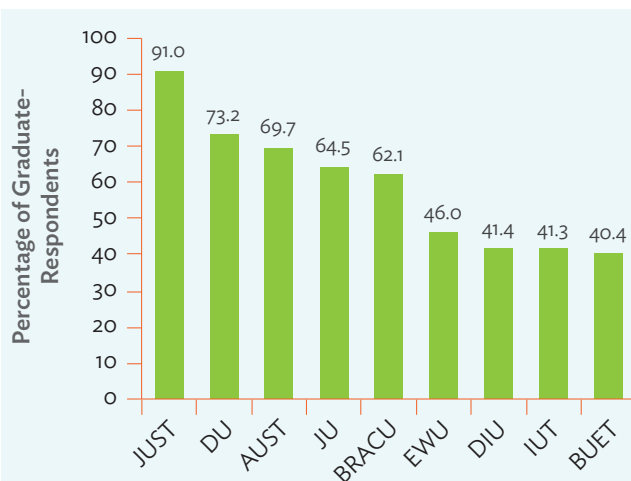
Note: Total number of graduate-respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

Source: Asian Development Bank.

D. Career Guidance

Although 61.3% of graduates were aware of career counseling in their universities, it was considered highly necessary to improve career guidance programs. Jashore University of Science and Technology, the university with the lowest job placement rate, leads with 91.0% of graduates pointing out the strong need to improve career guidance programs to help students transition from university to the labor market (Figure 42).

Figure 42: Proportion of Graduates Saying Improving Career Guidance Is Highly Necessary, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

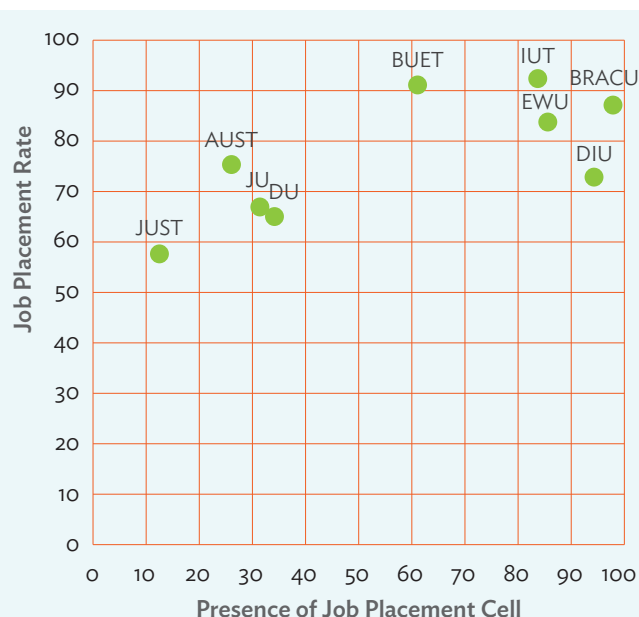
Note: Total number of graduate-respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).

Source: Asian Development Bank.

A job placement officer could be instrumental in finding employment opportunities.

Islamic University of Technology and BRAC University, the two universities with the highest level of job placement rates, had a job placement office or officer in their universities (Figure 43). While it is only a correlation, graduates interviewed in the focus group discussion also agreed that career guidance or counseling services were helpful in finding suitable employment, or—for those who did not have such services in their university— would have helped them in seeking jobs.

Figure 43: Correlation of Job Placement Cell in the University and Job Placement Rate, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

- Notes:
1. Total number of graduate-respondents for each university as follows: AUST (n=142), BRACU (n=140), BUET (n=203), DIU (n=140), DU (n=123), EWU (n=111), JU (n=121), JUST (n=144), IUT (n=92).
 2. Job placement rate after graduation is calculated by the number of graduates who said they were employed or self-employed after graduation divided by the total number of respondents.

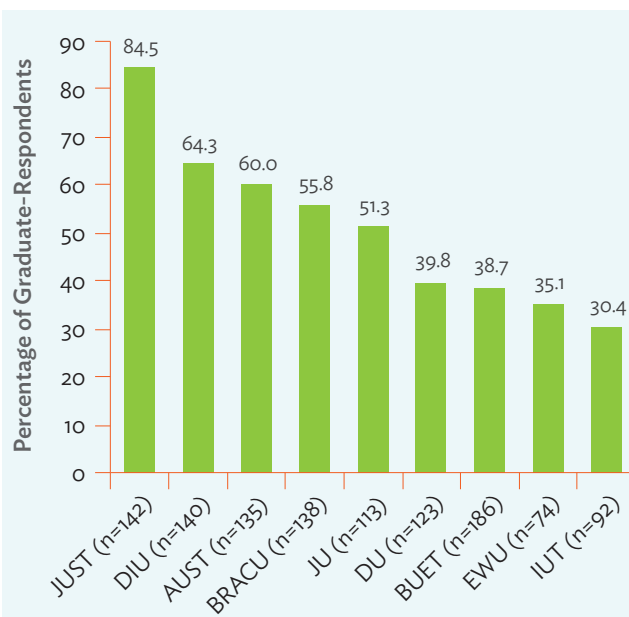
Source: Asian Development Bank.

E. Internship

Internship programs had significant scope for improvement (Figure 44).

Only 19.7% of graduates were required to go on an internship, which on average lasted for about 4 months. Among them, 92.5% found internship experiences useful for work interviews, which suggests the programs' effectiveness. Jashore University of Science and Technology again had the most graduates pointing out the strong need for internship programs.

Figure 44: Proportion of Graduates Saying Improving Internship Is Highly Necessary, 2018 (%)



AUST = Ahsanullah University of Science and Technology, BRACU = BRAC University, BUET = Bangladesh University of Engineering and Technology, DIU = Daffodil International University, DU = University of Dhaka, EWU = East West University, IUT = Islamic University of Technology, JU = Jahangirnagar University, JUST = Jashore University of Science and Technology.

Note: "n" is sample size.

Source: Asian Development Bank.

7.

CONCLUSION

A. Summary of Findings

The computer science and engineering and/or institute of information technology (CSE/IIT) graduate job placement rate in nine universities was 77.1%, exceeding the overall university graduate average of 40.0%.

The figure was also higher than engineering graduates, at 67.7% (BIDS 2018). Most graduates worked in the private IT/ITES industry as full-time professionals, implying strong demand for CSE/IIT graduates in the labor market.

Among the nine universities, CSE graduates from Islamic University of Technology and Bangladesh University of Engineering and Technology achieved more than 90% job placement rate. Among private universities, BRAC University and East West University recorded more than an 80% job placement rate. The job placement rate of Jashore University of Science and Technology was the lowest, at 57.6%, reflecting a series of challenges outside Dhaka.

The female job placement rate was 58.6%, 23.6 percentage points lower than that of males. Women faced numerous challenges, such as family commitments; employer's security concerns during recruitment; and social stereotypes in enrollment, job search, and workplace. The IT/ITES industry is not yet considered a breakthrough industry in addressing structurally low female labor force participation in Bangladesh.

Only 20.6% of CSE/IIT graduates found jobs within 3 months after graduation. Many

graduates found jobs after 1 year, suggesting that fresh graduates are not fully ready for IT/ITES industry. While overall job placement rate of CSE/IIT graduates is higher than the overall average of university graduates, universities need to make efforts to provide relevant jobs soon after graduation.

Employed graduates earned around Tk38,780 per month, with variation by gender and university. The wage of female employees (Tk34,933) was less than that of male employees (Tk39,513). The graduates from Islamic University of Technology earned Tk51,938 while graduates from Jashore University of Science and Technology was Tk25,342.

For those not in jobs (22.9%), around half were active job seekers. These were unemployed because of unsatisfactory working conditions, such as low wages. The average monthly wage among CSE/IIT graduates (Tk38,780) was higher than the overall university average (Tk30,000); one view is that job seekers have high salary expectations after graduating from CSE/IIT programs.

Around half of graduates not looking for jobs continued further education. The majority of respondents were graduates of bachelor's programs, and some continued on to a master's degree or other specialized training. Interestingly, regardless of job placement status, 60% of graduates expressed an interest in exploring further education for overseas employment or career development.

The internet is the most popular instrument for graduate job search.

CSE/IIT graduates are trained to take advantage of digital technologies and 36.7% used the internet for job search. Still, traditional media advertisements were useful to 16.1% of graduates. However, employers in the IT/ITES industry relied more on private employment services, job fairs, and partnership with universities. The analog recruitment channel is still important to find trusted candidates.

B. Way Forward

Access to CSE/IIT programs, particularly for women, needs to be expanded.

Since interest in CSE/IIT programs is the strongest motivation to enroll for both men and women, CSE/IIT faculty needs to reach out to higher secondary students to cultivate interest, particularly targeting women.

Financial assistance, such as stipend and scholarship, can also be reinforced.

Capacity expansion through additional seats at the public universities where the fee structure is nominal could be a sustainable method to promote education for meritorious students. In addition, financial assistance may incentivize students to opt for CSE/IIT programs compared to other subjects. Assistance targeted to female students may also be considered as a way to close gender gaps in CSE/IIT enrollment.

The relevance of the CSE/IIT programs can be expanded through effective career guidance and internship.

While graduates showed high satisfaction with their programs, these are two areas that respondents clearly pointed out as areas for improvement. This would be particularly important for universities outside Dhaka, considering feedback from Jashore University of Science and Technology graduates. Addressing these areas is not easy where the IT/ITES industry is not strong, but these universities require more deliberate efforts to make this happen. As such, stronger ties between the IT/ITES industry and universities, especially those located outside Dhaka, will be ideal.

The quality of CSE/IIT programs requires significant revision by introducing more hands-on practice in curriculums.

Feedback from graduates implies that teaching is based on theories, and skill levels taught in their curriculums need to be revisited for some universities. Up-to-date practical skills need regular updates from the industries. Soft skills need to be designed or integrated well in the curriculum and pedagogy to strengthen problem-solving and communication skills. Blended learning can be considered by utilizing digital technologies.

University infrastructure and faculty need to be developed to meet growing industry demand.

Additional hard infrastructure, such as computer laboratories and data centers are also needed to expand access to quality CSE/IIT higher education programs. The infrastructure specifications need to be informed by up-to-date curriculums reflecting labor market trends. Faculty skills and qualifications also have to be in line with the latest technologies and applications to make the most of additional hard infrastructure.

Academic staff need more industry exposure to provide quality and relevant guidance for students.

Students count on teachers not only for research but also for career development. Joint research with the industry or short-term training in the industry for academic staff could be useful to fill in the knowledge and skills gap. The universities can also ramp up efforts to recruit qualified faculty members with industry experiences.

Universities can strengthen support for start-ups to increase the number of successful high-tech entrepreneurs.

Although the number is limited, cases exist of successful entrepreneurs earning much more than employed graduates. Setting up incubation centers or integrating entrepreneurship courses in curriculums could increase the number of entrepreneurs with higher rates of success. Since there are entrepreneurs who start up their own business after gaining some work experiences, offering postgraduate degree or certificate courses for entrepreneurship might be effective. This could generate a new breed of innovative tech entrepreneurs to lead the Bangladesh IT/ITES industry.

APPENDIX 1

OVERVIEW OF SURVEYED UNIVERSITIES

34

A. Public Universities

Bangladesh University of Engineering and Technology

Bangladesh University of Engineering and Technology was established in 1947 as Ahsanullah Engineering College, which was a part of the Faculty of Engineering of the University of Dhaka. Bangladesh University of Engineering and Technology is the oldest institution for the study of engineering and architecture in Bangladesh. Currently, about 9,740 students are pursuing undergraduate and postgraduate studies in engineering, architecture, planning, and science in this institution. At present, Bangladesh University of Engineering and Technology has 18 teaching departments under 5 faculties, and it has 6 institutes. Some 661 academic staff are teaching in the departments and institutes. Eleven departments under five faculties offer bachelor's degrees, while most departments and institutes offer master's degrees and some departments have doctor of philosophy (PhD) programs.

University of Dhaka

University of Dhaka was established in 1921. At present, the university consists of 13 faculties, 83 departments, 12 institutes, and more than 56 research centers. The number of students and teachers is currently about 37,018 and 1,992, respectively. The Institute of Information Technology in the University of Dhaka started its journey in June 2001 to create efficient human resources in information technology. The Institute

of Information Technology currently offers a Bachelor of Science in Software Engineering, Master of Science in Software Engineering, Master of Information Technology, and Postgraduate Diploma in Information Technology. The bachelor program is a 4-year industry-oriented degree. A study period of 3 years is followed by a half-year industry placement before the final semester. Students are assisted by the Institute in placement for internship. They integrate industry experience within their studies upon return for their final semester. This helps provide students strong communication skills and a global perspective, positive personality, and business aptitude. This program enhances students' capabilities and competence to deliver in different technical roles and management positions.

Jahangirnagar University

Jahangirnagar University was established in 1970. It has 34 departments; 6 faculties; 2 institutes; more than 15,000 students; and about 500 academics in teaching and research. It had a modest beginning in 1987, with the aim to produce research in computers and computing-related disciplines. Later in 2009, the undergraduate program in information technology began, aiming to mold specialists of the highest caliber in information technology to be involved in research, design, and development. The university offers undergraduate, master's degrees, PhDs, and short course programs. It has 14 teaching faculty members. It aims to produce high-end professionals in information technology.

Jashore University of Science and Technology

Jashore University of Science and Technology was established in 2007 and started 4-year undergraduate courses from the 2009–2010 session. It is the fourth public university in Khulna Division and the first public university in Jashore. The university offers bachelor's, master's and PhD degrees in science as well as a bachelor's and Master of Science in engineering to almost 3,466 students. It has 22 departments under 7 faculties and 165 faculty members.

B. International Universities

Islamic University of Technology

Islamic University of Technology was established in 1981. It has two faculties and six departments. The Computer Science and Engineering (CSE) department offers bachelor's, postgraduate diplomas, and master's degrees. The CSE Department is celebrating nearly 20 years as a department. At its inception, it was known as computer science and information technology, and from academic year 2012–2013 as CSE. The department began offering Bachelor of Science degrees in software engineering from academic year 2017–2018. The department has 24 full-time and part-time faculty members from other reputed universities. About 250 undergraduate and 30 graduate students study in the department.

C. Private Universities

Ahsanullah University of Science and Technology

Ahsanullah University of Science and Technology was founded by the Dhaka Ahsania Mission in 1995. It has four faculties and one institute. It offers courses in architecture, civil engineering, computer science and engineering, electrical and electronic engineering, and mechanical engineering, among others.

BRAC University

BRAC University was established in 2001. It has four schools, four institutes, four centers, and six departments. The Department of Computer Science and Engineering offers academic programs of Bachelor of Science in Computer Science, Bachelor of Science in Computer Science and Engineering, Master of Science in Computer Science and Engineering, Master of Engineering in Computer Science and Engineering, and Master's in Computer Applications.

Daffodil International University

Daffodil International University was established in 2002. The university offers bachelor's degrees in a different spectrum of disciplines and provides the country's highly supported programs in many fields, including in information and communication technology (ICT), telecommunications, engineering, and business. Particularly strong programs can be found in the Faculty of Business, Information Technology and Engineering, and English language. Daffodil International University has five faculties and 24 departments. It offers 31 undergraduate and master's programs, 6 international IT programs, and 5 short courses.

East West University

East West University was established in 1996. It has over 216 faculty members and approximately 8,914 students. It has three faculties and 14 departments. The Computer Science and Engineering (CSE) Department was founded in 1996 and is now the second largest department. Its degrees include the Bachelor of Science in Computer Science and Engineering, and Master of Science in Computer Science and Engineering. The Bachelor of Science in CSE program at East West University has been accredited as a professional degree program by the Board of Accreditation for Engineering and Technical Education of the Institution of Engineers, Bangladesh. It has about 1,200 students and 28 qualified full-time faculty members (11 faculties have PhD degrees from reputed universities).

APPENDIX 2

KEY FINDINGS ON BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

A. General Characteristics of Graduates

- The quantitative survey covered 49.0% of total graduates from the Computer Science and Engineering (CSE) Department at Bangladesh University of Engineering and Technology between 2015 and 2017. A total of 414 graduates completed their courses, and 203 graduates (33 females) participated in the quantitative survey.
- The average and median age of graduates was 25 (ranging from 22 to 29 years); 85.2% of the respondents were Muslim and the rest were Hindu; 72.9% of the graduates were single, 26.1% were married or partnered, and 1% did not answer the question.

B. Key Findings

(i) Employment Outcomes

- Bangladesh University of Engineering and Technology had the second highest job placement rate among the nine universities at 91.1%, while its employment rate was the highest at 97.9%. By gender, the job placement rate among male graduates was higher at 91.8% compared to 87.9% among female graduates.
- Among the 8.9% not employed, only 22.2% looked for work. Among the 77.8% who did not look for work, 57.1% indicated that they moved on to further education or training.

(ii) Labor Market Outcomes

- For their first job, 90.3% of Bangladesh University of Engineering and Technology graduates were employed in the private sector, 7.6% in the government sector, 1.6% in the nongovernment sector, and 0.5% were self-employed. While currently 95.1% are paid employees, 1.1% are self-employed, and 3.8% are not working.
- A formal arrangement with employers through a contract or written agreement was reported by 62.5% of current employees, and 88.6% of the employees were hired to fill permanent or long-term positions.
- Employees are entitled to some mandatory benefits in their present jobs such as sick leave (87.5%), maternity leave (73.3%), and health insurance (49.4%). However, only 18.2% received overtime pay, although employees work for an average of 40.4 hours a week. Furthermore, less than half of employees (43.2%) had an employee provident fund, and a limited number of employers offer gratuity pay (24.4%) and pension (21.0%).
- The average starting gross monthly salary was Tk46,128 (median Tk48,000), which was the second highest among the nine universities.
- The gender wage gap exists as males consistently earn more than females. Starting gross monthly salary of male employees was 6.9% higher than female employees.

(iii) Access to Employment and Education

- The majority of graduates had chosen courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (89.7%), and employment opportunities in the sector (68.5%).
- Only 43.4% of graduates received financial support, which on average amounted to Tk430.5 per month. Fortunately, 57.4% of those who did not receive any stipend or scholarship noted that their family or parents could finance their education.
- Job search through the internet was most popular among graduates, as 22.2% of employed graduates looked for work through online job matching sites, and 11.4% used social media. Nevertheless, traditional strategies were still useful, such as on-campus job fairs (12.4%), university bulletin boards (11.4%), and traditional media advertisements (10.8%).
- Most graduates who did not participate in the labor force hoped to advance their career (50%) by continuing education. The majority took courses highly related to their course (62.5%). More specially, all graduates who continued education further took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with Bangladesh University of Engineering and Technology's reputation, and the knowledge and practical and soft skills they gained. However, some graduates were not satisfied with career guidance (1.0% highly dissatisfied and 4.5% moderately dissatisfied) and internship (9.0% highly dissatisfied and 16.2% moderately dissatisfied).
- Furthermore, graduates pointed out that it is highly necessary for the Bangladesh University of Engineering and Technology to improve its education program to ensure up-to-date theoretical knowledge (37.0%) and practical skills (40.4%), enhance training on soft skills (35.0%), develop its internships (38.7%) and career guidance programs (40.4%), design education relevant to labor market or industry needs (19.7%), improve its facilities (35.0%), and ascertain that the teachers were qualified to teach in their area (25.6%).
- In general, 88.1% of Bangladesh University of Engineering Technology graduates noted that their CSE skills were appropriate for their jobs after graduation.

APPENDIX 3

KEY FINDINGS

ON UNIVERSITY OF DHAKA

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A. General Characteristics of Graduates

- The quantitative survey covered 64.7% of the total graduates from the Institute of Information Technology at University of Dhaka between 2015 and 2017. A total of 190 graduates completed their courses, and 123 graduates (21 females) participated in the quantitative survey.
- The average and median age of graduates was 25 (ranging from 22 to 31 years); 93.5% of the respondents were Muslim and the rest Hindu; 80.5% of graduates were single while 19.5% were married or partnered.

B. Key Findings

(i) Employment Outcomes

- University of Dhaka had a job placement rate at 65.0%, and employment rate at 80.0%. By gender, job placement rate among male graduates was 64.7%, slightly lower than 66.7% among female graduates.
- Among the 35.0% not employed, 46.5% looked for work. Among the 53.5% who did not look for work, 47.8% indicated that they moved on to further education or training, and 39.1% were living abroad.

(ii) Labor Market Outcomes

- For their first job, 86.3% of graduates were employed in the private sector and 13.8% in the government sector. Currently, 93.8% are paid employees, 5.0% are self-employed, and 1.3% are presently not working.
- A formal arrangement with employers through a contract or written agreement was reported by 93.3% of current employees, and 94.7% of the employees were hired to fill permanent or long-term positions.
- Employees are entitled to mandatory benefits in their present jobs such as sick leave (92.0%), maternity leave (96.0%), and health insurance (36.0%). However, only 24.0% received overtime pay, although employees worked for an average of 41.5 hours a week. Furthermore, less than half of employees (48.0%) had an employee provident fund and a limited number of employers offered gratuity pay (6.7%), and pension (25.3%).
- The average starting gross monthly salary was Tk44,200 (median Tk40,000), the third highest among nine universities.
- Men earned more than women, with starting gross monthly salary of male employees 8.2% higher than female employees.

(iii) Access to Employment and Education

- More than half of graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of the employment opportunities in the sector (84.6%). A sizable proportion chose their course because of their interest in computer science and engineering or information technology (72.4%).
- Only 7.3% of graduates received financial support, which on average amounted to Tk338.9 per month. Of those who did not receive any stipend or scholarship, 89.5% noted that no stipends or scholarships were available.
- Job search through the internet was the most popular among graduates as 35.0% of the employed graduates looked for work through online job matching sites, and 1.3% used social media. Nevertheless, traditional strategies were still useful, such as traditional media advertisement (22.5%) and informal network of family and friends (12.5%).
- Most of the graduates who did not participate in the labor force hoped to advance their career (66.7%) by continuing further education. Many of them took courses highly related to their course (33.3%). More specifically, 33.3% took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with University of Dhaka's reputation, and the knowledge and practical and soft skills they gained. Compared with other universities, graduates' dissatisfactions on career guidance (0.8% highly dissatisfied and 3.3% moderately dissatisfied) and internship (0.8% highly dissatisfied and 1.6% moderately dissatisfied) were significantly less.
- However, graduates said it was highly necessary for the University of Dhaka to improve its education program to ensure up-to-date theoretical knowledge (37.4%) and practical skills (73.2%), enhance training on soft skills (64.2%), develop its internship (39.8%) and career guidance programs (73.2%), design education relevant to labor market or industry needs (30.9%), improve its facilities (82.9%), and ascertain that the teachers were qualified to teach in their area (88.6%).
- In general, 10.0% of University of Dhaka graduates noted that IIT skills were appropriate for their job after graduation, and 88.8% of graduates mentioned that job required lower level skills.

APPENDIX 4

KEY FINDINGS

ON JAHANGIRNAGAR UNIVERSITY

40

A. General Characteristics of Graduates

- The quantitative survey covered 73.3% of total graduates from the Institute of Information Technology at Jahangirnagar University between 2013 and 2017. A total of 165 graduates completed their courses, and 121 graduates (46 females) participated in the quantitative survey.
- The average and median age of graduates was 26 (ranging from 23 to 29 years); 90.9% of the respondents were Muslim and the rest Hindu; 69.4% of graduates were single, 29.8% were married or partnered, and 0.8% did not answer.

B. Key Findings

(i) Employment Outcomes

- Jahangirnagar University had a job placement rate at 66.9%, and employment rate at 77.9%. By gender, job placement rate among male graduates was higher at 77.3% than the 50.0% among female graduates.
- Among the 33.1% not employed, 57.5% looked for work. Among the 42.5% who did not look for work, 58.8% indicated that they moved on to further education or training.

(ii) Labor Market Outcomes

- For their first job, 80.3% of Jahangirnagar University graduates were employed in the private sector, 13.6% in the government sector, 3.7% in the nongovernment sector, and 2.5% were self-employed. While currently 86.4% are paid employees, 3.7% are self-employed, and 9.9% not working.
- A formal arrangement with employers through a contract or written agreement was reported by 75.7% of current employees, and 87.1% of employees were hired to fill permanent or long-term positions.
- Employees are entitled to some mandatory benefits in their present jobs such as sick leave (85.7%), maternity leave (85.7%), and health insurance (57.1%). However, only 30.0% received overtime pay, although employees work for an average of 40.1 hours a week. More than half of employees (61.4%) have an employee provident fund, and more than half of employers offer gratuity pay (51.4%), but less provide pension (38.6%).
- The average starting gross monthly salary was Tk37,500 (median Tk37,000).
- In the gender wage gap, starting gross monthly salary of male employees was 25.6% higher than female employees.

(iii) Access to Employment and Education

- The majority of the graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (93.4%), while a large proportion chose their course because of the employment opportunities in the sector (71.1%).
- An average Tk274 per month in financial support was received by 62.0% of graduates. Of those who did not receive any stipend or scholarship, about 41.3% noted that no stipends or scholarships were available, while 19.6% noted that they could finance their education through part-time jobs.
- Job search through the internet was the most popular among graduates, as 40.7% of the employed graduates looked for work through online job matching sites, and 2.5% used social media. Nevertheless, traditional strategies were still useful, such as traditional media advertisement (19.8%) and informal network of family, friends, or others (25.9%).
- Most graduates who did not participate in the labor force hoped to advance their career (58.3%) by continuing education. The majority took courses highly related to their course (58.3%). More specifically, the majority (75.0%) took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with Jahangirnagar University's reputation, and the knowledge and practical and soft skills they gained. However, some graduates were not satisfied with career guidance (8.7% highly dissatisfied and 5.8% moderately dissatisfied), and internship (9.1% highly dissatisfied and 9.1% moderately dissatisfied).
- Furthermore, graduates pointed out that it was highly necessary for Jahangirnagar University to improve its education program to ensure up-to-date theoretical knowledge (37.2%) and practical skills (63.6%), enhance training on soft skills (50.4%), develop its internship (51.3%) and career guidance programs (64.5%), design education relevant to labor market or industry needs (55.4%), improve its facilities (71.1%), and ascertain that the teachers were qualified to teach in their area (71.9%).
- In general, 86.4% of Jahangirnagar University graduates noted that their IIT skills were appropriate to their jobs after graduation.

APPENDIX 5

KEY FINDINGS

ON JASHORE UNIVERSITY OF SCIENCE AND TECHNOLOGY

42

A. General Characteristics of Graduates

- The quantitative survey covered 72.0% of total graduates from the Computer Science and Engineering Department at Jashore University of Science and Technology between 2013 and 2017. A total of 200 graduates completed their courses, and 144 graduates (35 females) participated in the quantitative survey.
- The average and median age of graduates was 26 (ranging from 23 to 29 years); 77.8% of respondents were Muslim, 20.8% Hindu, and 1.4% Christian; 81.9% of graduates were single while 18.1% were married or partnered.

B. Key Findings

(i) Employment Outcomes

- Jashore University of Science and Technology had a job placement rate and employment rate at 57.6% and 65.4%, respectively. By gender, the job placement rate among male graduates was much higher at 67.9% than the 25.7% for female graduates.
- Among the 42.4% not employed, 72.1% looked for work. Among the 27.9% who did not look for work, 64.7% indicated that they moved on to further education or training.

(ii) Labor Market Outcomes

- For their first job, 73.5% of graduates were employed in the private sector, 13.3% in the government sector, 9.6% in the nongovernment sector, and 3.6% were self-employed. Currently, 83.1% are paid employees, 8.4% are self-employed, and 8.4% are not working.
- A formal arrangement with employers through a contract or written agreement was reported by 49.3% of current employees, and 66.7% of the employees were hired to fill permanent or long-term positions.
- Employees were entitled to mandatory benefits in their present jobs such as sick leave (95.7%), maternity leave (88.4%), and health insurance (78.3%). However, only 42.0% received overtime pay, although employees work for an average of 41.9 hours a week. More than half of employees (55.1%) had employee provident fund, and gratuity pay (56.5%), and almost half of employees had pensions (49.3%).
- The average starting gross monthly salary was Tk25,342 (median Tk23,000).
- In the gender wage gap, starting gross monthly salary of male employees was 3.5% higher than female employees.

(iii) Access to Employment and Education

- The majority of graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (91.7%) and employment opportunities in the sector (91.7%).
- Only 2.1% of graduates received financial support, which on average amounted to Tk260 per month. Of those who did not receive any stipend or scholarship, 82.3% noted that no stipends or scholarships were available.
- Job search through the internet was the most popular among graduates, as 42.2% of employed graduates looked for work through online job matching sites, and 1.2% used social media. Nevertheless, traditional strategies were still useful, such as traditional media advertisement (25.3%) and informal network of family, friends, or others (24.1%).
- Most graduates who did not participate in the labor force hoped to obtain higher skills for job (75.0%) by continuing further education. Most of them (91.7%) took courses highly related to their course. More specifically, the majority (83.3%) took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with Jashore University of Science and Technology's reputation, and the knowledge and practical and soft skills they gained. However, many graduates were not satisfied with career guidance (26.6% highly dissatisfied and 9.1% moderately dissatisfied) and internship (78.5% highly dissatisfied and 4.3% moderately dissatisfied).
- Furthermore, graduates pointed out that it is highly necessary for Jashore University of Science and Technology to improve its education program to ensure up-to-date theoretical knowledge (50.0%) and practical skills (69.4%), enhance training on soft skills (61.1%), develop its internship (84.5%) and career guidance programs (91.0%), design education relevant to labor market or industry needs (71.5%), improve its facilities (87.5%), and ascertain that the teachers were qualified to teach in their area (54.9%).
- In general, 75.9% of Jashore University of Science and Technology graduates noted that their CSE skills were appropriate to their jobs after graduation.

APPENDIX 6

KEY FINDINGS ON ISLAMIC UNIVERSITY OF TECHNOLOGY

A. General Characteristics of Graduates

- The quantitative survey covered 52.9% of total graduates from the Computer Science and Engineering Department of the Islamic University of Technology between 2014 and 2017. A total of 174 graduates completed their courses, and 92 graduates (no females) participated in the quantitative survey.
- The average and median age of graduates was 24 (ranging from 22 to 29 years); all respondents were Muslim; 89.1% of graduates were single, 8.7% were married or partnered, and 2.2% did not answer.

B. Key Findings

(i) Employment Outcomes

- The Islamic University of Technology had the highest job placement rate at 92.4%, and third highest employment at 94.4% among the nine universities surveyed.
- Among the 7.6% not employed, 71.4% looked for work. Among the 28.6% who did not look for work, half indicated that they were living abroad.

(ii) Labor Market Outcomes

- For their first job, 98.8% of Islamic University of Technology graduates were employed in the private sector and 1.2% were self-employed. While currently 95.3% are paid employees, 3.5% are self-employed, and 1.2% are not working.

- A formal arrangement with employers through a contract or written agreement was reported by 64.2% of current employees, and 97.5% of employees were hired to fill permanent or long-term positions.
- Employees were entitled to mandatory benefits in their present jobs such as sick leave (76.5%), maternity leave (75.3%), and health insurance (64.2%). About 63.0% received overtime pay as employees work for an average of 45.3 hours a week. Furthermore, more than half of employees (59.3%) had an employee provident fund, and received gratuity pay (51.9%) and pension (51.9%).
- The average starting gross monthly salary was Tk51,938 (median Tk50,000), the highest among the nine universities.

(iii) Access to Employment and Education

- The majority of graduates (92.4%) chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology.
- An average Tk375 per month in financial support was received by 70.7% of graduates, the highest number among all nine universities. Of those who did not receive any stipend or scholarship, 48.2% noted that no stipends or scholarships were available.

- Job search through the internet was the most popular among graduates as 25.9% of employed graduates looked for work through online job matching sites, and 5.9% used social media. Nevertheless, traditional strategies were still useful such as informal network of friends, family, or others (18.8%); on-campus job fairs (12.9%); university career guidance office (11.8%); and traditional media advertisement (11.8%).

(iv) Quality and Relevance of Education

- Graduates were satisfied with Islamic University of Technology's reputation, and the knowledge and practical and soft skills they gained. However, very few graduates were not satisfied with career guidance (3.3% moderately dissatisfied) and internship (2.2% moderately dissatisfied).
- Furthermore, graduates pointed out that it is highly necessary for Islamic University of Technology to improve its education program to ensure up-to-date theoretical knowledge (44.6%) and practical skills (35.9%), enhance training on soft skills (41.3%), develop its internship (30.4%) and career guidance programs (41.3%), design education relevant to labor market or industry needs (47.8%), improve its facilities (42.4%), and ascertain that the teachers were qualified to teach in their area (38.0%).
- In general, 96.5% of Islamic University of Technology graduates noted that their CSE skills were appropriate to their jobs after graduation.

APPENDIX 7

KEY FINDINGS

ON AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

A. General Characteristics of Graduates

- The quantitative survey covered 87.1% of total graduates from the Computer Science and Engineering Department at Ahsanullah University of Science and Technology between 2013 and 2017. A total of 163 graduates completed their courses and 142 graduates (33 females) participated in the quantitative survey.
- The average age of graduates was 25 and median age was 24 (ranging from 23 to 28 years); 94.4% were Muslim, 4.9% Hindu, and 0.7% Christians; 86.6% of graduates were single while 13.4% were married or partnered.

B. Key Findings

(i) Employment Outcomes

- Ahsanullah University of Science and Technology had a job placement rate of 75.4%, while its employment rate was 84.9%. By gender, job placement rate among male graduates was higher, at 85.3%, compared to 42.4% among female graduates.
- Among the 24.7% not employed, 54.3% looked for work. Among the 45.7% who did not look for work, 56.3% indicated that they moved on to further education or training.

(ii) Labor Market Outcomes

- For their first job, 96.3% of graduates were employed in the private sector, 1.9% in the government sector, and 1.9% were self-employed. Currently, 92.5% were paid employees, 6.5% were self-employed, and 0.9% were not working.
- A formal arrangement with employers through a contract or written agreement was reported by 53.5% of current employees, and 98.0% of employees were hired to fill permanent or long-term positions.
- Employees are entitled to some mandatory benefits in their present jobs such as sick leave (91.9%), maternity leave (70.7%), and health insurance (67.7%). However, only 37.4% received overtime pay, although employees work for an average of 42 hours a week. Furthermore, more than half of employees (54.6%) have employee provident fund, gratuity pay (62.6%), and some employers provide pension (38.4%).
- The average starting gross monthly salary was Tk36,995 (median Tk30,000).
- In the gender wage gap, starting gross monthly salary of male employees was

11.9% higher than female employees.

(iii) Access to Employment and Education

- The majority of graduates took courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (92.3%), and employment opportunities in the sector (80.3%).
- Only 7.8% of graduates received financial support, which on average amounted to Tk371.3 per month. Of those who did not receive any stipend or scholarship, 89.3% noted that no stipends or scholarships were available.
- Job search through the internet was most popular among graduates, as 43.0% of employed graduates looked for work through online job matching sites, and 3.7% used social media. Nevertheless, traditional strategies were still useful such as traditional media advertisement (30.8%) and informal network of family, friends, or others (5.6%).
- Most graduates who did not participate in the labor force hoped to advance their career (70.0%) by continuing further education. Half took courses highly related to their course (50%). More specifically, all took a

postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with Ahsanullah University of Science and Technology's reputation, and the knowledge and practical and soft skills they gained. However, some graduates were not satisfied with career guidance (12.1% highly dissatisfied and 6.4% moderately dissatisfied) and internship (14.7% highly dissatisfied and 10.9% moderately dissatisfied).
- Furthermore, graduates pointed out that it was highly necessary for Ahsanullah University of Science and Technology to improve its education program to ensure up-to-date theoretical knowledge (50.7%) and practical skills (63.4%), enhance training on soft skills (56.3%), develop its internship (60.0%) and career guidance programs (69.7%), design education relevant to labor market or industry needs (57.8%), improve its facilities (63.4%), and ascertain that the teachers were qualified to teach in their area (65.5%).
- In general, 85.1% of Ahsanullah University of Science and Technology graduates noted that their CSE skills were appropriate to their jobs after graduation.

APPENDIX 8

KEY FINDINGS

ON BRAC UNIVERSITY

A. General Characteristics of Graduates

- The quantitative survey covered 33.5% of total graduates from the Computer Science and Engineering Department at BRAC University between 2015 and 2017. A total of 418 graduates completed their courses, and 140 graduates (46 females) participated in the quantitative survey.
- The average and median age of graduates was 25 (ranging from 23 to 36 years); 82.9% were Muslim, 14.3% were Hindu, 2.1% were Christians, and 0.7% were Buddhists; 80.0% of graduates were single, 18.6% were married or partnered, and 1.4% did not answer.

B. Key Findings

(i) Employment Outcomes

- BRAC University had the third highest job placement rate at 87.1%, and second highest employment at 96.8% among the nine universities surveyed. By gender, the job placement rate among male graduates (87.2%) and female graduates (87.0%) are almost same.
- Among the 12.9% not employed, 22.2% looked for work. Among the 77.8% who did not look for work, 57.1% indicated that they moved on to further education or training.

(ii) Labor Market Outcomes

- For their first job, 95.9% of BRAC University graduates were employed in the private sector, 1.6% in the government sector, 1.6% in the nongovernment sector, and 0.8% were self-employed. Currently, 89.3% are paid employees, 2.5% are self-employed, and 8.2% are not working.
- A formal arrangement with employers through a contract or written agreement was reported by 58.7% of current employees, and 67.0% of employees were hired to fill permanent or long-term positions.
- Employees are entitled to some mandatory benefits in their present jobs such as sick leave (92.7%), maternity leave (74.3%), and health insurance (49.5%). However, only 37.6% received overtime pay, although employees work for an average of 42.1 hours a week. Furthermore, more than half of employees (55.1%) had an employee provident fund, but a limited number of employees were offered gratuity pay (18.4%) and pension (5.5%).
- The average starting gross monthly salary was Tk34,009 (median Tk30,000).
- In the gender wage gap, starting gross monthly salary of male employees was 20.4% higher than female employees.

(iii) Access to Employment and Education

- The majority of graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (91.4%), while a large portion wanted to further their career (77.1%).
- Only 20.7% of graduates received financial support of Tk353.6 per month on average. Of those who did not receive any stipend or scholarship, 67.6% indicated that they did not qualify to receive the support.
- Job search through the internet was most popular among graduates, as 54.1% of employed graduates looked for work through online job matching sites, and 10.7% used social media. Nevertheless, traditional strategies were still useful, such as informal network of family, friends, or others (17.2%), and traditional media advertisement (5.7%).
- Most graduates who did not participate in the labor force hoped to change their career (46.2%) by continuing further education. The majority of them took courses highly related to their course (84.6%). More specifically, the majority of them (69.2%) took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with BRAC University's reputation, and the knowledge and practical and soft skills they gained. However, some graduates were not satisfied with career guidance (5.7% moderately dissatisfied) and internship (15.4% highly dissatisfied and 3.9% moderately dissatisfied).
- Furthermore, graduates pointed out that it was highly necessary for BRAC University to improve its education program to ensure up-to-date theoretical knowledge (53.6%) and practical skills (71.4%), enhance training on soft skills (49.3%), develop its internship (55.8%) and career guidance programs (62.1%), design education relevant to labor market or industry needs (43.6%), improve its facilities (70.7%), and ascertain that the teachers were qualified to teach in their area (85.7%).
- In general, 80.3% of BRAC University graduates noted that their CSE skills were appropriate to their jobs after graduation.

APPENDIX 9

KEY FINDINGS

ON DAFFODIL INTERNATIONAL UNIVERSITY

A. General Characteristics of Graduates

- The quantitative survey covered 64.5% of total graduates from the Computer Science and Engineering Department at Daffodil International University between 2015 and 2017. A total of 217 graduates completed their courses, and 140 graduates (19 females) participated in the quantitative survey.
- The average age of graduates was 26 and their median age was 25 (ranging from 23 to 35 years); 92.1% of respondents were Muslim and the rest Hindu; 67.9% of graduates were single, 31.4% were married, and 0.7% did not answer.

B. Key Findings

(i) Employment Outcomes

- Daffodil International University had a job placement rate of 72.9%, while its employment rate was 81.6%. By gender, job placement rate among male graduates is much higher at 80.2% compared to 26.3% among female graduates.
- Among the 27.1% not employed, 60.5% looked for work. Among the 39.5% who did not look for work, 40.0% indicated that they did not want to work; 26.7% indicated that they moved on to further education or training; another 26.7% indicated family commitments; and 6.7% said that there were no jobs available.

(ii) Labor Market Outcomes

- For their first job, 87.3% of Daffodil International University graduates were employed in the private sector, 5.9% in the government sector, 4.9% in the nongovernment sector, and 2.0% were self-employed. Currently, 83.3% were paid employees, 3.9% were self-employed, and 12.8% were not working.
- A formal arrangement with employers through a contract or written agreement was reported by 98.8% of employees, and 89.4% of employees were hired to fill permanent or long-term positions.
- Employees were entitled to some mandatory benefits in their present jobs, such as sick leave (98.8%), but fewer employers provided maternity leave (44.7%), and health insurance (12.9%). Furthermore, only 4.7% received overtime pay, although employees work for an average of 46 hours a week. While only a little over a quarter of employees (25.9%) have employee provident fund, a limited number of employers offer gratuity pay (8.2%), and pension (5.9%).
- The average starting gross monthly salary was Tk26,021 (median Tk22,800).
- In the gender wage gap, females earned Tk27,800, which was more than males at Tk25,910. Starting gross monthly salary of female employees was 7.3% more than male employees, although the number of female graduates was only five as opposed to 80 for male graduates.

(iii) Access to Employment and Education

- The majority of graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (72.9%) and to further their career (65.0%).
- None of the graduates received financial support. About 98.6% of graduates noted that no stipends or scholarships were available.
- Job search through the internet was most popular among graduates, as 38.2% of employed graduates looked for work through online job matching sites, and 9.8% used social media. Nevertheless, traditional strategies were still useful, such as informal network of family, friends, or others (27.4%); and traditional media advertisement (14.7%).
- Most graduates who did not participate in the labor force hoped to advance their career (60.0%) by continuing further education. Many of them took courses highly related to their course (60.0%). More specifically, the majority (80.0%) took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with Daffodil International University's reputation, and the knowledge and practical and soft skills they gained. Compared with other universities, graduates' dissatisfactions on career guidance (no one highly dissatisfied and 2.1% moderately dissatisfied) and internship (0.7% highly dissatisfied and 2.9% moderately dissatisfied) were significantly less.
- However, graduates pointed out that it was highly necessary for Daffodil International University to improve its education program to ensure up-to-date theoretical knowledge (27.1%) and practical skills (59.3%), enhance training on soft skills (45.0%), develop its internship (64.3%) and career guidance programs (41.4%), design education relevant to labor market or industry needs (15.0%), improve its facilities (36.4%), and ascertain that the teachers were qualified to teach in their area (58.6%).
- In general, 67.7% of Daffodil International University graduates noted that their CSE skills were appropriate to their jobs after graduation.

APPENDIX 10

KEY FINDINGS

ON EAST WEST UNIVERSITY

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A. General Characteristics of Graduates

- The quantitative survey covered 65.7% of total graduates from the Computer Science and Engineering Department at East West University between 2014 and 2017. A total of 169 graduates completed their courses, and 111 graduates (28 females) participated in the quantitative survey.
- The average and median age of graduates was 26 (ranging from 24 to 35 years); 90.1% of respondents were Muslim, 9.0% were Hindu, and 0.9% did not answer; 81.1% of graduates were single while 18.9% were married or partnered.

B. Key Findings

(i) Employment Outcomes

- East West University had a job placement rate at 83.8%, while its employment rate was 92.1%. By gender, job placement rate among male graduates is higher at 89.2% compared to 67.9% among female graduates.
- Among the 16.2% not employed, 44.4% looked for work. Among the 55.6% who did not look for work, 60.0% indicated that they moved on to further education or training, 30.0% cited family commitment, and 10.0% did not want to work.

(ii) Labor Market Outcomes

- For their first job, 90.3% of East West University graduates were employed in the private sector, 1.1% in the government sector, 6.5% in the nongovernment sector, and 2.2% were self-employed. Currently, 80.7% were paid employees, 4.3% were self-employed, and 15.1% not working.
- A formal arrangement with employers through a contract or written agreement was reported by 32.0% of current employees, and 89.3% of employees were hired to fill permanent or long-term positions.
- Employees were entitled to some mandatory benefits in their present jobs such as sick leave (76.0%), maternity leave (52.0%), and health insurance (49.3%). However, only 33.3% received overtime pay, although employees work for an average of 44.2 hours a week. Furthermore, less than half of employees (45.3%) had employee provident fund, and a limited number of employers offer gratuity pay (29.3%) and pension (26.7%).
- The average starting gross monthly salary was Tk39,213 (median Tk35,000).
- In the gender wage gap, starting gross monthly salary of male employees is 5.8% higher than female employees.

(iii) Access to Employment and Education

- The majority of graduates chose courses related to computer science and engineering and/or institute of information technology (CSE/IIT) because of their interest in computer science and engineering or information technology (91.9%) and to further their career (61.3%).
- Only 8.1% of graduates received financial support, which on average amounted to Tk419 per month. Of those who did not receive any stipend or scholarship, 63.7% noted that no stipends or scholarships were available, and 15.7% indicated that they did not qualify to receive the support.
- Job search through the internet was the most popular among graduates as 36.6% of employed graduates looked for work through online job matching sites, and 5.4% used social media. Nevertheless, traditional strategies were still useful such as informal network of family, friends, or others (31.2%); and traditional media advertisement (11.8%).
- Most graduates who did not participate in the labor force hoped to obtain skills required for job (30.8%) or to change their career (30.8%) by continuing further education. The majority of them took courses highly related to their course (61.5%). More specifically, more than half of them (53.9%) took a postgraduate course at a university.

(iv) Quality and Relevance of Education

- Graduates were satisfied with East West University's reputation, and the knowledge and practical and soft skills they gained. However, some graduates were not satisfied with career guidance (10.8% highly dissatisfied and 13.5% moderately dissatisfied) and internship (38.9% highly dissatisfied and 3.7% moderately dissatisfied).
- Furthermore, graduates pointed out that it was highly necessary for East West University to improve its education program to ensure up-to-date theoretical knowledge (19.8%) and practical skills (45.1%), enhance training on soft skills (17.1%), develop its internship (35.1%) and career guidance programs (46.0%), design education relevant to labor market or industry needs (18.0%), improve its facilities (37.8%), and ascertain that the teachers were qualified to teach in their area (26.1%).
- In general, 55.9% of East West University graduates noted that their CSE skills were appropriate to their jobs after graduation.

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