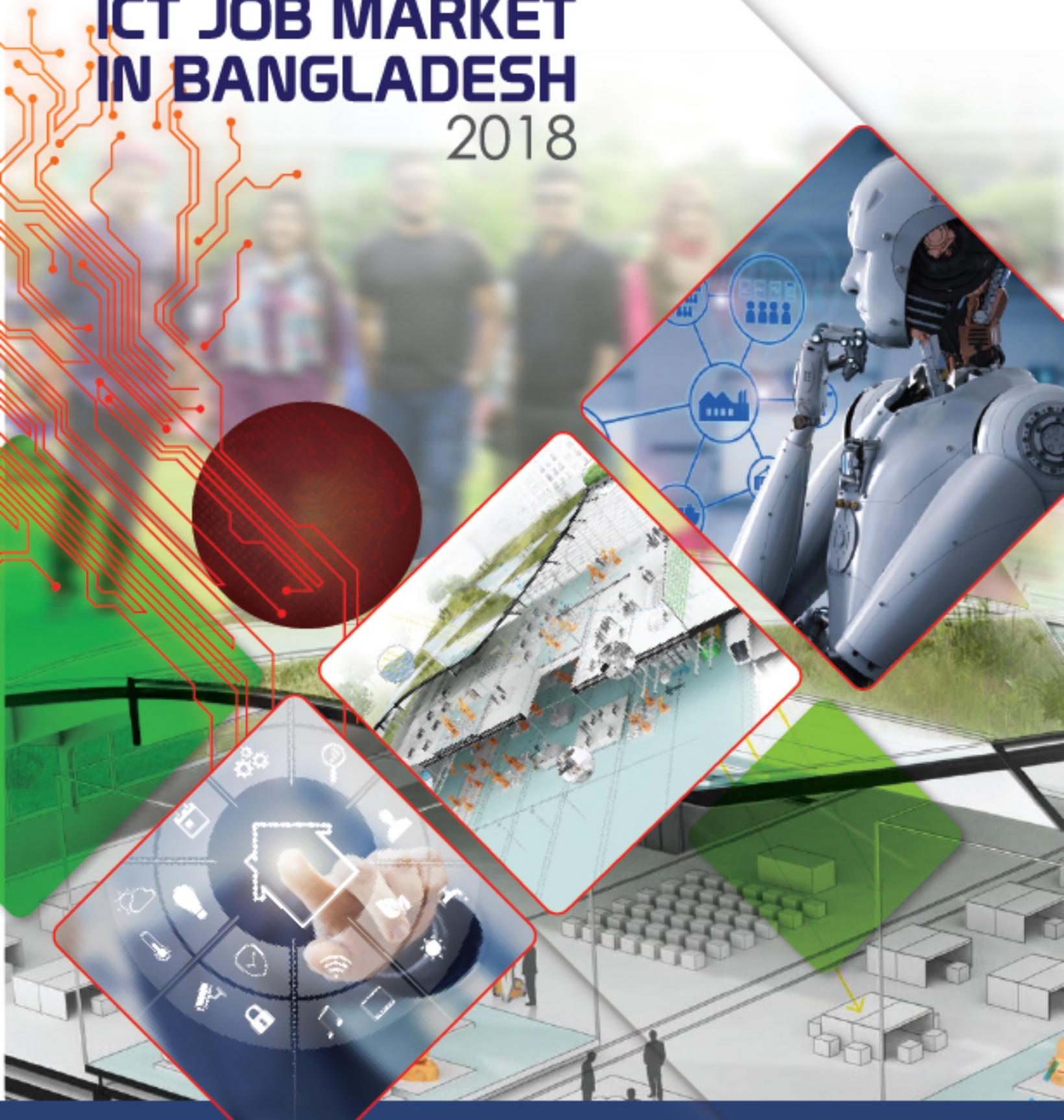


Survey on **ICT JOB MARKET IN BANGLADESH**

2018



SURVEY ON ICT JOB MARKET IN BANGLADESH 2018



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International
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SURVEY ON ICT JOB MARKET IN BANGLADESH 2018

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MESSAGE

Minister
Ministry of Education
Government of the People's Republic of Bangladesh



'Survey on ICT Job Market in Bangladesh 2018' published by Daffodil International university, I believe, will help the ICT professionals of the country and other Asian nations as well.

At the beginning of the 4th industrial revolution (4IR), Asian economies are embracing emerging technologies like robotics, artificial intelligence, quantum computing, etc. To align with 4IR, Bangladesh is also working in these domains to develop the capacity of its ICT workforce.

Under the prudent leadership of Honourable Prime Minister Sheikh Hasina, the present Government of Bangladesh is focusing on raising secondary and tertiary enrollment rates, along with vocational and technical education and it is committed to quality education so that the work force is equipped with the right skills to join the job market.

The perspective plans of Bangladesh envisage restructuring our education system to make it more aligned with the technology driven global landscape. In Bangladesh, remarkable achievements have been made in different areas where ICT is involved with the delivery of education, such as, admission fees payment, e-registration and publication of results, enrollment of students in secondary and higher education.

ICT has a pivotal role in sustainable development. In recent decades, Bangladesh has witnessed significant progress in the openings at ICT Job Market. Proliferation of ICT based education and training will enhance the capacity of our young workforce to prove their skills in the ICT sector.

I am delighted that Daffodil International university is going to publish such a timely and much needed report, which will be helpful not only for the policy makers, but also for the ICT professionals, researchers, employers and employees of the country.

Dipu Moni

(Dr. Dipu Moni, M.P.)

বাণী

মন্ত্রী

ডাক, টেলিযোগাযোগ ও তথ্যপ্রযুক্তি মন্ত্রণালয়
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার



চতুর্থ শিল্প বিপ্লবে ঘোগাযোগ, যান্ত্রিকবিদ্যা বা মেশিন লানিং, কার্ডামোগত উন্নয়ন প্রভৃতি প্রযুক্তির উন্নয়নকে অন্যমাত্রায় নিয়ে গেছে। এই বিপ্লবের ফলে প্রতিষ্ঠানসমূহ তাদের উৎপাদন দক্ষতা, নতুন বাজার সম্প্রসারণ, নতুন উভাবিত পন্থ প্রভৃতি বিষয়াদিতে ইমার্জিং টেকনোলজি বা নবপ্রযুক্তির সম্মিলন ঘটাতে সক্ষমতা অর্জন করেছে।

চলমান বিশ্ব ডিজিটাল বিশ্ব হচ্ছে এবং আমরা এমনএকটি রূপান্তরমূখী বিশ্বে আলাদা হতে পারি না। আমরা শিল্পযুগ মিস করেছি। ডিজিটাল শিল্প বিপ্লব মিস করে সেই একই ভূল আবার করতে পারি না। গর্ব করে বলতে পারি যে, মাননীয় প্রধানমন্ত্রী শেখ হাসিনা ২০০৮ সালের ১২ ডিসেম্বর ডিজিটাল বাংলাদেশ ঘোষণা করার মধ্য দিয়ে আমরা এই বদলে বৃপ্তিরের কর্মজ্ঞে নেতৃত্ব দিয়ে আসছি। আমাদের আগে বিশ্বের কোন দেশ পুরো দেশটাকে ডিজিটাল পদ্ধতিতে বদলে দেবার কথা ভাবেনি। আমাদের পর ২০০৯ সালে ত্রিটেন ও ২০১৮ সালে ভারত আমাদের পথ অনুসরণ করে। বাংলাদেশ বিশ্বের প্রথম ডিজিটাল বিপ্লব ঘোষণাকারী দেশ, প্রধানমন্ত্রীর ঘোষনার মধ্য দিয়ে যে দেশ কৃষি থেকে ডিজিটাল বিপ্লবের দেশে পরিনত হয়েছে। আমাদের আগামি দিনের চ্যালেঞ্জ হচ্ছে প্রযুক্তি ও জীবন ধারায় কৃষি যুগের পশ্চাপ্দতার বদলে দুনিয়াকে ডিজিটাল যুগে নেতৃত্ব দেয়া।

বিশ্বসভ্যতার রূপান্তর, বিগত সময়কালে আমাদের নিজেদের জ্ঞান ও অভিজ্ঞতা এবং বিদ্যমান প্রযুক্তির সঙ্গে আগামী দিনের প্রযুক্তিকে বিবেচনায় রেখে সামনে চলতে হবে। বস্তুত, ২০০৮ সালে ডিজিটাল বাংলাদেশ ঘোষণার পর দেশটিতে সব স্তরে ডিজিটাল বিপ্লব ঘটতে শুরু করে। তারপর থেকে এক দশক ডিজিটাল বাংলাদেশ গড়ার অনবদ্য প্রচেষ্টাকে বিবেচনায় রেখে ডিজিটাল রূপান্তরে বিপুল কর্মজ্ঞ আয়োজিত হয়েছে। তন্মূলের সাধারণ মানুষ থেকে রাষ্ট্রীয় জীবনের সকল পর্যায়ে এই বিপ্লব এখন বহুমান। সমগ্র দেশে ডিজিটাল সংযোগ স্থাপন, বঙবন্ধু স্যাটেলাইট মহাকাশে উৎক্ষেপণ, ৪-জির প্রবর্তন, ৫-জির পরীক্ষা, জনগনের হাতে সরকারী সেবা পৌছানো তথ্য সরকারের ডিজিটাল রূপান্তর, শিক্ষার ডিজিটাল যুগের উপযোগী মানবসম্পদ উন্নয়ন, অভ্যন্তরীণ ও রফতানির ক্ষেত্রে ডিজিটাল শিল্পের বিকাশ এবং জনগণের জীবনযাপনের মান উন্নয়নে ডিজিটাল প্রযুক্তির ব্যবহারে বাংলাদেশ এখনবিশ্বের কাছে অনুকরণীয় দৃষ্টান্ত হিসাবে প্রতিষ্ঠিত হয়েছে।

আমাদের দেশকে তথ্যপ্রযুক্তি উন্নয়নে আরো বেগবান করার লক্ষ্যে বৈশ্বিক প্রযুক্তির উন্নয়নে অংশগ্রহণ করে আমাদের জনশক্তিকে চতুর্থ শিল্প বিপ্লবের চালিকাশক্তি হিসাবে গড়ে তুলতে হবে। সাম্প্রতিক দশকে তথ্যপ্রযুক্তির উন্নয়নে বাংলাদেশ অভূতপূর্ব সাফল্য অর্জন করেছে যেমন দক্ষ তথ্যপ্রযুক্তি তৈরি, আইসিটি সহায়ক নীতিমালা প্রণয়ন, আইসিটি খাতে প্রণোদনাসহ বিভিন্ন কার্যক্রম যা বর্তমান সরকারের ডিজিটাল বাংলাদেশ গড়ার লক্ষ্যে গুরুত্ব পূর্ণ নিয়ামক হিসাবে কাজ করেছে।

আমরা অবগত রয়েছি যে, World Economic Forum কর্তৃক প্রকাশিত The Future of jobs Employment, skills and Workforce Strategy for the Forth Industrial Revolution প্রতিবেদন বর্তমানের নিয়োগকর্তাদের চিন্তার খোরাক হিসাবে আবির্ভূত হয়েছে। কেননা ভবিষ্যৎ কর্মীদের রোবটিজ, ইন্টারনেট অব থিম্পস (আইওটি) কৃতিম বুদ্ধিমত্তা, কোয়ান্টাম কম্পিউটার প্রভৃতি নবপ্রযুক্তির সাথে সম্মিলনের মাধ্যমে কর্মক্ষে অগ্রসর হতে হবে। এ বিষয়ে আমাদের নিত্যন্তুন গবেষণার দ্বার উন্মুক্ত করতে হবে।

আমি জেনে অত্যন্ত আনন্দিত যে, এ সকল বিষয়কে সামনে রেখে ড্যাফোডিল ইন্টারন্যাশনাল ইউনিভার্সিটি (ডিআইইউ) 'Survey on ICT Job Market in Bangladesh 2018' নামক গবেষণাধর্মী এবং তথ্য উপান্ত সম্বলিত প্রতিবেদন প্রকাশ করতে যাচ্ছে। তাদের এ উদ্দেয়গকে আমি সাধুবাদ জানাই এবং আশা করি এ প্রতিবেদনটি তথ্যপ্রযুক্তি, উদ্যোগ্তা, নীতিনির্ধারকদের জন্য অত্যন্ত সহায়ক হবে।

(মোস্তাফা জোবার)



MESSAGE

State Minister
ICT Division, Ministry of Posts,
Telecommunications and Information Technology
Government of the People's Republic of Bangladesh

Today, society is experiencing the Fourth Industrial Revolution (IR 4.0), an era, where scientific and technological breakthroughs are redefining the businesses and societies, at large. Emerging technologies such as robotics, artificial intelligence (AI), quantum computing, precision medicine, blockchain dent effect in new pattern of the society. I believe, Fourth Industrial Revolution can close the digital divide, globally.



Considering the rapid changes and development of emerging technologies, Bangladesh also embraces and is developing her capacity to utilize the opportunities of the Fourth Industrial Revolution. In doing so, we also need to increase the breadth of ICT professional in the country and ought to minimize the demand-supply gap.

I am very pleased to know that Daffodil International University has taken this initiative to publish the 'Survey on ICT Job Market in Bangladesh 2018' which will help the ICT professionals, policy makers, entrepreneurs to get a clear picture of this vibrant sector and will facilitate them to take strategic decision.

I wish everyone's success.

Joy Bangla, Joy Bangabandhu.
Live Bangladesh forever.

(Zunaid Ahmed Palak, MP)

MESSAGE

Chairman
University Grants Commission of Bangladesh
Government of the People's Republic of Bangladesh



It gives me immense pleasure to know that Daffodil International University is going to publish the 'Survey on ICT Job Market in Bangladesh 2018'. On this occasion, I would like to congratulate the university authorities for taking this holistic initiative and the team who have worked to come up with the report in a befitting manner.

An evolving digital economy is the result of the development and adoption of emerging technologies and innovations over several decades. In the age of Fourth Industrial Revolution, Bangladesh needs to be prepared to embrace the new and innovative technologies for quality life. I believe that the report covers all key areas or factors of job market in the ICT sector which will definitely bring positive response among the stakeholders like job seekers, students, policy makers and stakeholders of ICT industries.

I hope DIU will also continue to produce reports on other domains of this sector and my best wishes to them for future initiatives too.



(Professor Abdul Mannan)



MESSAGE

Senior Secretary
Posts and Telecommunications Division,
Ministry of Posts, Telecommunications and Information Technology
Government of the People's Republic of Bangladesh

The digital economy is currently undergoing a phase of irreversible revolution, which is called the 'Fourth Industrial Revolution (IR 4.0)'. This new industrial revolution is characterized by the merging of technologies and elimination of technological boundaries. We are now observing the emergence of new categories of industries, based on emerging technologies like artificial intelligence (AI), robotics, big data, fully automated production, augmented reality technologies, the Internet of Things (IoTs). To coup up with fourth industrial revolution (IR. 4.0). Bangladesh needs to be prepared, and should build its workforce, aligning with the objectives of IR 4.0.

We all are aware of the present government's 'Vision 2021: Digital Bangladesh', which is ' a comprehensive development program based on ICT, to make Bangladesh a middle income country. Significant developments were made in bringing major public services to the doorsteps of citizen with the advancement of ICT. Bangladesh has recorded outstanding progress in ICT development and many important policies and acts were enacted and also drafted for enactment. Moreover, we observed the employment at ICT sector during last 10 year is quite satisfactory. To assess these gap in ICT job market and to highlight the influence of emerging technologies in Bangladesh employment sector, DIU has taken the initiative to fulfill the objectives through publishing 'Survey on ICT Job Market in Bangladesh 2018'. On the verge of fourth industrial revolution, we all need to contribute in materializing the blueprint of development, focusing ICT and the survey report will complement the issue, vigorously. Since beginning, I was associated with this holistic approach. I appreciate and welcome their endeavor which will surely help all related stakeholders home and abroad and will dent positive effect in the ICT job market.



(Shyam Sunder Sikder)

MESSAGE

Chairman, Board of Trustees
Daffodil International University



To embrace the Fourth industrial Revolution (IR 4.0), we should think about the employability of new workforce and working areas of our students. Use of Information and Communications Technology (ICT) reflects in the expansion of global ICT-related employment. Fourth Industrial Revolution (IR 4.0) inspired digital technologies to lead the creation of jobs with new dimensions and occupations. Robotics, artificial intelligence (AI), block chain, data analysis (big data), software and applications development, cloud computing, machine learning have brought transformation in global job arena. We must be aware and get prepared to deal with different dimensions of job, focusing emerging technologies as reportedly, 65% of children entering primary school today will ultimately end up working in completely new job types that do not yet exist.

To address the adaptation of emerging technologies in employment eco-system and assimilation of technology in the course curriculum at different disciplines, DIU feels to do something, in this area. Hence, DIU has taken such initiative to publish "Survey on ICT Job Market in Bangladesh 2018". I do also believe, the alignment and redesigning in course curriculum at different disciplines, switching from conventional to innovative method of learning, will enable our students to fit in ICT and other sectors, easily .

Publishing the inclusive report, "Survey on ICT Job Market in Bangladesh 2018", Daffodil International University (DIU) caters the existing and timely demand of all related stakeholders like employers, employees, entrepreneurs, researchers, students, policy makers etc. This survey report (analyzing data of 384 organizations and of 2018 fiscal) will be able to help all stakeholders to get a comprehensive picture about the current overview of ICT job market in Bangladesh.

We will keep continuing our effort to come up with more publications on technologies and innovations, emphasizing employability.

A handwritten signature in black ink, appearing to read "Dr. Md. Sabur Khan".

(Dr. Md. Sabur Khan)



MESSAGE

Vice Chancellor
Daffodil International University

In the era of new government led digital economy, fundamental indicators need to reflect the extent to which enterprises and stakeholders have affordable access to relevant ICT infrastructure and digital solutions, and whether they make productive use of these towards development of the economy.

To support this perspective, Daffodil International University (DIU) has taken an initiative to publish a 'Survey on ICT Job Market in Bangladesh 2018', to address the cardinal factors considering the ICT job matrix in Bangladesh. The team has worked on preparing a survey report, based on primary data which has covered 384 organizations. I am also happy to tell you that the survey report also gives a possible outline of the future workforce, considering the fourth industrial revolution and emerging technologies.

I hope and believe, the report will be useful for all related people, organizations, institutions and we will be happy to receive any feedback so that we can keep on improving in our work on this domain.



A handwritten signature in black ink, appearing to read 'Yousuf Islam'.

(Professor Yousuf Mahbubul Islam, PhD)



NOTE

Chairman
Asian-Oceanian Computing Industry Organization (ASOCIO)

To strive in implementing the 2030 Agenda for Sustainable Development, we regard information and communications technologies as one of the keys to inclusive growth which open new trails of development and help developing countries to gain access to the global store of knowledge. Developing world is also experiencing technological innovation to spur economic growth thorough creation of employment in this sector. I am pretty happy to know that Daffodil International University, an ASOCIO Award recipient for 2018, has taken such holistic initiative to publish the 'Survey on ICT Job Market in Bangladesh 2018', which will surely help prospective employees and job seeker and entrepreneur as well to take right decision because the survey report has covered all areas and has given direction on emerging technologies too. The analysis and other information on ICT Job Market was conveyed in simple way which will enable the reader for easy understanding.

A handwritten signature in black ink, appearing to read "David Wong Nan Fay".

(Mr. David Wong Nan Fay)



NOTE

Chairman

World Information Technology and Services Alliance (WITSA)



I am very much acquainted with the activities of Daffodil International University while I met the Chairman, DIU, Dr. Md. Sabur Khan who was the Director, WITSA. It gives me immense pleasure that DIU publishes the 'Survey on ICT Job Market in Bangladesh 2018', which is a worthwhile endeavor to explore the current status of demand and supply gap of employability in ICT sector. I am also contended to see the dimensions of Fourth Industrial Revolution in this report. It is indeed my sheer opportunity to suggest this valuable document to the readers

A handwritten signature in black ink, appearing to read "Yvonne Chiu".
(Yvonne Chiu)



NOTE

President, BASIS

It is my immense pleasure and satisfaction to know that the Daffodil International University (DIU) is going to publish “Survey on ICT Job Market in Bangladesh 2018”. On behalf of the Bangladesh Association of Software and Information Services (BASIS), I am privileged to wish a grand success of the publication. We are on the verge of Fourth Industrial Revolution. ICT development enhances proliferation of micro, small and medium enterprises (MSMEs) and plays an important role in fostering entrepreneurship in the country. Aligning with the policy, Daffodil International University as private sector catalyst, advances to produce an inclusive survey report which focuses on all domains of ICT Job Market in Bangladesh. Appreciating this endeavor, I, on behalf BASIS, like to welcome DIU for taking this initiative for the development of ICT sector in the country

A handwritten signature in black ink, appearing to read "Almas Kabir".

Syed Almas Kabir

In today's world, digital economy influences the way we act in our environment. As part of global community, Bangladesh strives to implement the 2030 Agenda for Sustainable Development where information and communications technologies play a pivotal role for its success,

We observe, the developing economies are now showing capabilities in technological innovations which can spur visible growth at their economies.

We are now on the verge of Fourth Industrial Revolution (IR 4.0). As the Fourth Industrial Revolution unfolds, employers are seeking human resources, with skills (based on emerging technologies) to retain the competitive global edge for their enterprises and augment the workforce productivity. In this forth industrial revolution, Asian economies are embracing emerging technologies like robotics, artificial intelligence, quantum computing etc. To align with IR 4.0, Bangladesh is also working in this domain to develop the capacity of its ICT workforce.

To highlight these areas, Daffodil International University has taken the holistic approach to publish 'Survey on ICT Job Market Survey 2018', which encompasses all relevant survey information, which will surely help the ICT professionals of the country and other Asian countries as well.

The survey report attempts to present analysis on ICT Job Market of Bangladesh where various domains were focused like nature of ICT venture, demography of ICT Professionals, demand and supply of hard and core skills so that the readers can have an in-depth picture of ICT Job Market. All these analysis were conducted with primary data, engaging enumerators to collect raw data from 384 organizations sample.

The analysis contained in the 'Survey on ICT Job Market Survey 2018' will help all the community to know the real scenario of ICT Job Market in Bangladesh which will enable them to know how Bangladesh is evolving at the digital economy.

ACKNOWLEDGEMENT

A Survey Analysis on ICT Job Market in Bangladesh' was prepared by a team comprising Mr. Abu Taher Khan, Director, Career Development Centre (CDC), Dr. Imran Mahmud, Assistant Professor & Associate Director (Research), Mr. Nafees Imtiaz Islam, Senior Assistant Director (Research and IQAC), Mr. Md. Shumsud Doha, Assistant Director (Career Development Center) under the supervision of Mr. Shyam Sunder Sikder, Senior Secretary, Posts and Telecommunications Division, Government of the People's Republic of Bangladesh and the overall guidance of Dr. Md. Sabur Khan, Chairman, Board of Trustees, Daffodil International University.

We would like to extend our special gratitude to Mr. Mustafa Jabbar, Honorable Minister, Ministry of Posts, Telecommunications and ICT, Government of the People's Republic of Bangladesh, for encouraging us to publish this survey report.

The report benefited from major substantive contributions by field level data investigator of CDC. Relevant and valuable comments on the draft version of the report were received from experts on ICT sector.

DIU is grateful to all ICT based companies for their sharing of data and for responses received to our survey questionnaire on ICT usage by enterprises, and on the ICT sector, which is highly appreciated.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This is the era of fourth industrial revolution (IR 4.0). Reportedly, world's top four companies are all closely linked to the digital economy: Apple, Alphabet (Google), Microsoft and Amazon.com. There are also concerns over how data flows can be harnessed while at the same time addressing concerns related to privacy and security of the user and related stakeholders, who are involved at this process. The rapid pace at which the digital economy is evolving is a result of the technologies and innovations that are becoming more pervasive. The evolving digital economy include advanced robotics, artificial intelligence, the Internet of Things (IoT), cloud computing, big data analytics and three dimensional (3D) printing, being drivers of IR 4.0.

The ICT Job Market Survey in Bangladesh, is a timely initiative of DIU as the report addresses diverse factors of matrix of ICT Job Market in Bangladesh. With this survey report, users can easily interact with factors like demography of ICT employees, current status of recruitment, training, and academic collaboration in ICT sector, nature of involvement among Higher Education Institutes and ICT-based organizations, and demand for hard skills and soft skills. The survey rotates around ICT Employment outlook, where demand for different ICT skills have been stressed. The survey report also discusses the relationship between advancement of emerging technology (especially fourth industrial revolution aspect) with employability in ICT and non-ICT sector.

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PART-A
ICT JOB
MARKET SURVEY



ICT JOB MARKET SURVEY



CHAPTER-1

INTRODUCTION

1.1 Background

As a stakeholder of society, we need to maximize the benefits of science and technology for people's wellbeing. To achieve this, we ought to embrace emerging technologies and prepare ourselves to enter into Fourth Industrial Revolution where emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing. This is high time to think and analyze how the future workforce will act in this global environment; which jobs will sustain.

In this digital economy, digitalization of economic activities and transactions can help countries to overcome challenges to embrace inclusive development. ICT, e-commerce and other digital applications are those examples which can be leveraged to promote start-ups and new ventures. ICT helps in formalizing the growth of micro, smallest and medium-sized enterprises (MSMEs). Moreover, digital solutions can be leveraged through playing its role to enable 'value chain integration'.

Considering these 'glocal' (global and local) changes, Daffodil International University attempts to cater to the needs of the ICT professionals, employers, Policy makers and other relevant stakeholders to inform about the ICT job market outlook of the country. The readers can have a picture of the ICT Job Market. All these analysis were conducted with primary data, engaging enumerators to collect raw data from 384 organizations sample.

The analysis contained in the 'Survey on ICT Job Market Survey 2018 will benefit all the community to know the real scenario of ICT Job Market in Bangla-

desh which will enable them to know how Bangladesh is evolving at the digital economy.

1.2 Objectives

The key objectives of the survey are :

1. Bridging the information gap between demand and supply of ICT workforce by enhancing access to necessary information by all relevant stakeholders.
2. Gaining a better understanding of the strength and the composition of IT workforce in Bangladesh, in terms of salary.
3. Assessing the demand of the industry against the flow of supply of skilled personnel in ICT sector.

1.3 Methodology:

In order to support this initiative of DIU and Skill.jobs, Ministry of Post, Telecommunications and ICT, Government of Bangladesh, Bangladesh Association of Software & Information Services (BASIS) and Bangladesh Computer Samity (BCS) have joined their hands with dedicated assistance.

Conducting the survey, we have followed the Purposive Sampling Methods for better representation as there is no Sampling Frame of ICT Industry in Public and Private sectors of the country. So, we had to do the survey work through door to door movement in different Public and Private Organizations of ICT Industry as well as Non ICT Organizations. There is no secondary data but we followed the process of Focal Group Discussions (FGD) also.

We have almost covered all categories of the organizations (ICT and non-ICT) and the number is almost 400. The survey conducted by trained professional enumerators (DIU Volunteer Student Group) using 384 random sampling survey methods of every segment of the ICT Industry. After collecting data, our data analysts have run those data set, using Microsoft Excel and SPSS software.

1.4 Rationale:

In this 21st Century, knowledge has emerged as a leading determinant of economic growth and human welfare. At the economy level, knowledge is transforming ways that new technology is developed and adopted to enhance productivity and lower cost. At the individual level, the speed and ease by which an economic agent acquires and absorbs relevant knowledge to inform the underlying economic decision conveys a huge competitive edge. Knowledge is also transforming people's welfare by facilitating advances in medical sciences that is contributing to increased life expectancy and health quality through preventive, diagnostic and curative measures. Accordingly, the focus on strengthening the Knowledge Economy (KE) is an integral part of any development strategy.

In recent years, the Bangladeshi services sector has grown substantially which has led to a robust increase in domestic IT & ITES service demand: currently the revenue from domestic IT services is almost twice the amount of the revenue from IT & ITES exports. According to BASIS survey, there are over 800 registered software and ITES (IT Enabled Service) companies in Bangladesh. There are another few hundred unregis-

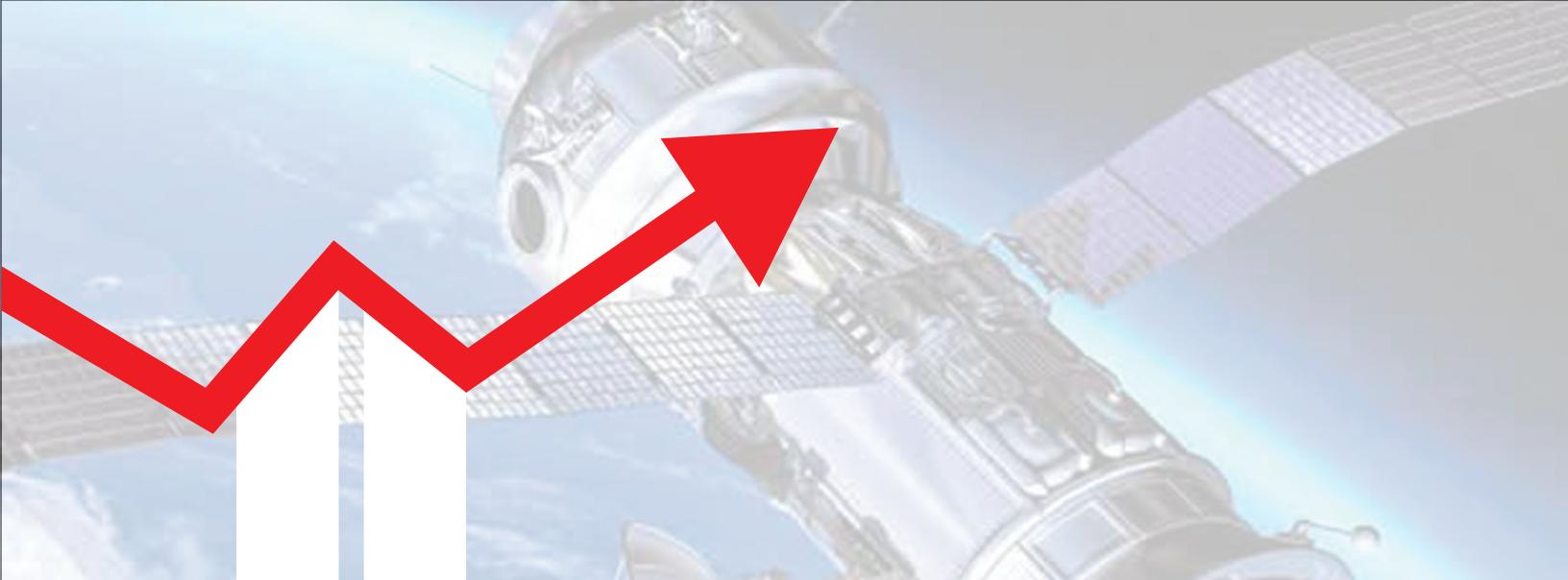
tered small and home-based software and IT ventures doing business for both local and international markets. The total industry size is estimated to be around US\$ 400 million. Approximately 70,000 professionals – the majority IT and other graduates – are employed in the industry. Though compared to other traditional mainstream industries, the contribution to overall employment creation is not especially high, if considered in terms of creating high quality employment (average monthly compensation over Tk. 15,000 per month), the software and IT service industry is surely one of the top graduate employment sectors in the country.

Through the 'ICT Job Market in Bangladesh' survey, the following components were focused on the Information and Communication Technology (ICT) Industry of Bangladesh:

- Job market outlook in different ICT sectors;
- Survey-based economic perceptions of job seekers and industry players;
- The latest salary reports (average standard salary) of ICT professionals by industry (entry to mid-level, according to expertise arena);
- Average salary of ICT professionals in Bangladesh compared to English-speaking countries where placement opportunities are available for Bangladeshi ICT talent migration or soliciting.

1.5 Limitations:

The figures from the survey are relevant only to relatively large business entities that are represented in the sample frame of the survey compiled from various available sources. They do not cover workforce employed by numerous small business entities that serve localized bases of customers. A considerable number of such small entities that are not registered with the government, industry related bodies or exist in the business directories and information about such players is scarce. The main reason is possible biases that could occur due to limited sample size. Validity of salary information has limitations due to low response rates.



CHAPTER-2 METHODOLOGY

2.1 RESPONDENTS

The Career Development Center (CDC) of Daffodil International University carried out a survey with 384 (Three Hundred Eighty Four) ICT opinion leaders and decision-makers from different public and private sector organizations in Dhaka to assess the state of the ICT workforce.

Among the respondents of ICT industry, 20 % from BASIS, 13% from BCS, 1% BACCO, 1% ECAB, 3% ISPAB, 9% Software and Web, 15% IT Support and Service Provide, 20% Non ICT, 4% Public Organization and the rest 14 % of respondents non ICT including RMG and Pharmacy.

Detailed picture of respondents have been depicted at Annex.

SUMMARY OF CLASSIFIED RESPONDENT ORGANIZATION'S DETAILS

For Leading Phase Survey Work of ICT Job Market in Bangladesh
(Duration: April,2018 to September,2018)

| SI | Category of Respondent Organizations | No. | Percentage |
|----|---|------------|----------------|
| 1 | BASIS | 96 | 25.00% |
| 2 | BCS | 54 | 14.06% |
| 3 | BACCO | 5 | 1.30% |
| 4 | E-CAB | 8 | 2.08% |
| 5 | ISPAB | 9 | 2.34% |
| 6 | Software and web (No Membership of BASIS/BCS) | 39 | 10.16% |
| 7 | Support & Service Provider (No Membership of BASIS/BCS) | 63 | 16.41% |
| 8 | Non ICT | 66 | 17.19% |
| 9 | Government Organizations | 16 | 4.17% |
| 10 | Others | 28 | 7.29% |
| | Total | 384 | 100.00% |

2.2 SURVEY QUESTIONNAIRE

This study aimed to explore the current scenario of ICT job market survey based on demand and supply of different domains of this vibrant sector, which are: experience, certification, core skills and soft skills. In order to assure the validity of the instrument, items used to measure the constructs were from scales developed in previous ICT job market survey of various countries. This study contained two parts of the measurement items in the questionnaire. First part of questionnaire consists of 9 items which reflected the demographic information that are given in table 2.2.1 Second part of the questionnaire consists of 10 items which reflected the ICT employment outlook that are given in table 2.2.2

The report also discusses the global and local scenario of ICT development and shares the ICT advancement, focusing on emerging technologies and fourth industrial revolution (IR 4.0)

Table 2.2.1 Items for Demographic

| | |
|---|---|
| 1 | What type of business industry your organization is now representing? |
| 2 | What type of business your organization in now involved? |
| 3 | How long you have been in the IT& ITES business/profession/services? (Applicable for ICT Industry) |
| 4 | How long you have been established your IT department? (Applicable for Non ICT Industry) |
| 5 | Please mention total number of ICT Professionals in your organization? |
| 6 | Please mention total number of ICT Professional by gender in your organization |
| 7 | Please mention total number of ICT Professionals by age in your organization? |
| 8 | Please mention the number of different level of academic degree holder among the ICT Professional of your organization? |
| 9 | Please indicate the type of contracts of your ICT professionals? |

Source: National ICT workforce survey Sri Lanka (2013)



Table 2.2.2 Items for Employment outlook

| | | Source |
|----|---|--|
| 1 | Please indicate the sources of Recruitment of ICT Professionals in your organization? | ICT workforce Kingdom of Saudi Arabia 2015 |
| 2 | What is the most common entry level ICT Specialties required in your organization? (Please rank the following positions by 1 -13 according; Hints 1 for Most common and 13 for Most uncommon) | ICT workforce Kingdom of Saudi Arabia 2015 |
| 3 | There is presence of formal training plans for ICT Professionals within my Organizations. | ICT workforce Kingdom of Saudi Arabia 2015 |
| 4 | Please circle the nature of involvement with academia of your organization | ICT workforce Kingdom of Saudi Arabia 2015 |
| 5 | Please select the level of necessary demand of experience and certification for specific position. | National ICT workforce survey Sri Lanka (2013) |
| 6 | Please select the level of demand and supply of necessary core skills set for specific position | National ICT workforce survey Sri Lanka (2013) |
| 7 | Please select the level of Demand and Supply of necessary soft skills set. | Internal Quality Assurance Cell |
| 8 | Please mention the Salary Range against the following Job Title (Please input the amount) | ICT workforce Kingdom of Saudi Arabia 2015 |
| 9 | Please provide most five (05) technical skills that are going to be most demanded in next five years | Self -Developed |
| 10 | Please provide most five (05) technical skills that are going to be obsolete in next five years | Self -Developed |

2.3 DATA PROCESSING AND ANALYSIS

Data analysis was carried out using SPSS software. The data was analyzed mainly using descriptive statistical methods and cross tabulation. Descriptive statistics of (e.g. frequencies and percentage) of key variables were calculated and results were presented using different forms of graphs and tables, accordingly.

Data from table 2.2.1 were measured objectively. For the item 1 to 5 of the 2nd part of questionnaire from table 2.2.2, data were calculated by measuring frequency.

In case of item 5 to 8, the following formula were implemented.

N= 337

Weight = High*3+ Medium*2 + Low*1

| | Demand | | | |
|------------------------|---------------|--------|-----|--------|
| | High | Medium | Low | weight |
| Database Administrator | 211 | 86 | 40 | 845 |

| | Supply | | | |
|------------------------|---------------|--------|-----|--------|
| | High | Medium | Low | weight |
| Database Administrator | 95 | 174 | 68 | 701 |

| | |
|------------------------|--------------|
| Demand- Supply Gap | |
| Database administrator | 845-701= 144 |



CHAPTER-3

DATA ANALYSIS AND RECOMMENDATIONS

3.1. Type of Business

As one would expect, 75.7% of the surveyed organizations provide ICT-enabled services, while the rest are non-ICT companies (24.3%). The latter are categorized into the following sub-sectors: apparels, finance including insurance and banking, agriculture, manufacturing, shipping and freight forwarding, hotel services and tour operators, construction and architecture, and wholesale and retail trade.

In fact, ICT-enabled companies constitute 84.3% of our total samples. Most of them provide ICT services to their customers or clients. Consequently, many user companies need the support of dedicated ICT staff to maintain their in-house facilities. These companies, therefore, offer numerous job opportunities to the country's skilled ICT workforce. Only 15.7% among the ICT-enabled organizations sell software as a product.

3.2 Years in Service

Following Table (Table 1. Years in service of ICT and Non-ICT industries) shows the percentage of the companies based on the time of establishment. This indicates that most of the ICT companies in our sample (43.8%) were established more than 10 years ago. For the non-ICT companies, this frequency is 41.5%.

Table 1. Years in service of ICT and Non-ICT industries

| | ICT | NON ICT |
|-------------------|-------|---------|
| Less than 1 year | 11.2% | 3.7% |
| 1-3 years | 12.7% | 14.6% |
| 4 – 6 years | 22.7% | 15.9% |
| 7-9 years | 20.7% | 24.4% |
| 10 years and more | 43.8% | 41.5% |

3.3 Number of ICT professionals

Sixty-six per cent (66%) of all the ICT businesses in our sample have less than 26 employees, 24% of them have 26–50 employees, 8% of them have 150 employees, and the remaining 2% have 100–150 employees (See Figure 1).

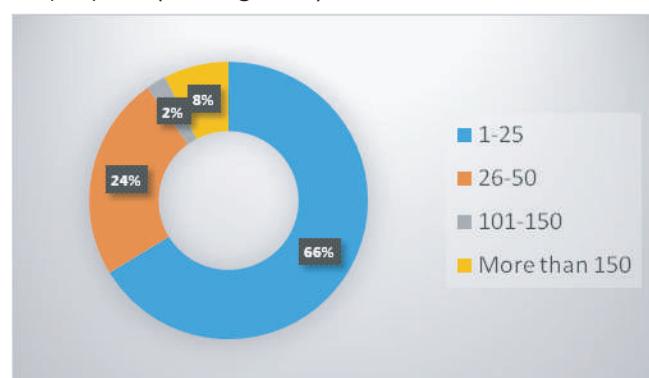
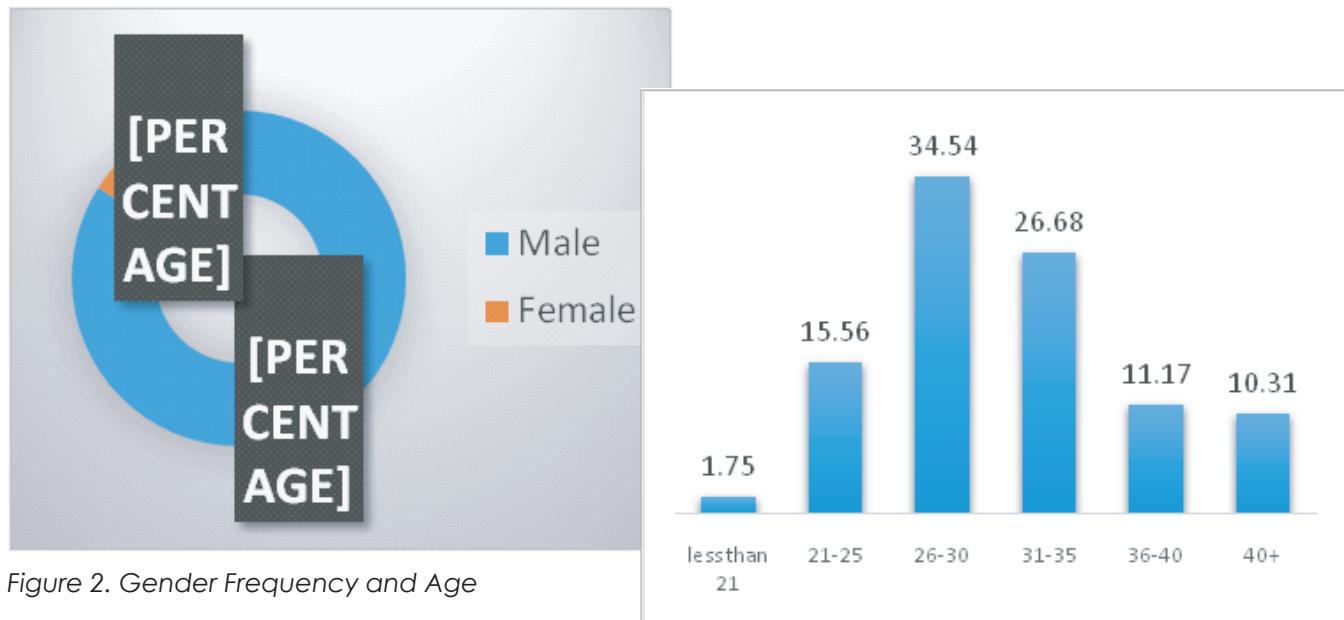


Figure 1. Number of ICT Professionals

3.4 Demographic of ICT employees

This section covers the male-female ratio, age, and education level of ICT professionals. Data from the job market survey shows that 84% of ICT professionals were male and 16% female. The ratio between male and female employees is almost 5:1. Most of the ICT workers (61.22%) are aged between 25 and 35 years whereas 15.56% represents age cluster between 21 and 25 years, 11.7% between 36 and 40 years, 10.31% of them are aged 40 years or more, and 1.75% are aged less than 21 years (See Figure 2).



Both the ICT and non-ICT organizations report that 44.31% of their ICT employees have completed graduation (Figure 3). Among the rest, 37.79% holds post-graduate degree, 11.03% holds diploma, 4.24% have completed the HSC exam, and 1.2% holds PhD degree. As much as 1.44% of the employees have only secondary grade qualification.

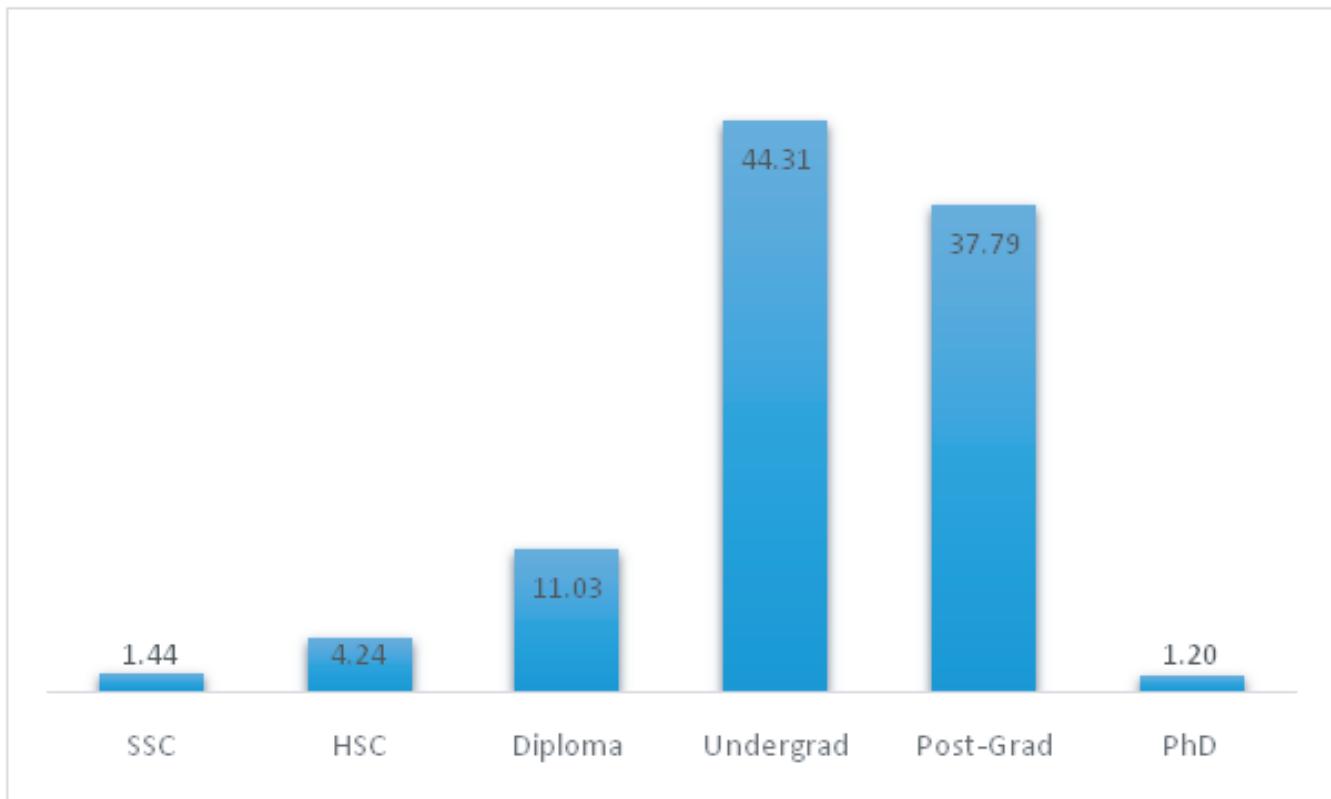


Figure 3. Educational Qualification of ICT employees

3.5 RECRUITMENT, TRAINING, & ACADEMIC COLLABORATION

Employment Tenure

Most of the ICT professionals in Bangladesh (87.9%) are full-time employees (see Figure 4), while the rest are either outsourced or contractual employees. Many of the organizations as the survey depicts, prefer to outsource their operational and maintenance tasks to vendors; but keep the core and strategic functions within their internal team functions.

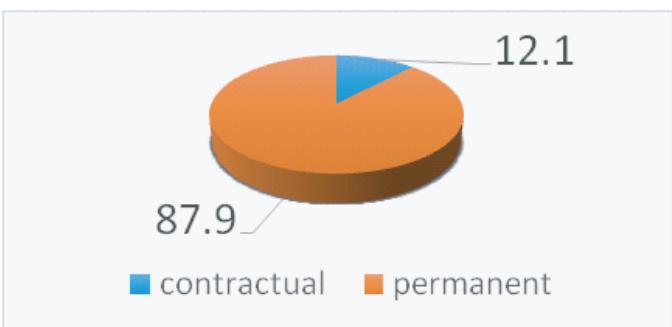


Figure 4. Employment Tenures

Sources of Job Recruitment

ICT employers use several sources to recruit ICT professionals. Online job portals like skill.jobs, chakri.com, and bdjobs.com are the primary sources—nearly half of the organizations surveyed by the CDC rely on them to fill vacancies. Outreach to educational institutions, including universities (6.39%), internal web (19.41%), job agencies (7.66%), social networks (10.09%), and newspaper advertisements (10.09%), another way of recruitment of workforces in this sector. Besides, online job portals and social media, such as LinkedIn and Facebook, are also becoming increasingly popular in the country (see Figure 5).

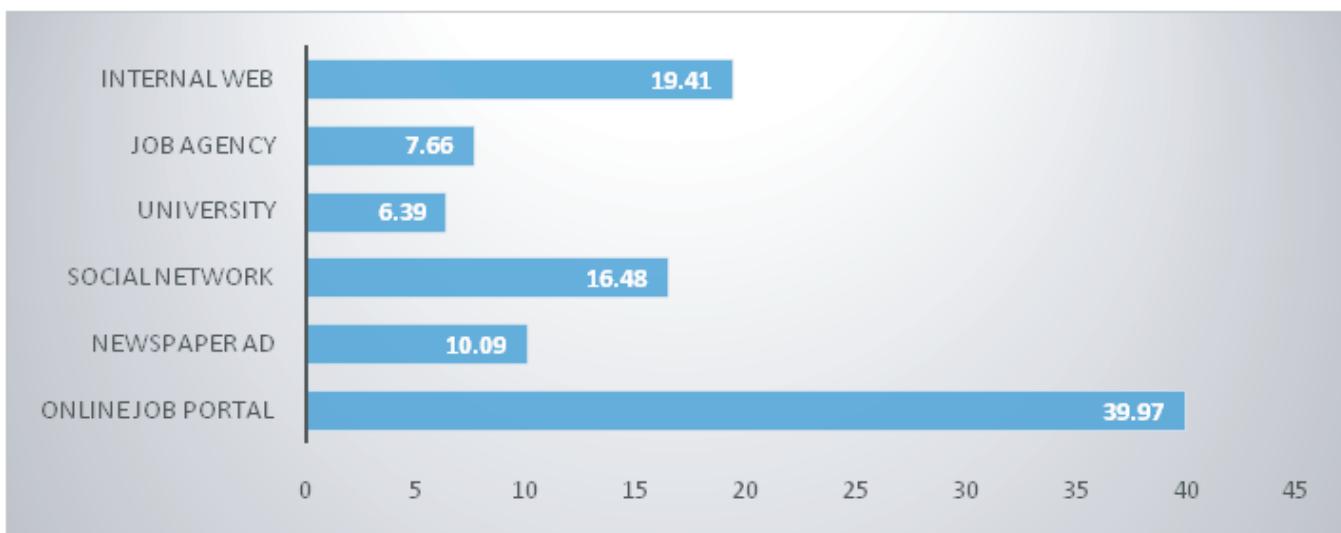


Figure 5. Sources of Recruitment

Most Common Entry Level Post

IT sales and marketing are the most common specialties, for which Bangladeshi organizations recruit entry-level professionals. However, most of the positions earmarked for entry-level ICT professionals are mostly specialized and currently generate the highest level of ICT employment.

These specialties are clearly those that provide employment to university graduates and relatively less experienced professionals (see Table 3).

Table 3. Most common entry level position

| | |
|----------------------------|----|
| IT Sales and Marketing | 1 |
| Database Admin | 2 |
| Programmer | 3 |
| Web Developer | 4 |
| Business Analyst | 5 |
| Software Tester | 6 |
| Project Manager | 7 |
| Technical Support | 8 |
| IT Management | 9 |
| Digital Media or Animation | 10 |
| Technical Writer | 11 |
| Solution and Architect | 12 |
| IT Research & Development | 13 |

IT sales and marketing is the most common specialty, for which Bangladeshi organizations recruit entry-level professionals.

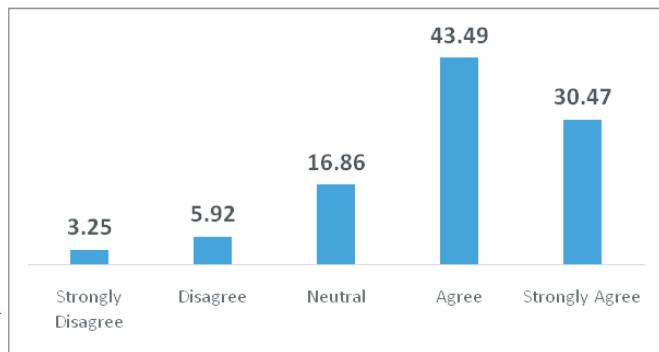
IT sales and marketing is the most common specialty, for which Bangladeshi organizations recruit entry-level professionals.

IT sales and marketing is the most common specialty, for which Bangladeshi organizations recruit entry-level professionals.

Training of ICT Professionals

Regular training of human resources is critical for their development; it bridges the skill gaps in the organization and also facilitates in understanding the local and global scenario. More than half of the organizations surveyed have their own formal training programmes (see Figure 6).

Figure 6
Training Facility
within Organization

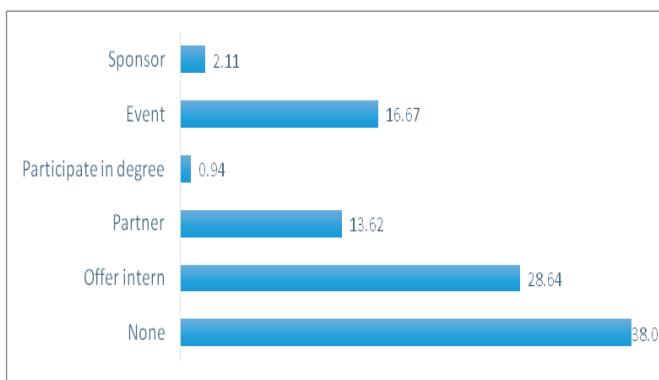


The demand for skills in emerging technology areas can be addressed only through regular training. Lack of training can lead to obsolescence of the skills pool in the organization. Regular training can result in greater employee turnover. Therefore, many successful organizations use training as a key tool to motivate and retain staff.

Linkage with Higher Education Institutions and Nature of Involvement

Nearly half of the organizations surveyed (38.03%) have no linkage with higher educational institutions (see Figure 6). The most common engagement is through internships (28.64%). Interestingly, 16.67% of the organizations have partnered with universities for various events and 13.62% of them for research and curriculum development (Figure 7). A handful of the organizations also sponsor students, and participate in the degree programmes.

Figure 7.
Industry-Academia Linkage



3.6 ICT EMPLOYMENT OUTLOOK

3.6.1 Job Requirement: Demand of Experience

Globally, one in three employers struggles to find employees with the skills and experiences necessary to meet their needs, while almost one-third of the employers cite the lack of experience as a key barrier to fill up open jobs. In fact, the demand of job experience is crucial for certain positions in both ICT and non-ICT industries.

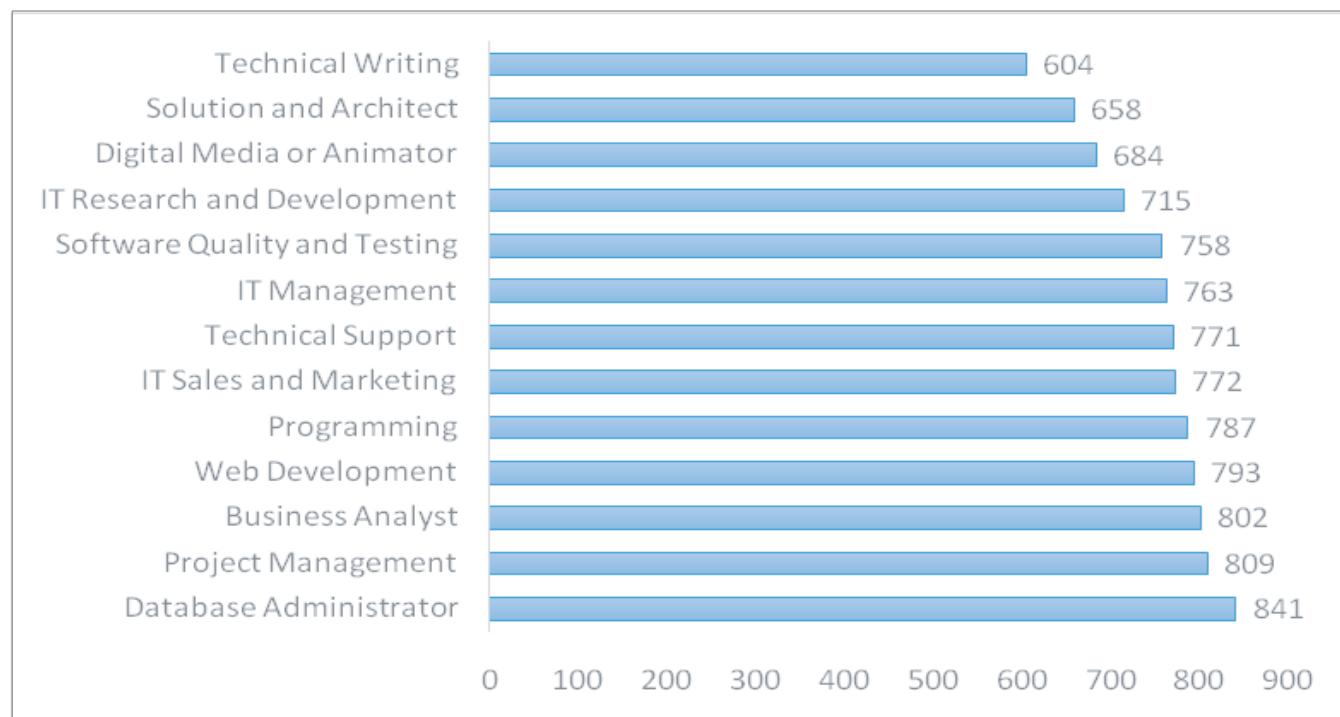


Figure 8. Demand of Experience

3.6.2 Job Requirement: Demand for Certification

Information technology (IT) is a rapidly growing field the knowledge possessed by IT professionals cuts a wide swath. With so much information out there and technologies changing every day, getting certified is the best way for someone to distinguish him/her from competitors and to demonstrate skills to hiring managers and employers. In 2016, CompTIA conducted a survey of IT managers to understand how they feel about IT certifications and how they impact hiring decisions. The findings from that conducted survey are given below:

- 66% of IT managers use IT certifications to distinguish between equally qualified candidates.
- 72% of IT managers require IT certifications for certain job roles.
- 60% of IT managers use IT certifications to gauge a candidate's expertise.
- 66% of IT managers believe that IT certifications are valuable.

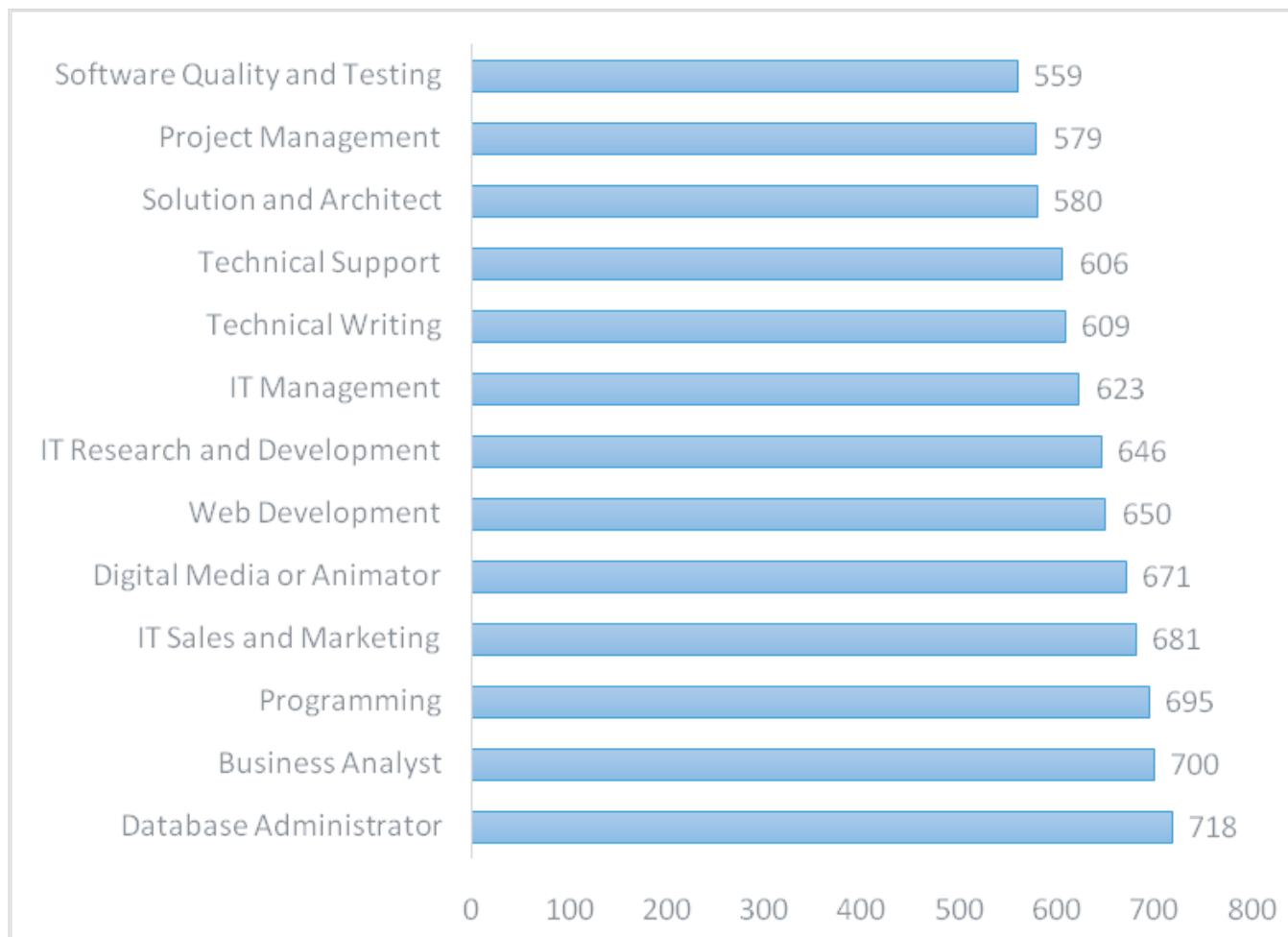


Figure 9. Demand for Certification

According to the data from a survey (Figure 9) conducted by Skill.jobs (<https://skill.jobs/>), recruiters believe that the position relating to software quality assurance and testing demands less certification than other positions.

This result is in line with the result of the CompTIA survey. Oracle and SQL have long been recognized as leaders in database management. These certifications give the candidate's résumé a boost and improve his/her employability. Having said that, database management overflows with valuable certifications.

- 66% of IT managers use IT certifications to distinguish between equally qualified candidates
- 72% of IT managers require IT certifications for certain job roles
- 60% of IT managers use IT certifications to gauge a candidate's expertise
- 66% of IT managers believe that IT certifications are valuable

3.6.3 Demand for Core Skills

The ICT workforce in this survey comprise nearly 17,000 professionals, who are employed in several specialties in the surveyed organizations. As per the information provided by recruiters, qualified and skilled

database administrators are most in demand. Relative to other specialties, the least demanded posts relate to software solution and architecture. Figure 10 will show recruiters' demand for several specialties.

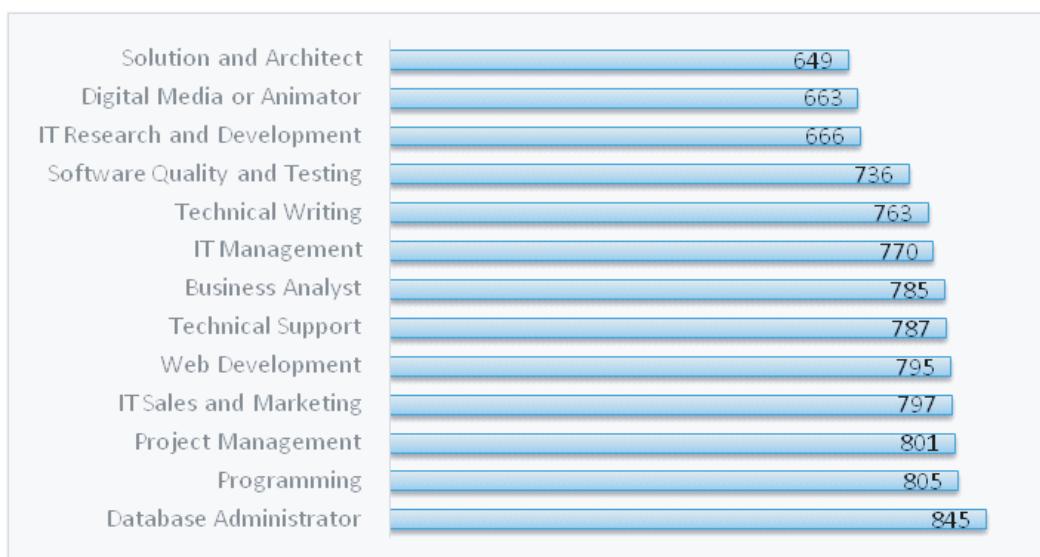


Figure 10. Demand for Core Skills (Low to High)

3.6.4 Supply of Core Skills

Universities and colleges have made substantial investments in new ICT courses and additional seats. Their primary role is to provide basic education, which can be leveraged for further skills development. Here, renowned universities produce a sufficient number of high-quality graduates. However, the authorities of these universities acknowledge that such graduates are not fully ready for the ICT market and need more

practical training on specialized technical topics. Such specialized training needs to be provided by both universities and employers. However, employers point out that the quality of graduates from the leading institutions is satisfactory. It must be noted that there is a sharp drop in quality between graduates from top-ranking universities and lower-tier institutions.

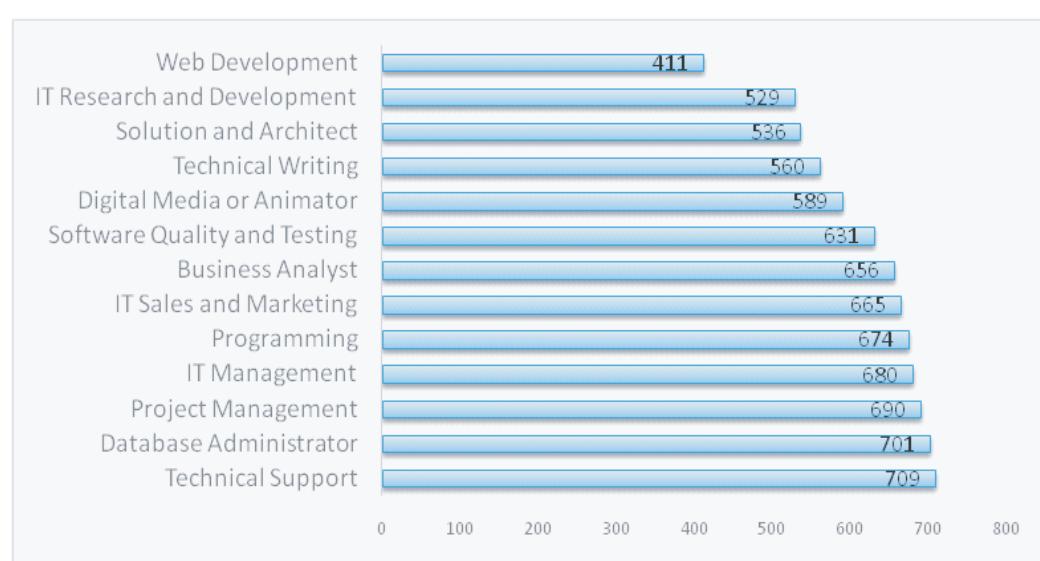


Figure 11: shows the supply situation of graduates in terms of their respective specialties.

The figure above suggests the supply situation touches the lowest point at web developers, while there is a large supply of graduates for IT helpdesk and support.

3.6.5 Demand-Supply Gap: Core Skills

Based on Figure 12, a key objective of the ICT job market survey was to find ways to match the gap between the demand for and supply of the ICT workforce, especially graduates. Demand and supply projections indicate a shortage in the supply of graduate workers in web development. The magnitude of the gap is 384, whereas at Digital Media or Animator, it stands 74.

Web developers and designers have always been the bedrock of a company's online strategy—their services have now become more essential than ever as web technology has hit another innovation sprint. A new study commissioned by GoDaddy.com says that this Golden Age of web development and design, which signals continuous growth of new small businesses and an economic boost, shows no sign of slowing down. This can mostly be attributed to the continued growth in the retail and travel industries. Professionals are eager to find out new ways to keep up with the growing demand and evolving technology (Venturebeat.com, 2017).

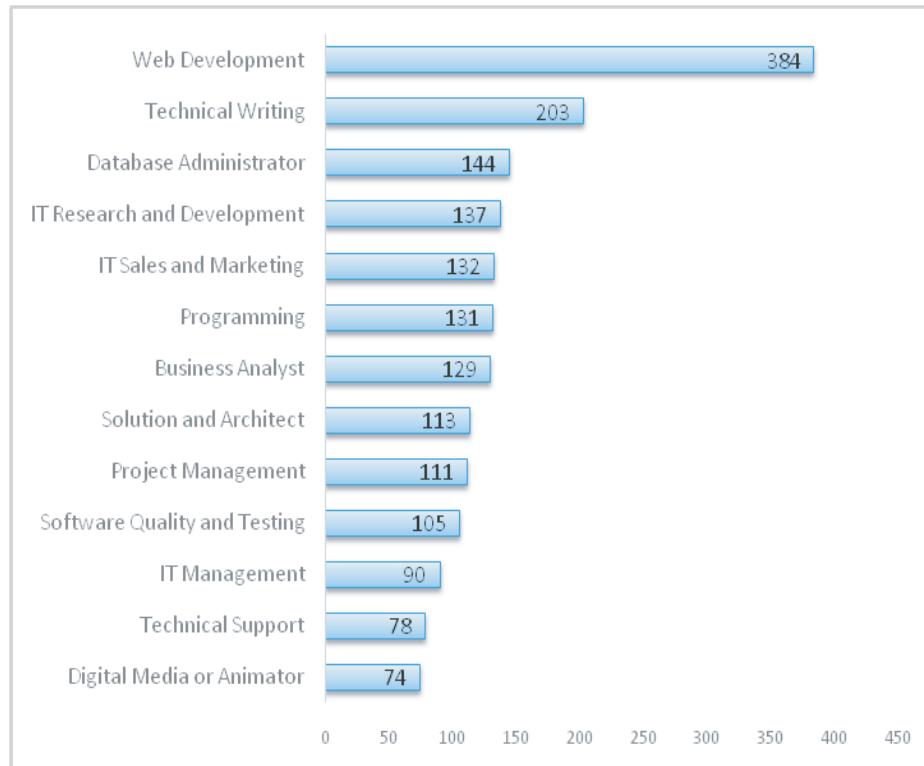


Figure 12 Demand-Supply gap (core skills)

3.6.6 Demand for Soft Skills

Technical skills are essential for any IT position. However, IT employees also need soft skills, sometimes known as interpersonal skills. IT professionals need to be able to successfully interact with customers and vendors, manage departments, and convey their ideas to others.

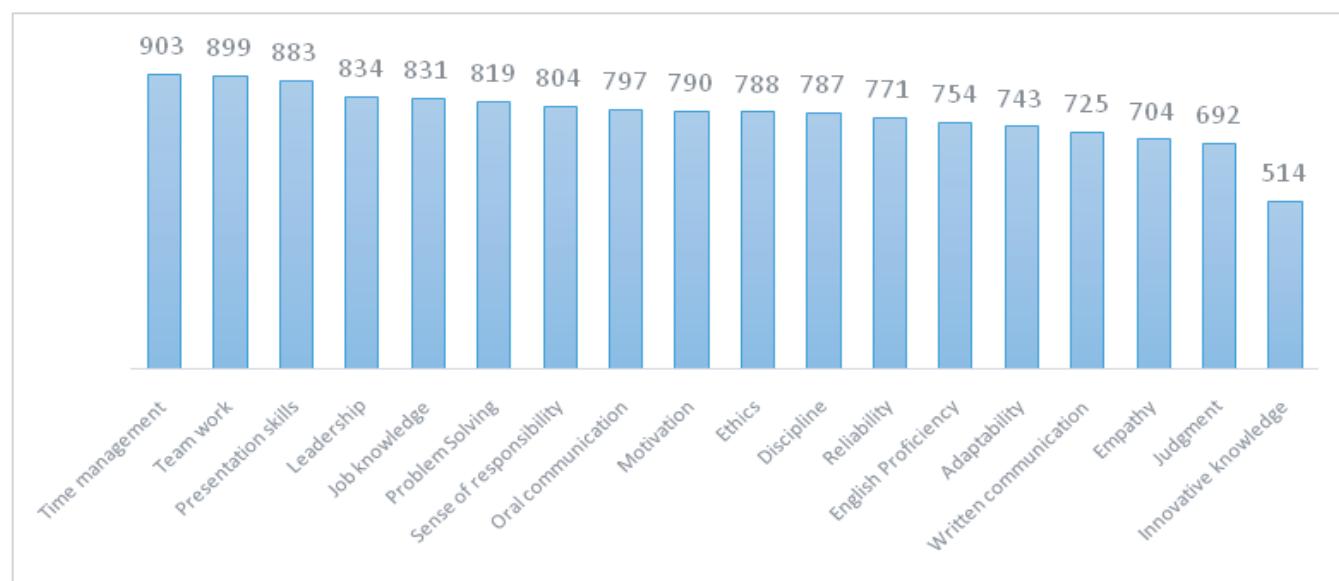


Figure 13. Demand for Graduate with Soft Skills (High to low)

According to the score achieved from the dataset, employers point out time management as the most important skill for their employees. Resourceful time management is the key to a successful day. Time management is a set of ideologies, practices, expertise, tools, and structures that help IT employees efficiently use their time to accomplish what they want. At the entry level, employers are not keen on getting much innovative knowledge.

3.6.7 Supply of Soft Skills

From the data received from our respondents, the core skills as well as soft skills of new graduates are highly important. The findings of the survey

regarding the supply of soft skills among graduates are given in the figure below :

Figure 14 suggests that graduates possess only innovative knowledge but there are graduates with problem-solving ability and English proficiency in an entry-level IT position.

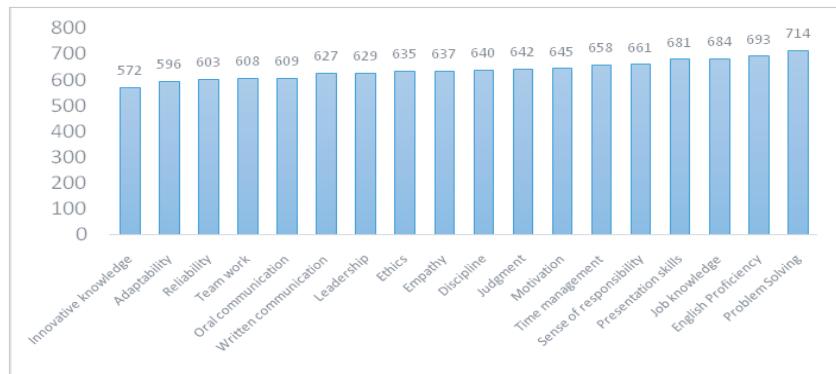


Figure 14 Supply of Graduates with Soft Skills (Low to High)

3.6.8 Demand-Supply Gap: Soft Skills

Demand and supply projections for 2018 indicate the demand-supply situation of the graduate workforce in terms of time management and presentation skills. The magnitude of these gaps are 210 and 199 respectively.

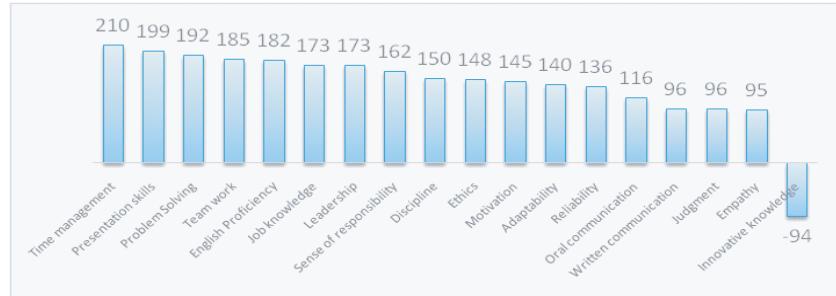


Figure 15: Demand–Supply Gap Based on Soft Skills

3.6.9 Salary Structure

| SI | Area of Job Function | Fresh | | 1-3 years | | More than 03 Years | |
|-----|------------------------------|--------|---------|-----------|---------|--------------------|---------|
| | | Min | Max | Min | Max | Min | Max |
| 1. | Database Administrator | 8,000 | 85,000 | 12,000 | 300,000 | 25,000 | 600,000 |
| 2. | Digital Media or Animator | 5,000 | 50,000 | 10,000 | 70,000 | 15,000 | 150,000 |
| 3. | Business Analyst | 7,000 | 250,000 | 10,000 | 60,000 | 18,000 | 500,000 |
| 4. | Programming | 5,000 | 50,000 | 10,000 | 100,000 | 15,000 | 250,000 |
| 5. | Project Management | 10,000 | 45,000 | 15,000 | 100,000 | 15,000 | 200,000 |
| 6. | Software Quality and Testing | 5,000 | 40,000 | 10,000 | 70,000 | 15,000 | 200,000 |
| 7. | IT Sales and Marketing | 4,000 | 80,000 | 7,000 | 60,000 | 11,000 | 150,000 |
| 8. | Technicd Support | 5,000 | 45,000 | 10,000 | 70,000 | 12,000 | 150,000 |
| 9. | Technical Writing | 4,000 | 50,000 | 9,000 | 65,000 | 12,000 | 100,000 |
| 10. | Web Development | 7,000 | 50,000 | 10,000 | 70,000 | 16,000 | 200,000 |
| 11. | IT Management | 7,000 | 50,000 | 10,000 | 80,000 | 15,000 | 200,000 |
| 12. | Solution and Architect | 10,000 | 50,000 | 15,000 | 150,000 | 30,000 | 300,000 |
| 13. | IT Research and Development | 6,000 | 100,000 | 12,000 | 100,000 | 10,000 | 200,000 |

3.7 Non ICT Job market outlook

This section focuses the status of non-ICT Job Market Outlook, compared to global and Bangladesh job market strata. The shared views at this section were excerpted from the following reports, which are as:

- ILO Global Wage Report 2018²
- World Employment Social Outlook: Trends 2018³
- The Editorial on 'Two billion jobs to be at risk by 2030' of The Daily Star⁴
- The paper, "Employment growth, and inequality in the labour market", based on Bangladesh⁵ Employment and Labour Market Watch 2018.
- The Daily Star report, "Why are university graduates failing to meet market needs?"⁶
- ILO: More than half of employed Bangladeshis in vulnerable jobs⁷

Views on Jobs in Bangladesh: ILO perspective⁸

Most jobs in Bangladesh informal

Almost one third of the population is involved in informal jobs, the ILO report says. Out of the country's 637 million strong labor force, only a small portion of workers are in formal sectors. The high incidence of informality continues to undermine the prospects of further reducing working poverty, especially in South and South-Eastern Asia. Indeed, informality affects around 90% of all workers in India, Bangladesh, Cambodia and Nepal, the report said. Such a high incidence of informality is only partially driven by the high shares of employment in agriculture. In fact, informality in these countries also remains pervasive in the non-agricultural sectors, such as construction, wholesale and retail trade, and accommodation and food service industries, it said. As per the report, unemployment rate in Bangladesh was 4.4% in 2017, which will remain same in the current year. The report also shows that, in 2017, the global unemployed population was 192.7 million, which is expected to come down to 192.3 million.

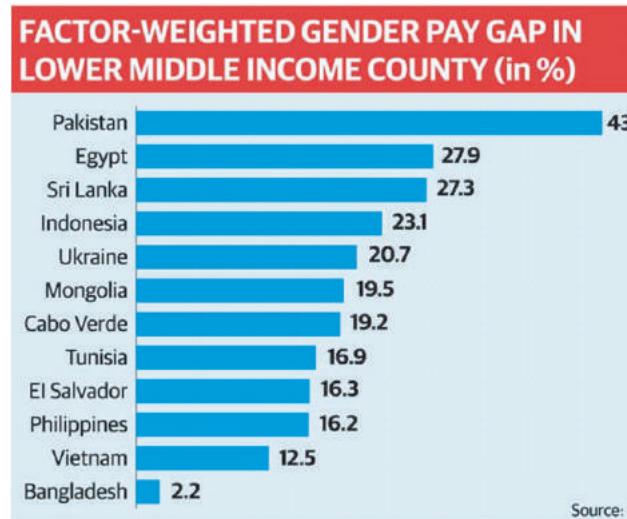
Unemployment to remain low in Asia-Pacific

As Asia-Pacific continues to create jobs at a very fast rate, unemployment in the region is expected to remain low by international standards, at around 4.2% in 2018, said the report. The report also projected that the number of employed persons in the region will grow by some 23 million or 1.2% between 2017 and 2019. Southern Asia, driven by fast labour force growth, is expected to account for almost 90% of the regional employment growth.

Working poverty on downward trend

The incidence of working poverty in the Asia-Pacific region is expected to continue its downward trend for the next couple of years. As of 2017, 23.4% of the region's working population was in extreme or moderate poverty, living on an income of below US\$3.10 per day, down from over 44% in 2007. Despite remarkable progresses, working poverty remains high in some parts of the region, notably in Southern Asia. Over 41% of workers in this region are estimated to be in either extreme or moderate poverty in 2017, accountable for more than two thirds of all working poor in the Asia-Pacific.

ILO Global Wage Report 2018⁹



The ILO Global Wage Report examines the evolution of real wages around the world, giving a unique picture of wage trends globally and regionally.

²https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcom/---publ/documents/publication/wcms_650553.pdf

³https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_615594.pdf

⁴<https://www.thedailystar.net/editorial/news/two-billion-jobs-be-risk-2030-1687033>

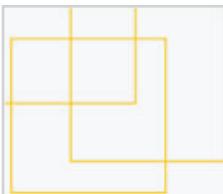
⁵<http://www.cderbd.org/Fdetail.php?Id=44&Type=2>

⁶<https://www.thedailystar.net/opinion/education/news/why-are-university-graduates-failing-meet-market-needs-1686997>

⁷<https://www.dhakatribune.com/bangladesh/2018/01/23/i-lo-half-employed-people-vulnerable-jobs>

⁸<https://www.dhakatribune.com/bangladesh/2018/01/23/i-lo-half-employed-people-vulnerable-jobs>

⁹https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_650553.pdf



Global Wage Report 2018/19
What lies behind gender pay gaps

Global Wage Report

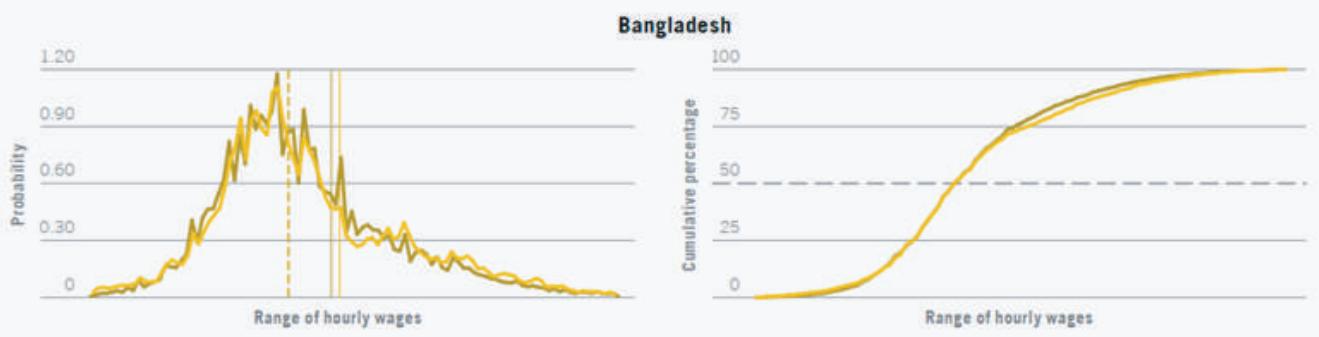
- Gender wage gap in Bangladesh is the lowest in the globe, as it came down to 2.2% last year against the world average of 21.2%, a report of the International Labour Organization (ILO).

The "Global Wage Report 2018", revealed the data on gender pay gap based on global, regional and national wage trends in 136 countries. Bangladesh is the only country in the globe, where the factor-weighted hourly wage gender pay gap is positive, the report said.

The gender pay gap is a widely used as an indicator, representing the difference on overall pay between women and men employees.

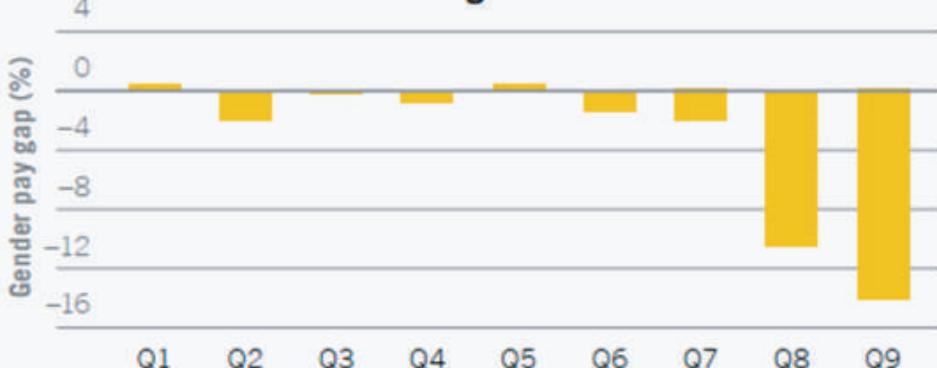
The report also evaluated some reasons for slow wage growth despite a general fall in unemployment and recovery in GDP.

- The mean gender pay gap is negative and the median is positive (selection plotted)



Lower-middle income countries

Bangladesh



- Lower - Middle income countries
Bangladesh

- **World Employment Social Outlook: Trends 2018¹⁰**

The ILO's World Employment and Social Outlook – Trends 2018 examines the current state of the labour market, assessing the most recent developments and making global and regional projections of unemployment, vulnerable employment and working poverty.

In 2017, 57.45% of the people working in Bangladesh were in vulnerable jobs, the International Labour Organization (ILO) has said. Vulnerable employment is defined as jobs that are unlikely to have formal work arrangements, and therefore more likely to lack decent working conditions, adequate social security and representation. According to ILO's flagship report titled "World Employment and Social Outlook: Trends 2018," of the 63.7 million total employed in Bangladesh in the last year, 36.6 million were in these sorts of jobs. Poor quality jobs and vulnerable employment affect more than 900 million men and women in the Asia-Pacific, the report said. Despite sustained job growth, decent work deficits and informality pose challenges to prospects of further reduction in working poverty in Asia and the Pacific. A large part of the jobs created in the region remain of poor quality. As per the latest data, the number of vulnerable employment was 1,391.3 million in 2017, which is expected to increase to 1,409 million in 2018. Projections indicate that 72% of workers in Southern Asia, 46% in South-Eastern Asia and the Pacific, and 31% in Eastern Asia will be in vulnerable employment by 2019, showing very little change from 2017.

Global economic growth has rebounded and is expected to remain stable but low

Global economic growth increased to 3.6 per cent in 2017, after hitting a six-year low of 3.2 per cent in 2016. The recovery was broad based, driven by expansions in developing, emerging and developed countries alike. Future growth is likely to stay below 4 per cent, as economic activity normalizes in most major economies without significant stimulus and fixed investment remains at a moderate level.

Global unemployment remains elevated at more than 190 million

The latest developments in global unemployment are also mixed. According to the ILO's new estimation, based on improved data sets and methodologies, the global unemployment rate is expected to fall slightly to 5.5 per cent in 2018 (from 5.6 per cent in 2017), marking a turnaround after three years of rising unemployment rates. However, with a growing number of people entering the labour market

to seek employment, the total number of unemployed is expected to remain stable in 2018, above 192 million. In 2019, the global unemployment rate is expected to remain essentially unchanged, whereas the number of unemployed is projected to grow by 1.3 million.

- Vulnerable employment is on the rise

With these improvements in employment projected to be modest, the number of workers in vulnerable forms of employment (own-account workers and contributing family workers) is likely to increase in the years to come. Globally, the significant progress achieved in the past in reducing vulnerable employment has essentially stalled since 2012. In 2017, around 42 per cent of workers (or 1.4 billion) worldwide are estimated to be in vulnerable forms of employment, while this share is expected to remain particularly high in developing and emerging countries, at above 76 per cent and 46 per cent, respectively. Worryingly, the current projection suggests that the trend is set to reverse, with the number of people in vulnerable employment projected to increase by 17 million per year in 2018 and 2019.

- The pace of working poverty reduction is slowing

Similarly. The global labour market has seen only weak progress in the area of working poverty. In 2017, extreme working poverty remained widespread, with more than 300 million workers in emerging and developing countries having a per capita household income or consumption of less than US\$1.90 (PPP) per day. Overall, progress in reducing working poverty is too slow to keep pace with the growing labour force in developing countries, where the number of people in extreme working poverty is expected to exceed 114 million in 2018, or 40 per cent of all employed people.

- Emerging countries, on the other hand, achieved significant progress in reducing extreme working poverty, which is expected to affect less than 8 per cent (around 190 million) of workers there in 2017. The incidence of extreme poverty should continue to fall, translating into a reduction in the number of extreme working poor by 10 million per year in 2018 and 2019. Nevertheless, moderate working poverty, in which workers live on an income of between US\$1.90 and US\$3.10 per day in PPP, remains widespread, affecting 430 million workers in emerging and developing countries in 2017.

- The high incidence of informality continues to undermine the prospects of further reducing working poverty, especially in South and South-Eastern Asia. Indeed, informality affects around 90 per cent of all workers in India, Bangladesh, Cambodia and Nepal.

¹⁰ https://www.ilo.org/wcmsp5/groups/public/---dgreports/-dcomm/---publ/documents/publication/wcms_615594.pdf

Share of informal jobs by sector, latest year (percentages of employment)



Source: ILO, forthcoming.

Two billion jobs to be at risk by 2030¹¹

With rapid technological advancement and the ever-increasing digitisation of various industries, a large number of expatriate workers employed in blue-collar jobs may return home by 2030 due to job displacement. As this newspaper reported yesterday, the number of jobs expected to be displaced by the year 2030 now stands at two billion and may easily rise given the speed at which technology is currently moving forward.

One study suggests that Bangladesh would lose about 53.8 lakh jobs by 2041 from only five sectors because of increased automation. This, under any circumstances, should be of grave concern. However, given that the youth now comprises of 65 percent of our population, Bangladesh has a window of opportunity to rapidly place itself in a position of strength during the fourth industrial revolution.

According to experts, both the public and private sectors should immediately adopt new technologies that are now available such as smart manufacturing, analytics and the Internet of Things, among others. And our education should be made more technology-driven in order to train people, particularly the youth, to be more proficient at handling this new influx of technology.

2030 is not far away, and the rate of change in technology use that we are currently seeing means that the government and the private sector do not have much time to make the necessary adjustments as called for by experts. Therefore, we urge both to start drawing up their plans for the approaching industrial revolution now so that Bangladesh does not lag behind other countries as it had done during past industrial revolutions.

Bangladesh Employment and Labour Market Watch 2018¹²

The Paper, 'Employment growth, and inequality in the labour market presented at the annual seminar on Bangladesh ELM Watch 2018', based on Bangladesh Employment and Labour Market Watch 2018.

Employment and annual growth of employment: 2000-2016

| Year | Total employed persons in million | Growth of employment /year in million |
|---------|-----------------------------------|---------------------------------------|
| 2000 | 39.0 | |
| 2005-06 | 47.4 | 1.53 |
| 2010 | 54.1 | 1.49 |
| 2013 | 58.1 | 1.33 |
| 2015-16 | 59.5 | 0.56 |

Table: Employment and annual growth of employment: 2000-2016

The most important observation emerging from the QLFS 2016 data is the slow growth of employment during 2013 to 2015-16. During the 2.5 years (taking the mid-point of 2013 and 2015-16), employment growth per year was 0.56 million

(Table: Employment and annual growth of employment: 2000-2016).

¹¹ <https://www.thedailystar.net/editorial/news/two-billion-jobs-be-risk-2030-1687033>

¹² <http://www.cderbd.org/Fdetail.php?Id=44&Type=2>

Data from two sources of BBS

| Item(in Million) | SVS 2015 | QLFS 2015-16 |
|-------------------------------|----------|--------------|
| Total population | 158.48 | 158.9 |
| Labour force age population | 109.96 | 106.0 |
| Employed population (est.) | 61.72 | 59.50 |

Structure of employment

| Year | Manufacturing | Construction | Agriculture | All non-agriculture |
|------|---------------|--------------|-------------|---------------------|
| 2010 | 12.46 | 4.81 | 47.6 | 53.2 |
| 2013 | 16.40 | 3.69 | 45.1 | 54.9 |
| 2016 | 14.40 | 5.60 | 42.7 | 57.3 |

Number employed (million) by sector

| Sectors | 2010 | 2013 | 2016 |
|---------------|------|------|------|
| Agriculture | 25.7 | 26.1 | 25.4 |
| Male | 15.2 | 17.2 | 14.2 |
| Female | 10.5 | 9.0 | 11.2 |
| Manufacturing | 6.7 | 9.5 | 8.6 |
| Male | 4.8 | 5.7 | 5.9 |
| Female | 1.9 | 3.8 | 2.6 |

During 2013-16, women's manufacturing employment declined by 1.2 million. Employment in agriculture increased by 2.2 million. RMG employment was stagnated but did not decline. It must be mentioned that during 2012-2013 RMG employment already faced stagnation but LFS shows an upward jump in the number of women in manufacturing during 2010-2013.

Success stories in the labour market:

- LFPR among women has increased (from 29.2 in 2006 to 35.6 in 2016). It has also increased if one compares 2013 and 2016.
- Underemployment rate has decreased
- The share of non-farm in total employment has increased. (From 51.9 in 2006 to 57.3 in 2016).

Why are university graduates failing to meet market needs? ¹³

The UGC Annual Report 2016, states that 34 public universities, and 95 private universities excluding the colleges affiliated with the National University, Open University and Islamic Arabic University, are providing tertiary education to some 601,241 students. According to the report, 125,131 students have been enrolled under arts and humanities and social science disciplines, 150,577 students under science, 12,627 students under pharmacy, 10,300 students under medical, 24,188 under agriculture, 152,214 under engineering and technical disciplines, 147,714 students under business studies, 4,650 students under education, 31,222 students under law, and 15,806 students under diploma/certificate programmes and other courses.

Many foreigners are currently working in different

multinational companies, readymade garment companies, and pharmaceutical companies or in other economic sectors in Bangladesh. Home Minister Asaduzzaman Khan Kamal gave an account in the parliament back in February 2018 of how many foreigners work in Bangladesh. According to his estimates, some 85,486 foreigners work in the country and around half of them are Indians (Prothom Alo, April 17, 2018). Foreigners mainly work in the production management of factories, management of machinery, quality control and mid-level management of organizations. Many foreigners also work in merchandising and buying houses of the readymade garment sector. Besides, they work in the technical and product manufacturing process in export processing zones. Along with this, foreigners are sometimes hired for the post of managing director and director of major MNCs in Bangladesh. According to a recent study by the Centre for Policy Dialogue (CPD), foreigners are working in 24 percent of garment factories in the country. More than 70 percent of managerial posts of organizations in the plastic industry have been given to foreign nationals. RMG, foreign remittance, and agriculture are considered key sectors of the economy. All three sectors more or less hinge on unskilled and semi-skilled manpower. Experts and economists have already begun to sound alarms about China's massive investments in capacity building and infrastructure development projects integrating RMG industries in African countries which may create challenges for Bangladesh's RMG in the near future. Moreover, the economic consequences of the Arab

¹³<https://www.thedailystar.net/opinion/education/news/why-are-university-graduates-failing-meet-market-needs-1686997>

Spring have already proved to be one of the biggest threats to the country's international remittance share. At a time when the country is facing a certain level of "credential inflation" (devaluation of educational or academic credentials over time and a corresponding decrease in the expected advantage for a degree-holder in the job market) in arts, humanities, social sciences, business studies, and other disciplines, sectors such as RMG, plastic, manufacturing industries, medical, education, ICT and development lack skilled human resources.

In today's world, the role of universities cannot only be limited to imparting knowledge but it must also introduce job-oriented curricula and skills-based training in order for students to be successful in their careers. Traditional graduation programmes should prepare young people for the job market—both in Bangladesh and abroad.

Universities should identify the skills that are required by corporate bodies for employability both at home and abroad. Universities should equip their students with these skills, attitudes and abilities so that graduates are confident going into the job market. More experimentation and research are needed to identify the shortcomings in university curricula in order to make tertiary education more effective in creating skilled manpower. The gap between education and employment can be closed through employer engagement in education and training. In order to address these challenges, the government and other stakeholders need to establish a close link between employers and universities.

3.8 Summary of Skills (Core Skills and Soft Skills) outlook

3.8.1 Core Skills Outlook

Web Development

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 1st | |
| Experience | 4th | |
| Certification | 6th | |
| Scope as Entry level | 4th | |
| Salary | Min | Max |
| Fresher | 7000.00 | 50, 000.00 |
| 1-3 years' experience | 10,000.00 | 70, 000.00 |
| 3+ years' experience | 16,000.00 | 2,00, 000.00 |

Notes:

A Web developer is a kind of programmer who specializes in the development of applications relating to the World Wide Web or distributed network applications, which typically run protocols like HTTP from a Web server to a client browser using associated programming languages like HTML/CSS, C#, Ruby and PHP to name a few.

Some developers handle all aspects of a website's construction, and others specialize in a certain aspect of it. The following are examples of types of specialized web developers:

Back-end web developers are responsible for the overall technical construction of the website. They create the basic framework of the site and ensure that it works as expected. Back-end web developers also establish procedures for allowing others to add new pages to the website and meet with management to discuss major changes to the site.

Front-end web developers are responsible for how a website looks. They create the site's layout and integrate graphics, applications (such as a retail checkout tool), and other content. They also write web design programs in a variety of computer languages, such as HTML or JavaScript.

Webmasters maintain websites and keep them updated. They ensure that websites operate correctly, and they test for errors such as broken links. Many webmasters respond to user comments as well.

Technical Writing

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 2nd | |
| Experience | 13th | |
| Certification | 9th | |
| Scope as Entry level | 11th | |
| Salary | Min | Max |
| Fresher | 4000.00 | 50, 000.00 |
| 1-3 years' experience | 9,000.00 | 65, 000.00 |
| 3+ years' experience | 12,000.00 | 1,00, 000.00 |

Notes:

Technical writers, also called technical communicators, prepare instruction manuals, how-to guides, journal articles, and other supporting documents to communicate complex and technical information more easily. They also develop, gather, and disseminate technical information through an organization's communications channels.

Applying their knowledge of the user of the product, technical writers may serve as part of a team conducting usability studies to help improve the design of a product that is in the prototype stage. Technical writers may conduct research on their topics through personal observation, library and Internet research, and discussions with technical specialists.

Technical writers are also responsible for managing the consistency of technical content and its use across business departments including product development, manufacturing, marketing, and

customer relations.

Job opportunities, especially for applicants with technical skills, are expected to be good. The growing reliance on technologically sophisticated products in the home and the workplace and the increasing complexity of medical and scientific information that consumers demand will create many new job opportunities for technical writer.

Database administration

| | |
|------------------------------|-------------|
| Demand- Supply gap in Market | 3rd |
| Experience | 1st |
| Certification | 1st |
| Scope as Entry level | 2nd |
| Salary | Min |
| Fresher | 8000.00 |
| 1-3 years' experience | 12,000.00 |
| 3+ years' experience | 25,000.00 |
| | Max |
| | 85,000.00 |
| | 3,00,000.00 |
| | 6,00,000.00 |

Notes:

Database administrators use specialized software to store and organize data, such as financial information and customer shipping records. They make sure that data are available to users and secure from unauthorized access.

Database administrators, often called DBAs, make sure those data analysts and other users can easily use databases to find the information they need and that systems perform as they should. Some DBAs oversee the development of new databases. They have to determine the needs of the database and who will be using it. They often monitor database performance and conduct performance-tuning support.

Many databases contain personal or financial information, making security important. Database administrators often plan security measures, making sure that data are secure from unauthorized access. Many database administrators are general-purpose DBAs and have all of these duties. However, some DBAs specialize in certain tasks that vary with an organization and its needs. Two common specialties are as follows:

System DBAs are responsible for the physical and technical aspects of a database, such as installing upgrades and patches to fix program bugs. They typically have a background in system architecture and ensure that the firm's database management systems work properly.

Application DBAs support a database that has been designed for a specific application or a set of applications, such as customer-service software.

Using complex programming languages, they may write or debug programs and must be able to manage the applications that work with the database. They also do all the tasks of a general DBA, but only for their particular application.

IT Research and Development

| | |
|------------------------------|-------------|
| Demand- Supply gap in Market | 4th |
| Experience | 10th |
| Certification | 7th |
| Scope as Entry level | 13th |
| Salary | Min |
| Fresher | 6000.00 |
| 1-3 years' experience | 12,000.00 |
| 3+ years' experience | 10,000.00 |
| | Max |
| | 1,00,000.00 |
| | 1,00,000.00 |
| | 2,00,000.00 |

Notes:

Research and development (R&D) comprises three types of activity—basic research, applied research, and development. Basic research is conducted to further scientific knowledge without any direct application.

This sort of research typically involves a high level of theory. Due to this risk, and because it is difficult to determine in advance what new products, if any will result, most basic research are funded by government, universities, or nonprofit organizations.

Applied research is the bridge between science and business. It is directed toward solving some general problems, but may produce several viable options that all achieve some aspects of the goal. Development, which accounts for more than half of all R&D spending, according to the National Science Board, then refines the technologies or processes of applied research into immediately usable products. Most development is done by private industry and is generally oriented toward manufacturing. Nearly everything consumers use, from antibiotics to zoom lenses is a product of basic research, applied research, and development.

Scientific research and development services rely heavily on workers with extensive post secondary education. A larger percentage of workers in this industry have bachelor's or graduate level degrees than in all other industries.

| IT Sales and Marketing | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 5th | |
| Experience | 6th | |
| Certification | 4th | |
| Scope as Entry level | 1st | |
| Salary | Min | Max |
| Fresher | 4000.00 | 80, 000.00 |
| 1-3 years' experience | 7,000.00 | 60, 000.00 |
| 3+ years' experience | 11,000.00 | 1,50, 000.00 |

Notes:

Generates IT (information technology) sales and business, develops relationships with new clients, makes sales visits and presentations, maintains advanced knowledge of products and services, and establishes and meets sales goals.

The role of IT sales and marketing executives develops and expands a portfolio of corporate clients by networking and marketing, assesses client IT needs and makes recommendations, including IT equipment and service packages and negotiates sales, package discounts, and long-term contracts with clients.

| Programming | | |
|------------------------------|------------|--------------|
| Demand- Supply gap in Market | 6th | |
| Experience | 5th | |
| Certification | 3rd | |
| Scope as Entry level | 3rd | |
| Salary | Min | Max |
| Fresher | 5000.00 | 50, 000.00 |
| 1-3 years' experience | 10,000.00 | 100, 000.00 |
| 3+ years' experience | 151,000.00 | 2,50, 000.00 |

Notes:

Software developers are the creative minds behind computer programs. Some develop the applications that allow people to do specific tasks on a computer or another device. Others develop the underlying systems that run the devices or that control networks.

Developers who supervise a software project from the planning stages through implementation sometimes are called information technology (IT) project managers. These workers monitor the project's progress to ensure that it meets deadlines, standards, and cost targets

| Business Analyst | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 7th | |
| Experience | 3rd | |
| Certification | 2nd | |
| Scope as Entry level | 5th | |
| Salary | Min | Max |
| Fresher | 7000.00 | 25, 000.00 |
| 1-3 years' experience | 10,000.00 | 60, 000.00 |
| 3+ years' experience | 18,000.00 | 5,00, 000.00 |

Notes:

The specific job deliverables of a business analyst vary according the employer's needs. Some may be limited to IT-related projects only, while others may be involved in areas such as finance or accounting, marketing or operations. Business analyst training online can be beneficial to professionals currently in banking, insurance, information technology, telecommunications and marketing – since the essential skills and business knowledge required for success in any of these fields can facilitate understanding of an employers' needs.

IT business analysts gather intelligence from corporate executives and middle managers about needs and future growth, assume responsibility for project tasks, and ensure they are completed in a timely fashion. They also compile and distribute reports on application development and deployment, evaluate and draw conclusions from data related to customer behavior and consult with the executive team and the IT department on the newest technology and its implications in the industry.

| Solution and Architect | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 8th | |
| Experience | 12th | |
| Certification | 11th | |
| Scope as Entry level | 12th | |
| Salary | Min | Max |
| Fresher | 10,000.00 | 50, 000.00 |
| 1-3 years' experience | 15,000.00 | 1,50, 000.00 |
| 3+ years' experience | 30,000.00 | 3,00, 000.00 |

Notes:

A solution architect is an information technology professional who designs computer systems, networks, applications and user interfaces for an organization.

These professionals typically work with internal and external customers to develop systems to required business specifications. In most cases, these professionals have a wide range of technical knowledge, rather than focusing their skills in a specific area of information technology.

A solution architect is responsible for understanding internal and external customer needs, and designing computer and network systems that allow customers to implement systems for their technology business applications. This involves performing system and network modeling, analysis and planning to implement a solution that will meet business needs within financial budget guidelines. This may include researching software and hardware products or services, and finding best solutions and prices to meet business requirements. In most cases, the architect presents and translates the design to customers to ensure the design will meet the customers' requirements.

Project Management

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 9th | |
| Experience | 2nd | |
| Certification | 12th | |
| Scope as Entry level | 7th | |
| Salary | Min | Max |
| Fresher | 10,000.00 | 45, 000.00 |
| 1-3 years' experience | 15,000.00 | 1,00, 000.00 |
| 3+ years' experience | 15,000.00 | 2,00, 000.00 |

Notes:

IT project managers oversee and direct the activities of information technology projects, including managing personnel, overseeing budgets and schedules, and executing a project communication plan. IT project managers may also be referred to as computer and information systems managers and must possess a bachelor's degree and considerable amounts of experience and on-the-job training.

The majority of computer and information systems manager's work full-time, with overtime commonly reported as projects' needs require. Though many IT professionals are able to telecommute, project managers generally have to report to an office setting in order to supervise their team and the project as a whole. There are few physical demands or risks associated with this career.

Software Quality and Testing

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 10th | |
| Experience | 9th | |
| Certification | 13th | |
| Scope as Entry level | 6th | |
| Salary | Min | Max |
| Fresher | 5,000.00 | 40, 000.00 |
| 1-3 years' experience | 10,000.00 | 70,000.00 |
| 3+ years' experience | 15,000.00 | 2,00, 000.00 |

Notes
Although a low-profile career that is often overlooked, Software Testing is a highly sought-after position in the tech industry. Their primary job is to continually test the software to find defects, called bugs, and report any defects they find into a tracking system. Every piece of software has to pass through several rounds of rigorous testing to ensure that the product works as designed before it's released.

In the Software testing, there are two terms used: QA(Quality Assurance) and testing. Quality Assurance is basically a process of activities designed to ensure the system will meet its objectives & create a quality software. QA process is much more about giving the continuous monitoring and consistent improvement and maintenance of process. QA is used to set up the process for a prevention of bugs appearing, TESTING activity is basically called the "Quality Control" which is used to measure the quality of the product.

Testing is Identification or uncovering the bugs before moving to actual users.

IT Management

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 11th | |
| Experience | 18th | |
| Certification | 18th | |
| Scope as Entry level | 19th | |
| Salary | Min | Max |
| Fresher | 7,000.00 | 50, 000.00 |
| 1-3 years' experience | 10,000.00 | 80, 000.00 |
| 3+ years' experience | 15,000.00 | 2,00, 000.00 |

Notes:

IT management services provide day-to-day management and operation of IT assets and processes. As such, they represent the core value components of ITO. IT management services are divided into three key subsegments: operations services (for IT infrastructure), application management services and help desk management services.

IT managers ensure that all technology resources and associated employees are utilized properly and in a manner that provides value for the organization. Effective IT management enables an organization to optimize resources and staffing, improve business processes and communication and enforce best practices.

Individuals working in IT management must also demonstrate abilities in such general management areas as leadership, strategic planning and resource allocation.

Technical Support

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 12th | |
| Experience | 7th | |
| Certification | 10th | |
| Scope as Entry level | 8th | |
| Salary | Min | Max |
| Fresher | 5000.00 | 45, 000.00 |
| 1-3 years' experience | 10,000.00 | 70, 000.00 |
| 3+ years' experience | 12,000.00 | 1,50, 000.00 |

Notes:

Computer support specialists provide help and advice to computer users and organizations. These specialists either support computer networks or they provide technical assistance directly to computer users.

IT support provide services like physically repair or optimize hardware, including basic installation, contract maintenance and per-incident repair — both on-site and at a centralized repair depot. Hardware support also includes telephone technical troubleshooting and assistance for setup and all fee-based hardware warranty upgrades. Exclusive of parts bundled into maintenance contracts, sales of all parts used to repair high-tech equipment in carry-in, mail-in or per-incident on-site delivery models, or purchased by the internal staff to perform the repair, are included.

Computer Graphics/Digital Media or Animator

| | | |
|------------------------------|-----------|--------------|
| Demand- Supply gap in Market | 13th | |
| Experience | 11th | |
| Certification | 5th | |
| Scope as Entry level | 10th | |
| Salary | Min | Max |
| Fresher | 5000.00 | 50, 000.00 |
| 1-3 years' experience | 10,000.00 | 70, 000.00 |
| 3+ years' experience | 15,000.00 | 1,50, 000.00 |

Notes:

Graphic designers create visual concepts, using computer software or by hand, to communicate ideas that inspire, inform, and captivate consumers. They develop the overall layout and production design for various applications such as advertisements, brochures, magazines, and corporate reports. Graphic designers combine art and technology to communicate ideas through images and the layout of websites and printed pages. They may use a variety of design elements to achieve artistic or decorative effects.

Graphic design is important to marketing and selling products, and is a critical component of

brochures and logos. Therefore, graphic designers, also referred to as graphic artists or communication designers, often work closely with people in advertising and promotions, public relations, and marketing.

Digital animation professionals may work for television and film companies, advertising agencies, the video game industry or many other industries that utilize the skills of digital animators. Digital animators create images that move, such as animated characters in commercials and films, or characters in video games. Some post secondary training is required to break into this field.

3.7.2 Soft Skills Outlook

Soft Skills Outlook

Skills

This section has been written by
Dr. Md. Sabur Khan
Chairman, Board of Trustees
Daffodil International University

We have found that in our country, the members of younger generation are not trained by the institutions or universities, considering rapid technological developments. Considering new trend of technology, market is changing rapidly. It has been reported, different technological developments are taking place on a regular basis. Now, we can see these emerging technologies, which did not exist 5 to 10 years back and demand was not created on these technologies like Artificial Technologies, Cloud Computing, Digital Marketing, SEU and so on.

In recent days, many employers do not focus or address the latest technological advancement. Even, we do not know the exact demand of the ICT professionals in the market which has not yet been recognized by the organizations.

For example, we are not much aware of the real demand of professionals, particularly at Java, PHP or how many experts are needed at specialized job areas of Animation, AutoCAD, etc.

As there is no exclusive statistics on ICT job market, organizations should work more vigorously on this area. We hope our endeavor, by publishing ICT Job Market Survey, will help all these stakeholders move forward and consider the issue regorously.

Time Management

Demand- Supply gap in Market

1st

Time-management skills for most people are learned along the way, a necessary part of getting the job done. However, like most things, the more ICT professionals invest in it, the greater the reward. To reach the short- or long-term goals, time management is critical for prioritizing tasks, scheduling appointments, emails, projects and so much more,

not to mention family responsibilities.

Considering the existing availing opportunities in the market, if any organization cannot properly manage the assignment in due course of time, the organization will not be able to achieve or get required result or benefit. So, time management and managing supply gap need to be considered in a proper way.

Presentation Skills

Demand- Supply gap in Market

2nd

In minimizing demand supply gap at ICT market, firstly, we need to know the real challenges of ICT market. In many cases, job seekers or skilled personnel in ICT arena, present themselves to avail of the opportunity without knowing the demand of the market (e.g. demand for PHP or JAVA expert), and they concentrate less on latest trend of the market or underscore requirement analysis so often, they will fail to capitalize the opportunity.

We sometimes present ourselves in a conventional way, not presenting ourselves in an innovative way which should be based on market demand.

Someone may tell s/he knows better in Database, Coding; but we should remember what industry seeks. Industry wants result. So, prospective employee should represent in such a way so that the presentation focuses market demand, and the latest information of the industry. If s/he presents without knowing exact gap, the employer will fall in problem to decide in recruiting. Interestingly, in some cases, it has been found that an employer is also unaware of the latest trend of the technological advancement.

For example, a skilled employee can also share with employer, in the interview that the organization has some loopholes, which need to be addressed properly and s/he can contribute to resolving the problems.

This way, a well-informed person who possesses proper ICT skills, can ensure his/her job from that day with the help of presentation skill. So, performance or probable output need to be presented with proper presentation skill. We need to overcome these gaps with proper solution.

For reference:

What is Employability Skills
by Dr. Md. Sabur Khan'.

<https://www.youtube.com/watch?v=z3yb7Y6EgV0&list=PLcH6Aph5ljcXIW6Re-CzIDLCKDJsseeZI&index=20>

Problem solving Skills

Demand- Supply gap in Market

3rd

Problem solving is a crucial job skill that is applied in any position at ICT field. Many entrepreneurs face lots of challenges and problems in their working areas on ICT. Addressing problems is not everything, one also needs to give the pragmatic solution too.

Because it will not create any value if we only address the problem but cannot give the solution. In our environment, we have observed some people enjoy and always feel interested to solve problems and they also find happiness in solving problems. International competitions or programing events focus how participants solve problems, how quickly they can give solution of the problem and how many problems can be solved.

Major portion of programmers (professionals / job seekers) do not apply their problem solving skills. A problem solver should consider in which position, which problems, which valuable support s/he should consider as employer seeks. An Employer will not find him/her comfortable to recruit those people if they cannot highlight issues like compliance based on international practice requirement.

Understanding the critical components involved in problem-solving will help ICT professionals improve the skill set and demonstrate the expertise to employers. Strong problem solvers are a valuable addition to any team.

You may also see :

Do you see Problem or Opportunity?

By Dr. Md. Sabur Khan

: <https://www.youtube.com/watch?v=K50hg8rRWZ4&index=13&list=PLcH6Aph5ljcXIW6Re-CzIDLCKDJsseeZI>

Problem solving is a crucial job skill that applies any position at ICT field. Many entrepreneurs faces lot of challenges and problems with his working areas on ICT. Addressing problems are not everything, one also need to give the pragmatic solution too.

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We have found that in our country young generation are not trained by the institutions or universities, considering rapid technological developments. Considering new trend of technology, market is changing rapidly. It has been reported, different technological development takes place. Now, we can see these emerging technologies, which do

Team Work

Demand- Supply gap in Market

4th

One of the major problems, in our country, is completion of any task or assignment, in a team. While IT professionals sometimes feel best working alone at their tasks, collaboration is a big part of the business world. In fact, over a three-year period from 2009-2012, the volume of corporate work requiring collaboration increased 67 percent, according to a survey conducted by the Corporate Executive Board Company.

The ability to work with others, —especially if they have a different vision or difficult personality—makes one a more successful leader. Accepting that everyone comes to the table with his/her own skills and knowledge, and incorporating their ideas improves teamwork and output.

When many work in a team, then the rules should be: one need to proceed with work, discussing within themselves and particular skills for specific tasks need to be identified, who has skill in which areas to complete the task considering these traits. For example, we cannot expect a tasty food menu, with the mismatch of the recipes and spices: garlic/salt/spices/turmeric/water (appropriateness). Same as team work: who is good at which area (e.g. someone may good at presentation, documentation, or combining lot of programmers or coding that she/he collect information from web and can come up with result with less time spending). This skill may not be possessed by all. But in a team, those who have some unique traits or skills, may combine (one another helping each other discussing in the team). However in general, our attitude is not to help others.

Our attitude is as: If one renders help, one's credential may goes to that person. So s/he will not help other rather concentrate on own task and will not inspire others to work for better result. With this attitude, we affect our companies, our product, output, in fact, everything because of teamwork is absent. We need to keep in mind that 10 people can complete a work in 10 different ways. We need to organize or assemble everyone's skill to give a good result which will show the performance of the team. By this way, good product can be delivered to the end user and organization will become successful.

In the long run, organizations recognize those staff and reward them because of their combined efforts. Sacrifice is also one of the important domain factors. If someone can form a good team against someone's sacrifice; ultimately s/he can be a good leader because of integrating the team to activate for result.

If anyone takes the responsibility to make understand all team members to integrate for the work, then (s/he) may become a good leader at the end and will be rewarded. Integrating team for completing work is difficult task as all may have possessed personal/communication ego and different level of tolerance. All may different opinions but all need to focus on company interest first; all other factors subsidiary. This gap must be minimized well.

You can also see: Why Teamwork is important | Listen from Dr. Md. Sabur Khan

(<https://www.youtube.com/watch?v=KyF9peW1KWA&index=11&list=PLch6Aph5ljcXIw6Re-CzIDLCkDJrseeZI>)

English proficiency

Demand- Supply gap in Market

5th

IT professionals and software engineers, all over the world need to have a good command of English to be able to collaborate with their colleagues and help their customers.

ICT professionals have outstanding knowledge on mathematics, data analytics, programing, coding, system design etc. but have lacking in English language proficiency. ICT professional, should focus on increasing English proficiency, otherwise they may fall in problems. To grab the opportunity at international market, they need to emphasize on English proficiency; they need to properly understand key words (English) of ICT tasks.

There are some key words in English which must be acquainted by the ICT professionals, to overcome the problems. If s/he is not able to overcome the problems, there are some other ways like Google Translate, i-Translate or many other apps, available in the google play store and in other platform to download for solving the English problems. It is important because, if they do not understand the proper meaning of the word, they may lose some big international project(s) or may take additional days to complete the required task.

So, one must try to increase one's skills on English language, the basic tools for ICT professionals for entering into international market for outsourcing.

Job Knowledge

Demand- Supply gap in Market

6th

Job knowledge is important in regards to industry demand. Employees who do not have a clear understanding of how their jobs fit into the overall work picture of their organization are more likely to

exhibit carelessness and the inability to make clear distinctions on which aspects of their job are the most important.

Someone may not like the existing job which may not related with his desire; or in different track; different sector or not matching with his/her alignment. Then what he need to do? Since s/he has agreed to perform the job at the organization, morally, his/her inability to perform the job should not affect the organization. For this, the employee may start searching for available resources in the market, developing required skills for the particular task like information of that product, expert on this particular environment, knowledge enrichment, and if needed, spare separate time for gathering knowledge on the particular job only then, the job can easily be identified. In our society, we have found that the employee emphasizes more on day-to-day basis job rather concentrating on increasing (in-depth) job knowledge.

Lack of proper knowledge on particular job, s/he cannot deliver the task within stipulated time or in precise way, which resulted to responsible a person for non-performance and was told that the limitation in job knowledge and gap prevails by ICT professional in Bangladesh. Every will be perfect in each area; someone may be expert in pharmacy, some other may be good at programming, financial product, transport etc. For example, when (s/he) works at transport sector, s/he should know and search the availing opportunities in transport market, mechanism, software, comparative analysis with other global products, searching at google for any available presentation. In 99% case, we have found, job seeker cannot segment their priority conducive work environment or best fit for their skills. Today, someone works in food industry, tomorrow in telco or in automobile sector. Hence, capacity cannot be developed if someone possesses this attitude.

Every job seeker needs to emphasize his preferred areas where s/he enjoys most. He can easily work with his domain knowledge (job knowledge) so that s/he can guide the team easily. Here, a good leader has lot of things to do. A good leader will extract all capable output from his/her employees and appoint those people who have interest and can-do ability in preferred areas to make perfect combination. In our country, a leader cannot properly assess his people who work under him. S/he needs to assess the skills and interest of his employees: who is best, who has interest in his working areas, the limitations to manage, etc.

Moreover, the leader should also take into consideration the team spirit, English proficiency etc.

A Leader should analyze the domain knowledge of all his employees, and utilize the best input from the employees who are best in his areas and have interest in performing the assigned job at his areas at ease. If one has found someone is moderate in English (e.g. others are not up to the mark) can be trained for improvement. Again someone may be good at documentation, but does not have latest knowledge on managing documentation properly. in that case (s/he) may be trained up with latest training knowledge.

For instance, someone, an owner of law firm does not require to be from law background rather s/he should focus on who can conduct the case efficiently and effectively to win the case. Thus employees should be hired at his law firm. Leader will also manage the output, compiling all others skill.

Leadership

Demand- Supply gap in Market

7th

Even if an IT professional is not in a management position, s/he will often be asked to manage a project or team, only for a brief period. Being a project manager requires strong communication skills, the ability to delegate tasks, and to have a constant focus on the end goal. As an IT professional, s/he may also be involved in vendor management. It is essential that s/he knows how to communicate with vendors to ensure the company's needs. An efficient leader, for example, can drive a bad car with good domain knowledge. In Bangladeshi ICT companies, we have found ICT professionals are working and trying to contribute a lot, but cannot give proper output because of leadership gap in this sector. Lacking at this area cannot facilitate in rendering proper output or product in the market.

You can also visit the following link for further reference:

Seminar on Employability Skills, By Dr. Md. Sabur Khan. Retrieved from https://www.youtube.com/watch?v=ySFj_-wRyg

Sense of responsibility

Demand- Supply gap in Market

8th

In ICT based organization, we have found that there are some lackings on showing proper sense of responsibility. We may cite example and analyze the organizational matrix of ICT based firm, which basically, works in software segment. A responsible employee will search for the best software in the market to accomplish the objective of the organization, if the organization does not have enough resources to provide. If that organization comes across the scarcity of resources like software, cyber

security, router etc and the employee always blames the organization for not providing these resources, it reflects the lack of sense of responsibility of that particular employee.

S/He should search for open source software or available free cyber protection software in the market to safeguard the organization, without blaming the organization for limited resources. We should not always find out the limitations of the organizations, it means lack of professionalism. In this case, the person should give substantive resources to the organization for its betterment. In today's world, we can render more support virtually even, rather than physically, as we can now download resources from cloud computing technology for getting open source software.

Employer should also focus on whether the employees are contributing for getting minimum price to serve the institutional objectives or concentrating routine job (e.g. 9-5 p.m. office hour). If employees do not take the responsibility, entrepreneurs also do not feel encouraged. When the entrepreneurs observe well-organized human resources who perform task well, guide the organization well, have good sense of responsibility, they recruit more people to produce more.

For further reference, you can watch.

'Ask for Work Not for a Job - Employability 360°'.
Retrieved from https://www.youtube.com/watch?v=bXiKe5MsKrc&index=12&list=PLcH6Aph5ljcU0qkdJyXtG_6neeWm5rrkm

Discipline

Demand- Supply gap in Market

9th

ICT Professionals are not generally known for discipline. Many of them have unhealthy eating habits, barely move, and generally don't take care of themselves. Talent, except maybe in overwhelming quantities, is not everything. Indeed, talent or skill is only part of the formula for success. "Discipline is the other part," says Gady Pitari, CTO at Badger Maps, a New Relic customer. "A highly skilled software engineer without discipline is like a veteran sailor without a map: really good at steering the boat, but can't find shore."

In reality, discipline does not mean only wearing good outfit, attend office regularly, at 9:00 a.m. to 5:00 p.m. rather it also relates more, with his/her approaches, food habit, and mental strengthens. For example, if we do not go bed early we cannot wake up early to go to office for performing the task. Hence, we cannot deliver our best effort to the organization, too. Physical exercise and mediation

are also very important for ICT professionals. We can have the example of Google and Facebook office; these companies look after the health hazards, food habit of the employees too.

ALLAH has given us halal foods, vitamins, minerals for maintaining good health. In fact disciplines means, food habit, your movement, conversation, relationship with colleagues, maintaining company norms, etc. In a programming contest, we see good contestant participates with proper compliance like designing software, analysis, documentation, extensive planning which are the integral part of discipline. Discipline might show up in your life as healthy habits, like daily exercise or a meditation practice, or it might mean that you hold yourself to a certain standard, like a personal code of conduct or a particular religion's tenets. Without maintaining proper compliance (discipline), we often find the client can not get proper result or output at final product of the company.

We, sometimes find that a skilled software engineer are not able to generate skills in designing the software product, because of his/her absenteeism in discipline trait. For instance, a pilot has some regulation like rest requirements and flight hour restrictions to fly a plane, including other issues like not taking drugs, smoking, taking 24 hours rest (before big flight assignment) etc. Many reports or research claim that big accidents occur because of indiscipline life pattern of a pilot.

Alike this example, we also need to be more cautious for running a software firm. Lot of companies evolved in the market but compelled to shut down even after attaining billions of dollar revenue, because of non-compliance, presence of proper follow-up. In Bangladeshi ICT sector, professionalism and discipline, time management, & team spirit are the major challenges.

For reference:

What is Employability Skills
Dr. Md. Sabur Khan'

<https://www.youtube.com/watch?v=z3yb7Y6EgV0&list=PLcH6Aph5ljcXIW6Re-CzIDLCKDjrseezl&index=20t>

Ethics

Demand- Supply gap in Market

10th

Lack of ethics badly affects Bangladeshi ICT companies to perform better. We can cite hypothetical example of a software engineer who may join a company with handsome salary. Few days later, he/she got another job with higher salary than the previous one. S/He can join the new assignment, but s/he

should be honest and ethical as long as s/he) serves the existing one. He should share all documents in a systematic manner, with existing one, and tells his/her employers that s/he) will join another company.

But, before joining, s/he) will have to maintain all compliances, system and most importantly need to handover all related documents in systematic ways. Such ethical practice by any employee also ensures his/her returning back to the previous organization, if s/he) wants to return. Nobody should deceive or hide such type of information to the authority since authority gets informed in any way regarding such practice and knowing these information may feel hurt them. There is no place for an unethical personnel in the organization. As cited earlier, the advantage of being ethical is that if the person cannot perform well in other companies, s/he has scope to join the previous job. We should concentrate on practicing ethical norms. I can cite my own example. When I started my job (for few days) and then decided to start my own venture, I shared my views with the organization and they were pleased to my ethical approach and for this attitude, they took it very positively. And that company was my first client and still maintains a very good cliental relationship with us.

In an example, we can cite the professional code of ethics. Identified in Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering, the condition indicates the importance of ethics in the profession of software engineering: "...graduates need to gain an understanding and appreciation of professional issues related to ethics and professional conduct, economics, and the societal needs"

Motivation

Demand- Supply gap in Market

11th

Motivation plays a very good role in ensuring a company eco-system. We can motivate any employee without searching for his faults, always. We can tell him/her that you can do better as you have creativity, capabilities; what you need that you have to focus more on particular areas; such type of words works well to motivate them towards getting better result. In organizational structure, we observed some peoples become angry and some may become cool at different situations. Both these attitudes may become good or bad, depending situation. But, right people should be at right place. In organizational matrix, we may start motivating each other for doing better. If we practice the above mentioned issues, both the organization and the employees will equally be benefitted.

Reference: Importance of Employability Skills.

YouTube Link:

<https://www.youtube.com/watch?v=1thDIPtQqzY&list=PLcH6Aph5ljcXIW6Re-CzlDLCKDJrseeZl&index=19>

Adaptability

Demand- Supply gap in Market

12th

The nature of the job calls for someone with the ability to adopt new technologies and tackle new software engineering challenges as they come from various project assignments or technical issues they need to solve.

It has been observed, many employees do not want to adapt the technological environment of the organization. Someone tells that s/he) knows better in Java, but the organization works with OODOO (Open Source ERP and CRM) under PHP platform.

In that case, the employee should tell the company that s/he) can work with open source software features of Java to perform the task, with a view to adapting the prevailing environment of that organization. Regarding adaptability, we need to adapt the technology and practice norms of the organization.

Reliability

Demand- Supply gap in Market

13th

Employees also should discuss their whereabouts with the organization with open-minded approaches.

It also reflects the degree of reliability, trustworthiness, and sharing attitudes. Even if s/he) has any family related matter, s/he can discuss with superior or any other personnel, who s/he) feels comfortable of that organization.

Oral communication

Demand- Supply gap in Market

14th

We also find that in organizational matrix, some personnel are also good at oral communication which is also a strength. Organization should place him/her in right position. Sometimes, we also see that some are not good at this domain; for which we can take initiative to give him/her proper training to improve.

Organization should address these factors and open share for better. For example, spokesperson of any organization is selected from those who can manage well with conversation in any environment. Besides having effective ways to identify issues, ICT professionals need to provide relevant information about the state of development and quality of the product or escalate to management when issues arise. They should effectively share status, regular updates on how things are going, what has been accomplished, and where blocker issues exist preventing them from effectively continuing or issues posing critical risks for release delivery.

Written communication

Demand- Supply gap in Market

15th

Written communication is very important part for ICT professionals. To grab the international task, we should focus on this issue. For example, 'I need to meet with you' can be written as 'If you are free and any opportunity I will be grateful (or I love to) to meet with you'. In this example, meaning are same but articulation is different from each other. Because of deficiency in well written communication, many endeavors may get stuck.

ICT professionals should be a conversant writers because their prose need to be logical and elegant as their code.

Judgment

Demand- Supply gap in Market

16th

We need to judge our own to address our capabilities and integrity. If we think the assigned task cannot be completed by me, we should tell the superior about the fact without hiding it. Our employee should set a fix deadline to complete and if s/he thinks it cannot be done within the scheduled time, s/he should seek more time. S/he should not use any excuse for not doing it after seeking additional time. We should always try to complete the task in stipulated period.

You may also see: 'Importance of Employability Skills'.

YouTube Link:

<https://www.youtube.com/watch?v=1thDIPtQqzY&list=PLch6Aph5ljcXIW6Re-CzIDLCkDJrseeZl&index=19>

Empathy

Demand- Supply gap in Market

17th

We should deal with our employees with care. Sometimes, they may undergo with personal problems. So organization may talk to him/her so that s/he feels sympathized and sharing motive (with each other: employees the organization). Through practicing these traits, output and outcome would be positive for the organization and employees as well. Empathy – the action of understanding, being aware of, being sensitive to, and vicariously experiencing the feelings, thoughts, and experience of another of either the past or present without having the feelings, thoughts, and experience fully communicated in an objectively explicit manner.

The benefits of being more empathic and in touch with the needs of others and of yourself are clearly something most developers can get behind. Usually developers approach this by learning tips and techniques and apply them with success.

Innovative knowledge

Demand- Supply gap in Market

18th

Innovative knowledge may not come from every body, though many people think they are innovative in generating ideas. We should encourage innovativeness but need to assess which are innovative and which are not. We may assess innovativeness of the employee from analyzing internet source which are innovative, in line with product of the organization and its defined features. Moreover, we should also address two things: a) whether my ideas are innovative or not, b) analyze the innovativeness (applicable and acceptable) according to the market analysis through using search engine or other technological tool. Our ICT firms sometimes show disinterest in changes which is inevitable to embrace.

The ICT firms should inspire 'out of the box' ideas, accept new generation, judge organization behavior well. New generation people are always innovative. Innovativeness comes from sense of innovativeness (something of sixth sense) not from experience, always. We may search innovativeness from different sources whether any previous job was accomplished or not in this area. If any person feels his idea is not innovative, s/he can approach organization to check whether the idea is innovative and can be improved further or there are any room to grab the idea. It implies when organization accredits the idea as innovative, one can credit it. We must deliver the innovative idea which must be backed by responsibility, documentation and ethical practice otherwise leader will not accept the idea. Other traits like job knowledge (for carrying out the innovativeness into reality), team work, adaptability, skill in managing problem, presentation skill, time management are interrelated with the innovation.

If we are able to integrate these skills in output level, we can manage those challenges, prevailing in ICT sector of Bangladesh.

While innovation is essential, IT professionals should never make changes just for the sake of changes. They need to think through the ideas organization want to implement and be certain that they are the best options for the end user.

Further reference:

Managing Technological Innovation in Global Competition. Retrieved from

<https://www.youtube.com/watch?v=sfrpzFwgBgE>

Other Skills: Identify Position in Right Company



A job seeker or prospective employee should make broad study on the position s/he is applying for and also know the organization in details. While hiring human resources, every company disclose the requirements before the job seeker 'what they really want' from the prospective employee. For example, the advertisement may seek the programmer should know Java, Python, or .NET (along with professional experience). Many fresh graduates may think s/he may not apply for the position. This is absolutely a wrong notion.

The thing is that employer seeks experience, just because of the prospective employee may get started taking responsibility at the desired position, soon after joining. So, a university student should strongly focus on his/her growing expertise while studying. If any student does not concentrate vigorously, on programming course (for example), may get call for interview (manages anyhow) and then s/he should take it serious to attend the interview with confidence as s/he may start studying Programming language. S/he may take core preparation on the requirement as the interview, usually take place 2/3 weeks ahead. Different sources from internet may facilitate him/her to learn. Moreover, s/he may make a thorough study on the organization and prepare a project based on SWOT analysis.

The information may be retrieved from internet and in some exceptional cases, s/he may physically, visit the organization. S/he may then tell the organization regarding the prepared project profile which was prepared, based on the job requirement at the job circular and also experience sought, which may be fulfilled with the knowledge attained. In our society, it has been keenly observed that the job seeker take the interview and recruitment process, lightly. They need to prepare themselves properly (as for example, aspirant candidate takes extensive preparation for BCS exam). We have also found that student do not show their devotion for preparing themselves towards facing selection process as they prepare themselves for study.

Job seeker or fresh student should search required information of prospective organization, key solution/product for that organization, may make demo product by outsourcing software to impress the interviewer (so that employer may convinced to see the solution). Then the employer/interviewer will evaluate his credential (which would comply their requirement), not judging with the experience.

If prospective employees do not become serious on

this issue, employer may get irritated and thinks negative towards of the candidate and also to the academic institutions and its faculty members, too. In today's dynamic world, anybody can manage all solution which are available in the online. For ICT graduates, I will advise them to make study on the requirement that the organizations sought for and only then they would be able to get job accordingly.

Technological Integration:

All technological resources are available now, in all on-line and off-line platform. It has been observed that graduates do not have domain knowledge to develop and create new technological innovation, though they have received formal academic knowledge. Ironically, it has also been noticed that some may start working on creating new innovation, but in due course of time those product may be get obsolete. So, technological integration evolves.

For example, a company needs full system solution, where the company needs different digital component which can be designed by different unique features like hangout Skype, customer CRM, ERP, Forum, blog, Video, Record, Gallery, Social Media. Here technological integration works. If any graduate can design mapping (based on requirement) and make a system, integrating available opportunities, any organization will pick him, without hesitation. Because, in many cases, it has been observed that owner or CEO or decision maker of the organization does not have in-depth knowledge on employing ICT components to its organization structure like young graduate. The thing is that how new and young employee can present the solution, properly, to integrate technology.

An ICT professional can serve a company through integration of technology, though s/he may not have profound knowledge on every single CIT components. So, here it lies to absorb and evaluate him/her as prospective and demanding employee. Even a small firm can serve may be supported by available, free version software in the market. For big companies, it needs premium version.

Another important fact is that the ICT professional also need to know the available opportunities as one should know using Google translate, i-translate or Samsung translator to translate different language into cherished one or speech translator (as Chinese now using it to translate in its own language, which may not require to learn more language). Sometimes many people fall into problem for not using Gmail, Facebook where techno savvy people use high quality VPN to resolve the problems, which means they know the fact but others do not know. For example there are lot of

Google Apps that many people are not aware of like G-Suit (Calendar, Hangouts, Drive, Gmail, Docs, Sheets, Slides, Sites, Jamboard, App Maker and Vault), Plugins software etc. So, this is vital for a ICT professional: how s/he can manage well with technological integration and how s/he many integration techniques s/he know, to make a one-stop solution by a 'click' to make full integration of the system.

Interestingly, a fresh graduate may also build his/her career in ICT sector, without having graduation in ICT discipline.

The following links will also be useful for the ICT professionals on developing soft skill domains:

- *Employability Guidance - For University Students to Develop their Skills.* Retrieved from <https://www.youtube.com/watch?v=XChKnRFr3rl>
- *Teacher need to develop students for job market.* Retrieved from <https://www.youtube.com/watch?v=loKK8tZoUVQ>
- *Seminar on Employability Skills, By Md. Sabur Khan.* Retrieved from https://www.youtube.com/watch?v=ySFj_-wRyg&list=PLcH6Aph5ljcU0qkdJyXtG_6neeWm5rrkm
- *Note Taking and Delegation.* Retrieved from <https://www.youtube.com/watch?v=wnbB8lVYjg&list=PLcH6Aph5ljcXIW6Re-CzIDLCkDJrseeZl>
- *How to get experience before Job Appointment by Dr.Md. Sabur Khan.* Retrieved from <https://www.youtube.com/watch?v=A8nWxCzkYS8&list=PLcH6Aph5ljcXIW6Re-CzIDLCkDJrseeZl&index=9>
- *Make yourself employable: Md. Sabur Khan (Daffodil International University).* Retrieved from <https://www.youtube.com/watch?v=gVCTceiyq2w&list=PLcH6Aph5ljcXIW6Re-CzIDLCkDJrseeZl&index=21>

LinkedIn 2018 Emerging Jobs Report

The Emerging Jobs Report is the opportunity to take a look at the jobs and skills that are growing most rapidly around the country. So you, like a U.S. professionals, can make more informed decisions about your career. Using data from LinkedIn's Economic Graph, The Emerging Jobs Report analyzed the roles that companies are rapidly hiring for, the skills associated with them, and the roles that have emerged over the last five years.

Bigest takeaways from this year's Emerging Jobs Report:

Artificial Intelligence (AI) is here to stay. No, this does not mean robots are coming for job, but we are likely to see continuos growth in fields and functions related to AI. This year, six out of the 15 emerging jobs are related in some way to AI, and research shows that skills related to AI are starting to infiltrate every industry, not just tech only. In fact, AI skills are

fastest-growing skills on LinkedIn, and globally saw a 190% increase from 2015 to 2017.

Basic business functions are rolling. Artificial Intelligence (AI) may be on the rise, but it cannot replace the position and power of humans. Basic operational functions like Administrative Assistant, Assurance Staff and Sales Development Representative also landed spots on the Emerging Jobs list.

The largest skills gaps are soft skills. Despite technical roles making a strong show on this year's Emerging Jobs list, soft skills - like oral communication, leadership and time management - make up nearly half the list of skills with the largest skills gaps. While hard skills are important, it remains imperative for professionals to maintain their arsenal of soft skills in this rapidly changing jobs landscape because those that have them, have a leg up.

This year's Emerging Jobs are nearly all in incredibly high demand across the USA, and in industries from healthcare to government services. These are the most relative growth in roles, based on members who've added these roles to their profile.

The report finds an explosion of machine learning roles and continuing growth of data science roles. It also may not shock that Blockchain Developer is topping the list following this year's surge in interest around blockchain and crypto-currency. Only time will tell if blockchain will be a long-standing trend in the job market.

Following are the jobs that have been enjoying strong and steady demand over the last four years with having the largest growth in hiring rates among jobs in the U.S., meaning these roles are experiencing sustainable higher hiring rates and large growth year-over-year making them potentially more stable career choices:

| | | | | | | | |
|----------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------|-----------------|
| Blockchain Developer | Machine Learning Engineer | Application Sales Executive | Machine Learning Specialist | Professional Medical Representative | Relationship Consultant | Data Science Specialist | Assurance Staff |
| Sales Development Representative | Business Support Consultant | Solar Power Consultant | Administrative Assistant | Background Investigator | Machine Learning Researcher | Data Science Manager | |

You may also remember a couple of these jobs from last year's Emerging Jobs list: Realtor and Data Scientist, indicating these roles are likely to keep growing - and fast.

| | | | | |
|-------------------|----------------------|-------------------|-----------------|----------------|
| Software Engineer | Account Executive | Realtor | Account Manager | Recruiter |
| Project Manager | Marketing Specialist | Real Estate Agent | Product Manager | Data Scientist |

Oral Communication remains the skill group with the biggest shortage in nearly every city across the USA. Core technical skills like social media, graphic design and web development are consistently in demand as every organization - no matter how big or small - needs a digital presence to survive.

The report also points out that, people with these skills are hired at faster rates than people without these skills, so consider taking a LinkedIn Learning class to keep jobseeker competitive in the job market.

1. Oral Communication

- Skills include: Public Speaking, Communication, Presentation Skills
- Jobs relevant to this skills group: Teacher, Administrative Assistant, Attorney

2. People Management

- Skills include: Teamwork, Supervisory Skills, Personnel Management
- Jobs relevant to this skills group: Salesperson, Project Manager, Marketing Specialist

3. Development Tools

- Skills include: Java, C++, Linux
- Jobs relevant to this skills group: Software Engineer, Research Assistant, Data Scientist

4. Social Media

- Skills include: Social Media, Digital Media, Social Media Measurement
- Jobs relevant to this skills group: Graphic Designer, Marketing Director, Writer

6. Time Management

- Skills include: Organization Skills, Time Management, Multitasking
- Jobs relevant to this skills group: Recruiter, Finance Analyst, Store Manager

7. Leadership

- Skills include: Leadership, Team Leadership, Team Building
- Jobs relevant to this skills group: Salesperson, General Manager, Sales Manager

8. Graphic Design

- Skills include: Adobe Photoshop, Web Design, Illustration
- Jobs relevant to this skills group: Graphic Designer, Software Engineer, Creative Director

9. Data Science

- Skills include: Data Analysis, Forecasting, Statistics
- Jobs relevant to this skills group: Software Engineer, Data Scientist, Finance Analyst

10. Web Development

- Skills include: HTML, JavaScript, Cascading Style Sheets (CSS)
- Jobs relevant to this skills group: Graphic Designer, Frontend Developer, Data Analyst.

Methodology:

This report was created by analyzing LinkedIn Economic Graph data (2014 – 2018).

Reference:

LinkedIn 2018 Emerging Jobs Report. Retrieved from <https://economicgraph.linkedin.com/research/linkedin-2018-emerging-jobs-report>

The report defines Artificial Intelligence (AI) skills as those skills that are most essential in order to develop, and effectively use, tools and technologies powered by Artificial Intelligence.

Researchers predict that AI will have applications across nearly every industry sector -- from manufacturing to financial services and beyond. The report also looks across industries to figure out whether AI is still confined to the software industry, or if it has begun to spill over and impact other fields. The answer? Nearly every industry is starting to see an influx of AI-related skills.

As AI skills become increasingly relevant, we were also interested in better understanding whether typically "human" skills – e.g., those related to personal characteristics, interpersonal communication and cognitive skills – are on the rise as well.

On average, more than one in four (26%) of all skills reported in 2017 by LinkedIn members based in the US can be classified as interpersonal or soft skills. Soft skills like project management and leadership are also among the fastest-growing "unique" skills. Consider positions like "System Engineer" -- in 2015, soft and interpersonal skills made up less than 1% of the skills required to succeed on the job. Now, they make up 8%.



Remarks

of Successful Business Personalities of Bangladesh at the Industry Academia Lecture Series arranged by DIU

well-known entrepreneurs of the country en route to success, DIU Industry Academia Lecture Series on Entrepreneurship Development has been introduced where country's renowned 13 successful well known Entrepreneurs as well as self-established persons have already taken part in different episodes and delivered their success stories among the students and youths striving to become self-employed. Following are some glimpses of their statements which will encourage the employees, employers and entrepreneurs of today and tomorrow.



Mr. Al-haj Sufi Mohammed Mizanur Rahman
Chairman , PHP Family

".....Seven things in life, are important in becoming an ideal person and we can achieve success in life through improving the employability skill. We should respect our parents and elders, willingness towards learning, helping the poor people, increasing communication skills, Self-management traits, work hard mentality and confidence towards tasks are those seven pillars of success."

Mr. Syed Manzur Elahi
Chairman, Apex Group

".....In order to get success in life, first thing that we have to face is Obstacles.

Without facing risks in life, we would not understand the things, around us, on how the matrix works and relates to us.

An entrepreneur faces challenges in life and once he becomes familiar to tackle, success starts knocking at his door."



Mr. Md. Mozibar Rahman
Chairman
BRB Cable Industries Limited

".....Before starting any startup, lot of obstacles will emerge and affect the flow of endeavor. Traits like self-confidence and entrepreneurial skills will help you to overcome this things."

The Department of Innovation and Entrepreneurship and Career Development Centre of Daffodil International University (DIU) have arranged a public lecture program under the title of "DIU Industry Academia Lecture Series on Entrepreneurship Development". With the aim to inform and motivate the educated youths for being entrepreneur from taking the lesson from the struggle and challenges faced by the



Mr. M Anis Ud Dowla
Chairman, ACI Group

".....If any company operates their ventures by prioritizing things like quality of the product, customer satisfaction and employee satisfaction there will be no chance to look back or fall down."



Mr. A.K. Azad, Chairman
Ha-Meem Group

"....Self-motivation, passion for success and communication skill will help you to overcome the barriers. Student life is the right time to grow this things inside of you which will help you towards achieving the success."



Mrs. Rokia Afzal Rahman
Chairman, MIDAS Financing Limited

"....if you believe that you have entrepreneurial skills and abilities, confidence and pro-entrepreneurial attitudes, you will get the taste of success."



Mrs. Geeteara Safiya Chowdhury
Chairman, ADCOMM Limited

".....It is necessary to opt for your preferred option what you love to do. When you will determine your chosen area or area of interest do not look back and go with that passion and keep yourself working until get success."



Mr. Latifur Rahman
Chairman & CEO, Transcom Group

“.....If you want to make your business successful, you ought to behave with your employees as peer, not like a boss.

Remarks

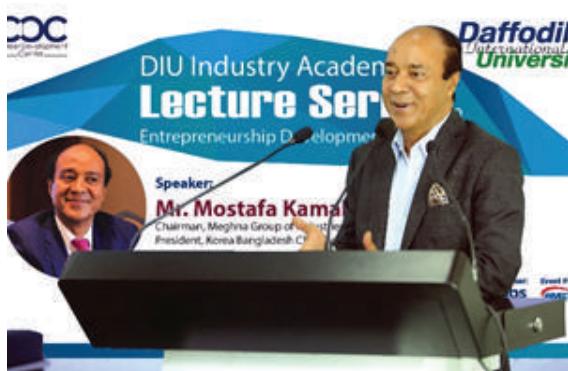


Mr. Niaz Rahim
Group Director
Rahimafrooz Bangladesh Limited

“.....In order to get success you have to think out-of-the box, which will help you in becoming a unique one and innovator.”

Professor Dr. Achyuta Samanta
Founder
KIIT University & KISS

“.....Tough times help us to learn many lessons which we can implement in future to get success. Behind every successful entrepreneur, there are challenging stories, which have made them and facilitate them to become a successful entrepreneur.



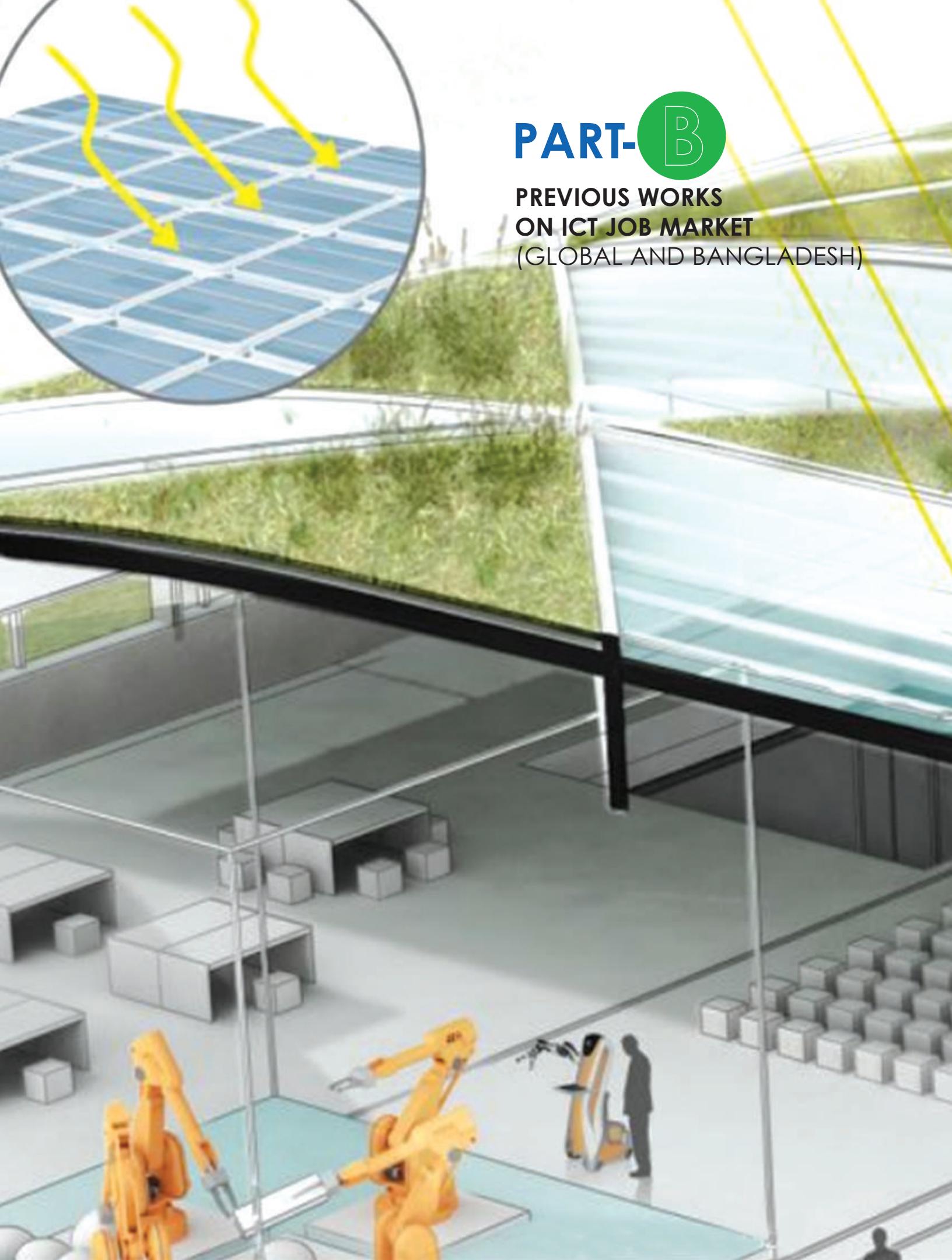
Mr. Mostafa Kamal
Chairman, Meghna Group of Industries

“.....If you see big dreams, it will lead help you to make big things. Successful person starts their career with small things, at the beginning and their big dreams facilitate them to reach into their goal or success.”



PART-B

PREVIOUS WORKS
ON ICT JOB MARKET
(GLOBAL AND BANGLADESH)



CHAPTER-4

REVIEW OF LITERATURE

4.1 ICT and Bangladesh

(Job Market in ICT Sector: Bangladesh Scenario)

Recently Bangladesh has achieved remarkable growth in the information and communications technology (ICT) sector. It has a market of more than 160 million people, where consumer spending is around USD 130 billion plus and the country is growing at an average of 6.5 percent annually. In recent years, the Government of Bangladesh has played a major role in promoting the ICT sector as the next growth engine for Bangladesh. A major role was played by a2i, the key driver from the Prime Minister's Office in deploying the rapid expansion of technologies in delivering public services to citizens. The BASIS, BCS and other ICT related associations and organizations have also been playing the keystone role in developing the ICT sector and creating attractive job market in ICT sector of Bangladesh. It is expected to fetch \$1 billion export earnings from the ICT sector within the next 5 years.

More than half of the world's internet users are now in Asia. The majority of the global middle class is in emerging markets (EM), and nearly 90% of the next billion entrants will come from Asia, according to the Brookings Institute. Instead of paying with cash or credit cards, EM consumers use mobile wallets to get lunch or pay for utilities, making the most of swift modern digital infrastructure especially in buzzing urban hubs. The largest emerging markets are still the growth engines of global GDP. The IMF predicts that the global economy will grow 3.5% in 2017, while the most populous emerging markets will grow much faster. India is to rebound with 7.2% growth in 2017–2018, and 7.7% in 2018–2019. The IMF has also revised up China's growth by 0.2% to 6.7% in 2017.

ICT Industry of Bangladesh

Bangladesh targets to reach of earning \$1 billion from exports by 2018. Bangladesh government will build internet literacy centres across the country to increase internet penetration, which is 40 percent now. However, the International Telecommunication Union said in its latest report that internet penetration in Bangladesh is only 14 percent and the country ranks 144th in its ICT Development Index. Data from the Export Promotion Bureau shows earnings from the sector stand close to \$250 million. According to recent report, 'UNCTAD B2C e-commerce index 2017, Bangladesh ranked 117. According to the Export Promotion Bureau (EPB) data, the earnings figure for the fiscal year which ended on June 30 was 19.34%, above the fiscal year target of \$160 million

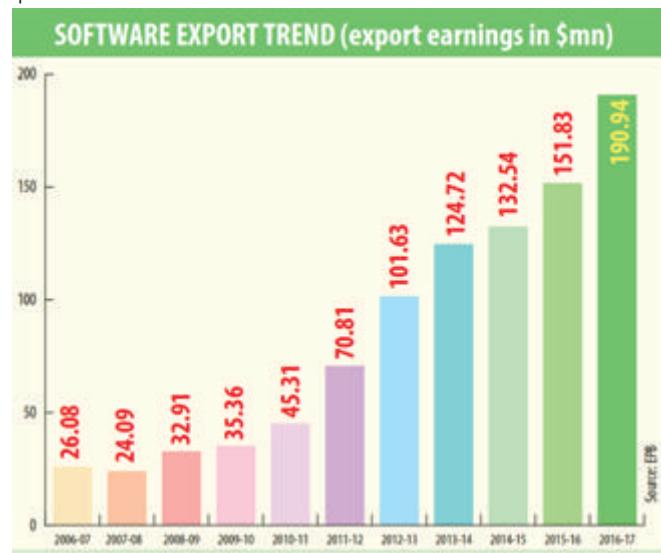
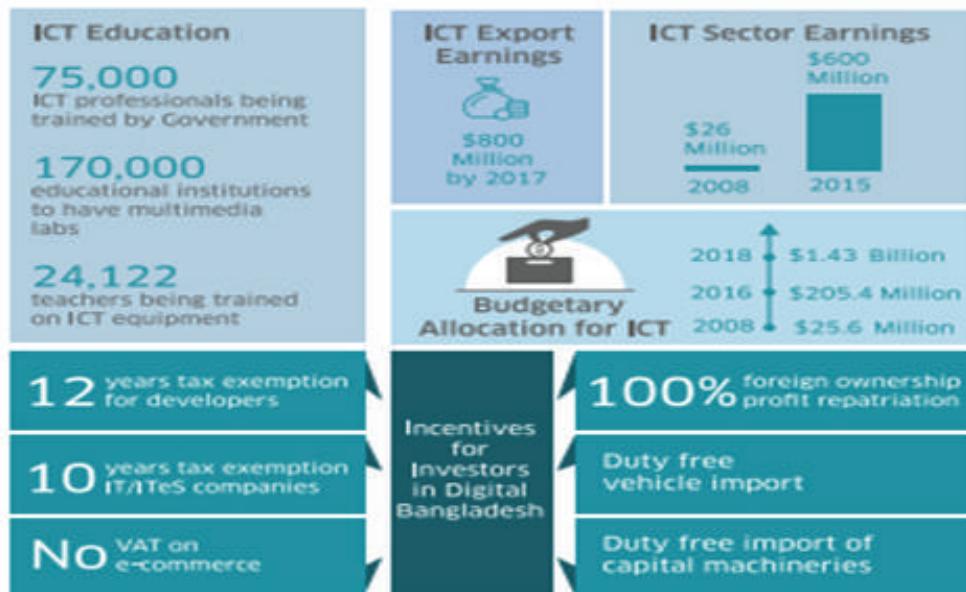


Figure: Software export earnings (2006-2017)

Source: Export Promotion Bureau, Bangladesh

Some Infograph of ICT Industry in Bangladesh
(Building Bangladesh's Digital Future, CRI)

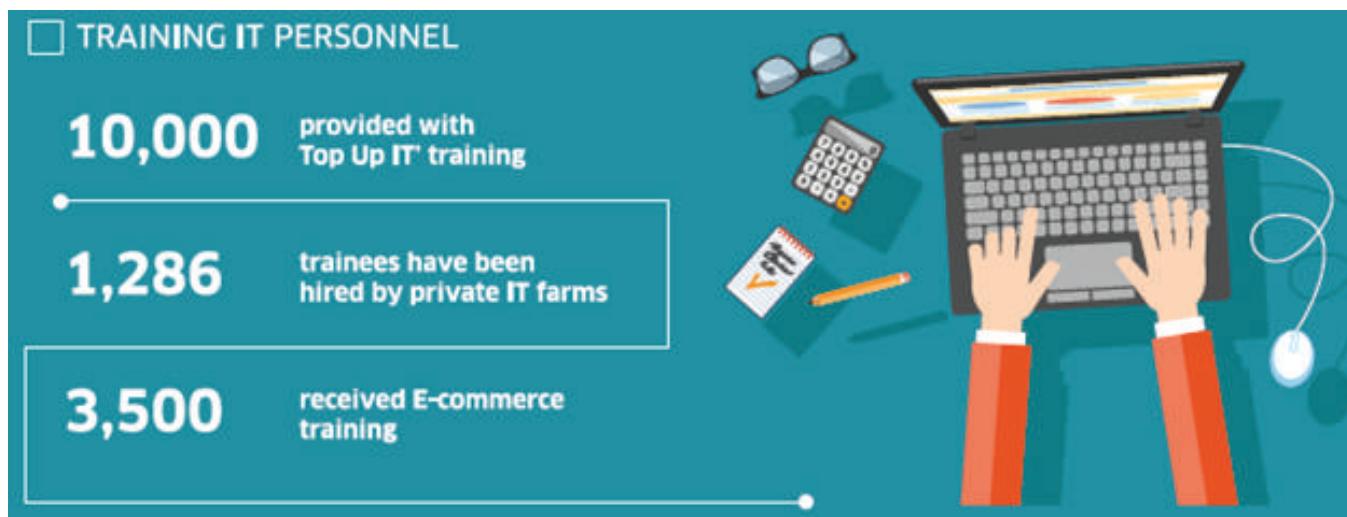
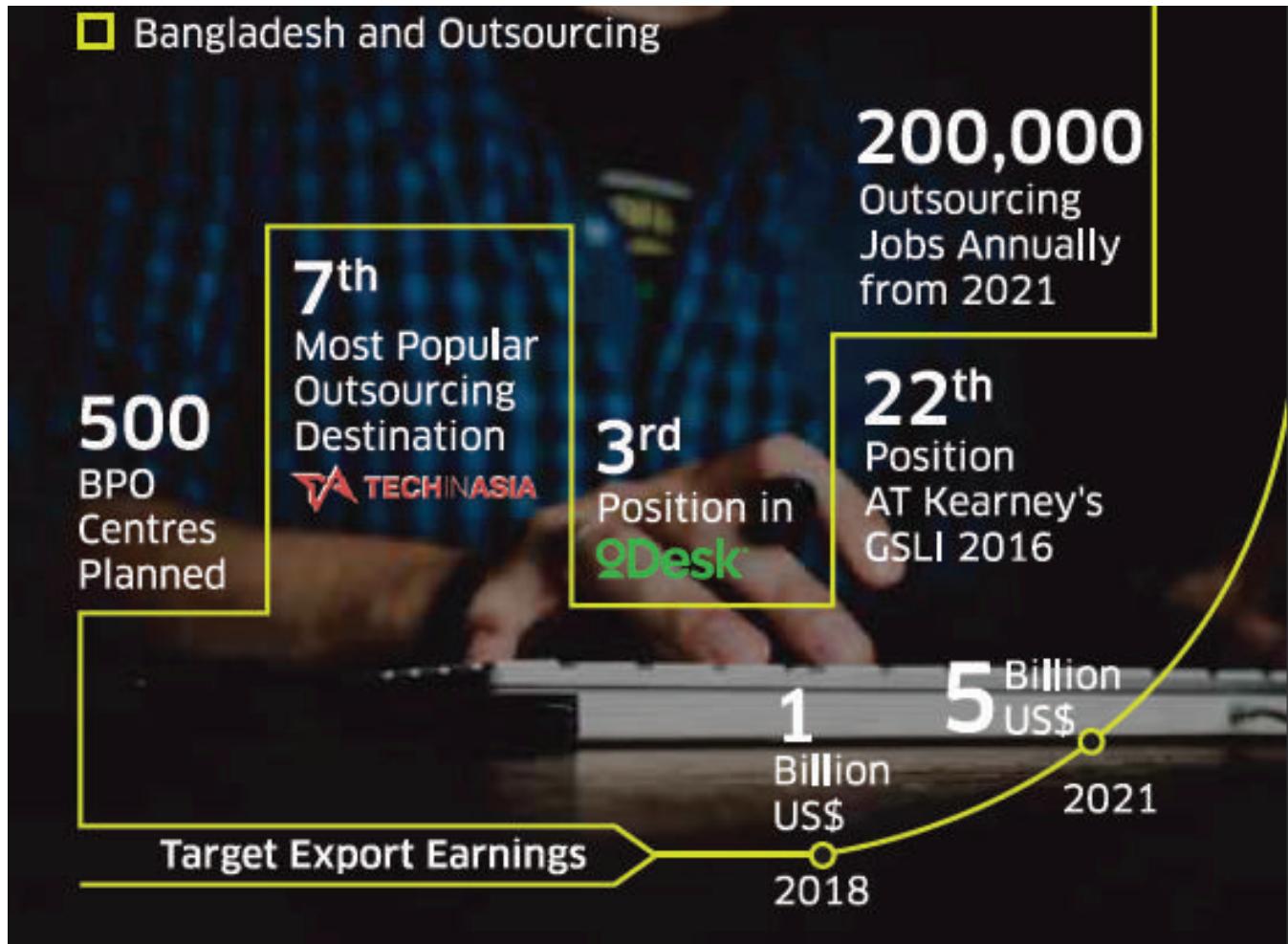


Some Infograph of ICT Industry in Bangladesh



Source:
Building Bangladesh's
Digital Future
CRI

Bangladesh and Outsourcing



Source: Building Bangladesh's Digital Future, CRI

Since the launch of the Digital Bangladesh Initiative, the youth of Bangladesh, including the disadvantaged groups like women, the extreme poor, and person with disabilities got the chance to access into necessary information, skills and education to transform their lives individually and as members of groups.

An organized network to distribute centralized infor-

mation on various development sectors to local levels that can be spearheaded by youth will be developed to bring about sustained long term development for the youth. The next five years is the key to extract a rich demographic dividend through grooming the youth with secular, democratic, ethical, and humane values who will drive Bangladesh to a happy and prosperous nation (7th Five Years Plan (FYP)).

ICT is evolving in Bangladesh as the pillar of development and government has already formulated and passed several policies to boost and encourage the entrepreneurial eco-system by addressing ICT developments. A number of acts, policies and guidelines are in place to guide the nation towards the realization of Digital Bangladesh. The ICT Policy 2018 and the 'Strategic Priorities for Digital Bangladesh 2011' also contain elaborate work plans. Because of the cross-cutting nature of the vision, these work plans encompass priorities in almost all

development sectors. These policies and regulations have provided a first round enabling environment for the implementation of the Digital Bangladesh enterprise. The ICT Policy 2015 has now been updated to ICT Policy 2018. ICT Division of the Government of the People's Republic of Bangladesh has introduced submission of innovative project in providing financial grant for The Information and Communications Technology (ICT) sector of the country.

Policies and Regulatory Framework

- | | |
|---|--|
| <ul style="list-style-type: none"> • ICT Policy 2015, now updated to ICT Policy 2018 • Right to Information Act 2015 • Perspective Plan • ICT Act 2013 (amended) • Strategic Priorities of Digital Bangladesh • Cyber Security Policy 2010 • Information Security Policy Guideline 2014 • Rural Connectivity Policy Guideline 2010 • Broadband Policy • Mobile Keypad Standardization Policy • Guidelines for Utility Bill Payment • National e-Governance Architecture | <ul style="list-style-type: none"> • Mobile Banking Policy Guideline • National Telecom Policy 2010 • Guidelines on Mobile Financial Services (MFS) for the Bank • Secretariat Instructions 2014 (amended) • Proactive Information Disclosure Guidelines 2014 • Innovation Team gazette • National Portal management gazette • Hi-Tech Park Authority Act 2010 • ICT Fellowship and Donation Policy • Guideline for Private STP 2015 • e-Krishi Policy • Cyber Security Strategy |
|---|--|

In the fiscal year (FY) 2016-17, it registered export earnings worth US\$ 0.8 billion from the global market and US\$ 1.54 billion from the domestic market span - thereby making around one per cent contribution to the gross domestic product (GDP).

In 2015, the Government of Bangladesh has enacted a proper guideline for ICT and declared it as the thrust sector. It is estimated that within five years ICT sector will contribute 1 percent to the Bangladesh's total GDP and create employment for 150,000 ICT professionals. A National ICT Task Force, headed by the Honorable Prime Minister, Government of the People's Republic of Bangladesh, has been formed and the government has taken initiatives to set up Bangabandhu Hi-Tech City at Gazipur, Sheikh Hasina Software Technology Park at Jessore, Hi-Tech Park at Sylhet (Sylhet Electronics City), Barendra Silicon City at Rajshahi, 12 IT parks, Mohakhali IT Village and Janata Tower Software Technology Park in Dhaka to attract foreign direct

investment and to create massive employment in this sector for our people. It is expected that of them, Bangabandhu Hi-Tech City at Gazipur would create jobs for 70,000 people, while Sheikh Hasina Software Technology Park at Jessore to generate 10,000 jobs, Hi-Tech Park at Sylhet (Sylhet Electronics City) to create 50,000 jobs, Barendra Silicon City at Rajshahi to generate 14,000 jobs, 12 IT parks would create 60,000 jobs, Mohakhali IT Village to create 30,000 employment and Janata Tower Software Technology Park would facilitate 2,500 people with employment.

During May 12, 2018, Bangladesh has entered into the space era with the successful launching of its first satellite 'Bangabadhu-1'. Bangladesh has now become the 57th country to have its own satellite in outer space.

Benefits of Bangbandhu-1 Satellite



Internet coverage in most remote areas



Uninterrupted internet service



Earning foreign currency



Effective disaster preparedness



Faster broadcast service

Source: Building Bangladesh's Digital-Future. (2018). Centre for Research and Information. Retrieved from http://cri.org.bd/publication/Building-Bangladesh's-Digital-Future-June%202018/Building-Bangladesh's-Digital-Future_June_2018.pdf

The horizontal and vertical integration of the software and IT-enabled services (ITES) sector has upgraded the lifestyle of the people alongside industrial and government efficiency in many ways. Around 80.83 million people are using internet now (BTRC, 2018) and 59 million are registered under the mobile financial services until January this year (Bangladesh Bank, 2018). This can be deemed as a catalyst to ensure inclusive financial and equitable economic growth mostly targeting the unbanked people as they transacted around US\$ 42 billion alone last year.

In pursuit of a 'Developed Bangladesh' by 2041 through skipping the 'middle-income country trap' after 2024, it is required to start initiating policy reforms in such a way that would make a bridge between the future transitory phases, from LDC to middle-income country (MIC) and MIC to a developed economy. To reach there, ICT sector of Bangladesh can play a keystone role. Oxford University has also recognized Bangladesh as the second largest resource provider in the global outsourcing market.

IT companies have created a sizable market space in service industries like telecommunications, retail and wholesale business, healthcare, education, publishing and real estate in Bangladesh. The growth in the software industry has been driven by this growing IT automation demand in the domestic market. The impressive trends in software exports in recent years played a deterministic role as well. Bangladesh has made major strides in laying the groundwork for a diverse and successful outsourcing market

The availability of information of skills gap in ICT sector of Bangladesh is a real challenge. The survey on ICT job market in Bangladesh and its in-depth analysis needs to be undertaken on a regular basis as the skills requirement changes rapidly in this sector. The digital revolution that Bangladesh is going through now is principally backed by its home-grown multi-dimensional ICT industry. To scale up national productivity and efficiency through appropriate use of ICT and in order to maintain 10 per cent GDP growth in next two decades escaping the middle-income country trap, it is required to continue policy reforms. What's highly necessary now is to support the country's thriving ICT industry that is making us proud every day.

Government initiative in facilitating Start-up in Bangladesh

The Program – Connecting Startups

This program will connecting Startups to markets and investors - Providing mentoring and incubation to promising Startups by providing space, logistic support, and training; organizing opportunities through exposure to venture capital's and other funds; creating opportunities for access to markets.

| Achieve By 2021 | Achieve By 2025 |
|---|---|
| 100% teledensity | Increasing internet penetration to 90% |
| 65% internet penetration | Reaching broadband facilities to 90% |
| 40% people to have fixed-broadband | |
| 4,553 unions to have optical fibre connectivity | 50% residences and organizations to have optical fibre connectivity |

Graphical Source:
Building Bangladesh's Digital Future, CRI

4.2 Global Perspective on ICT Development and Explicit Effect in Transformation of Digital Economy

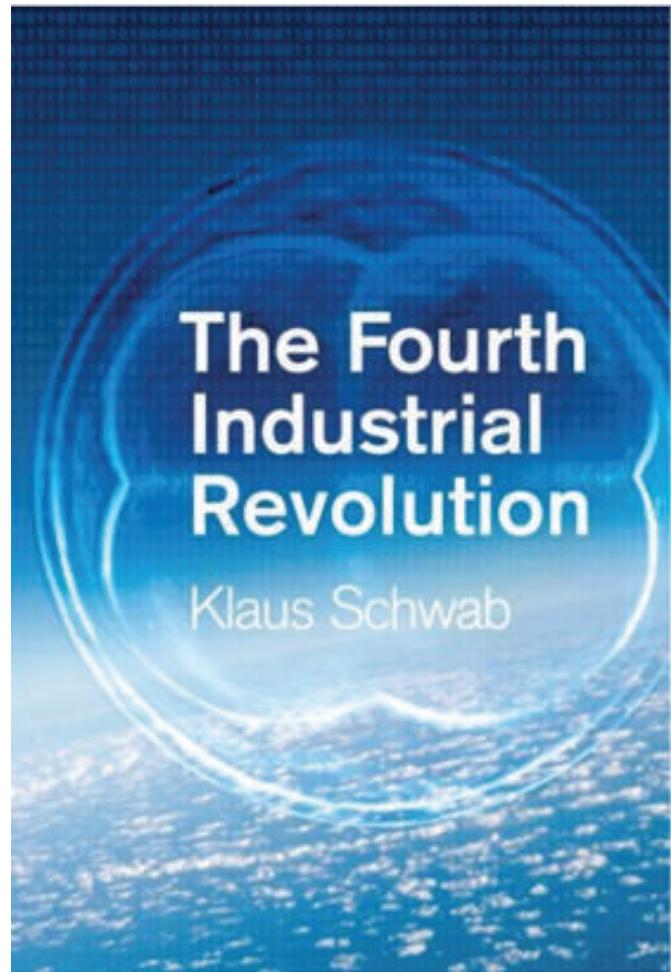
In this chapter, we have tried to focus on the global ICT scenario, through examining different reports like Annual reports of ASSOCIO and WITSA, Expert Analysis of World Economic Forum (WEF), UNCTAD Information Report 2017.

We are now on the verge of fourth Industrial Revolution which is also called the Industry 4.0. Previous industrial revolutions liberated humankind from animal power, made mass production possible and brought digital capabilities to billions of people. This Fourth Industrial Revolution is, however, fundamentally different. It is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.

In this phenomenon, the future of work is going to be determined by artificial intelligence (AI), big data, machine learning, blockchain, nanotechnology, quantum computing, biotechnology, The Internet of Things, The Industrial Internet of Things (IIoT), fifth-generation wireless technologies (5G), additive manufacturing/3D printing and fully autonomous vehicles.

These technologies will eliminate some jobs, but they will also create new opportunities and greater demand for the jobs that humans still do best. We decided to shine the spotlight on five positions you will see much more of on job boards in 2018.

In particular, Klaus Schwab calls for leaders and citizens to "together shape a future that works for all by putting people first, empowering them and constantly reminding ourselves that all of these new technologies are first and foremost tools made by people for people.



These technologies will eliminate some jobs, but they will also create new opportunities and greater demand for the jobs that humans still do best. We decided to shine the spotlight on five positions you will see much more of on job boards in **2018.**

The Future of Jobs

Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution

January 2016



Report:

Executive Summary of
'The Future of Jobs Employment, Skills
and Workforce Strategy for
the Fourth Industrial Revolution.'

Publication Date: January 2016

The World Economic Forum's Future of
Jobs Report seeks to understand the
current and future impact of key
disruptions on employment levels, skill
sets and recruitment patterns in differ-
ent industries and countries.

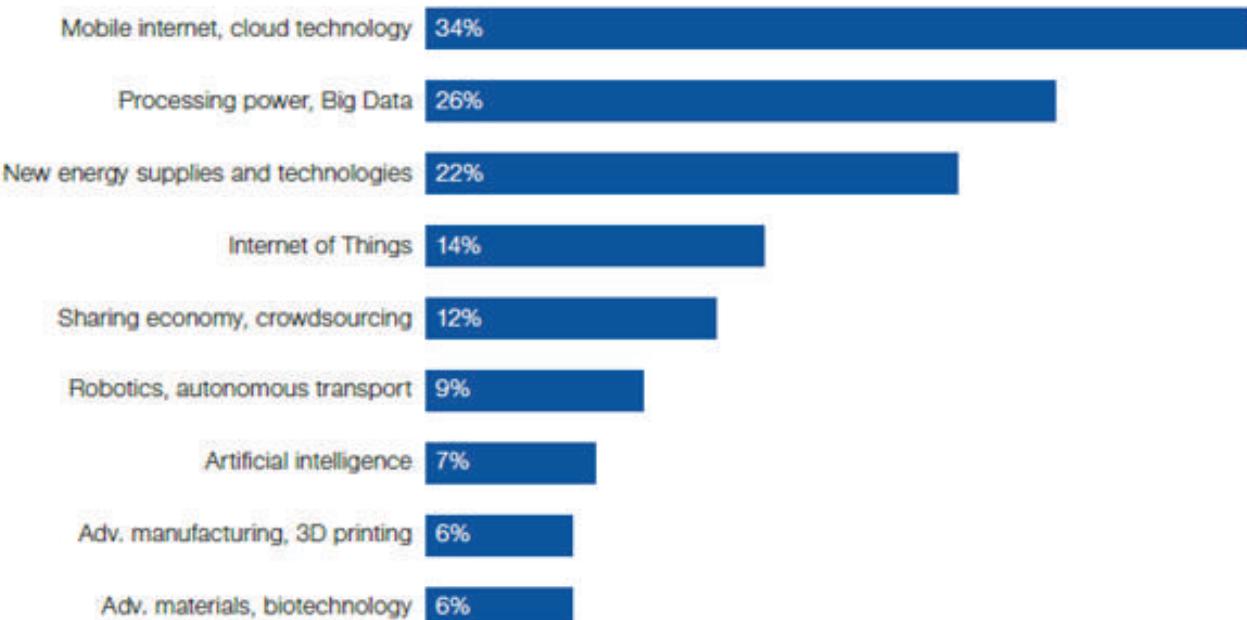
EMPLOYMENT TRENDS

In this section the report addresses the disruptive labour market issues.
The study of the report states, the global workforce is expected to experience significant
churn between job families and functions.

Across the countries covered by the Report, current trends could lead to a net employment
impact of more than 5.1 million jobs lost to disruptive labour market changes over the period
2015–2020, with a total loss of 7.1 million jobs—two thirds of which are concentrated in routine
white collar office functions, such as Office and Administrative roles—and a total gain of 2
million jobs, in Computer and Mathematical and Architecture and Engineering related fields.

Manufacturing and Production roles are also expected to see a further bottoming out but are
also anticipated to have relatively good potential for up-skilling, redeployment and produc-
tivity enhancement through technology rather than pure substitution.

TECHNOLOGICAL



Source: Future of Jobs Survey, World Economic Forum.

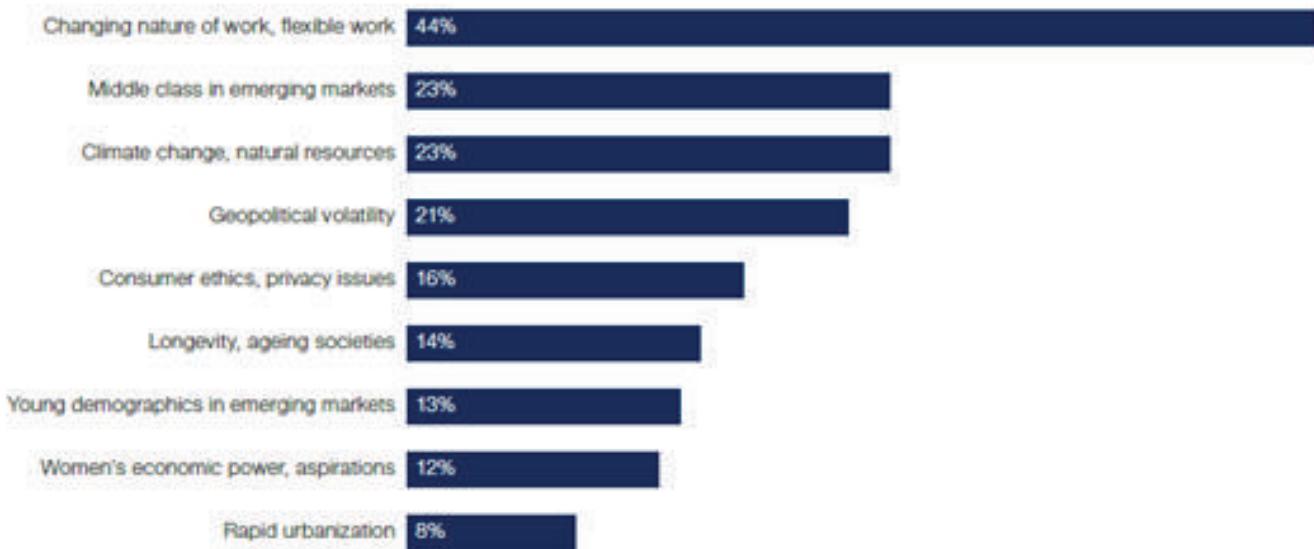
Note: Names of drivers have been abbreviated to ensure legibility.

Glimpses of the study, focusing core issues:

Drivers of change, industries overall

Share of respondents rating driver as top trend, %

DEMOGRAPHIC AND SOCIO-ECONOMIC



Reinventing the HR Function: As business leaders begin to consider proactive adaptation to the new talent landscape, they need to manage skills disruption as an urgent concern. What this requires is an HR function that is rapidly becoming more strategic and has a seat at the table—one that employs new kinds of analytical tools to spot talent

trends and skills gaps, and provides insights that can help organizations align their business, innovation and talent management strategies to maximize available opportunities to capitalize on transformational trends.

- Making Use of Data Analytics: Businesses and governments will need to build a new approach to workforce planning and talent management, where better forecasting data and planning metrics will need to be central. To support such efforts, the Forum's Future of Jobs project provides in-depth analysis on industries, countries, occupations and skills.
- Talent diversity—No more excuses: As study after study demonstrates the business benefits of workforce diversity and companies expect finding talent for many key specialist roles to become much more difficult by 2020, it is time for a fundamental change in how talent diversity issues are perceived and well-known barriers tackled. In this area, too, technology and data analytics may become a useful tool for advancing workforce parity, whether by facilitating objective assessment, identifying unconscious biases in job ads and recruitment processes or even by using wearable technologies to understand workplace behaviors and encourage systemic change.
- Leveraging flexible working arrangements and online talent platforms: As physical and organizational boundaries are becoming increasingly blurred, organizations are going to have to become significantly more agile in the way they think about managing people's work and about the workforce as a whole. Businesses will increasingly connect and collaborate remotely with freelancers and independent professionals through digital talent platforms. Modern forms of association such as digital freelancers' unions and updated labour market regulations will increasingly begin to emerge to complement these new organizational models.

Longer Term Focus

- Rethinking education systems: Most existing education systems at all levels provide highly skilled training and continue a number of 20th century practices that are hindering progress on today's talent and labour market issues. Two such legacy issues burdening formal education systems worldwide are the dichotomy between Humanities and Sciences and applied and pure training, on the one hand, and the prestige premium attached to tertiary-certified forms of education—rather than the actual content of learning—on the other hand. Businesses should work closely with governments, education providers and others to imagine what a true 21st century curriculum might look like.

- Incentivizing lifelong learning: The dwindling future population share of today's youth cohort in many ageing economies implies that simply reforming current education systems to better equip today's students to meet future skills requirements—as

worthwhile and daunting as that task is—is not going to be enough to remain competitive. Ageing countries won't just need lifelong learning—they will need wholesale reskilling of existing workforces throughout their lifecycle. Governments and businesses have many opportunities to collaborate more to ensure that individuals have the time, motivation and means to seek retraining opportunities.

- Cross-industry and public-private collaboration: Given the complexity of the change management needed, businesses will need to realize that collaboration on talent issues, rather than competition, is no longer a nice-to-have but rather a necessary strategy. Multi-sector partnerships and collaboration, when they leverage the expertise of each partner in a complementary manner, are indispensable components of implementing scalable solutions to jobs and skills challenges. There is thus a need for bolder leadership and strategic action within companies and within and across industries, including partnerships with public institutions and the education sector.

These efforts will need to be complemented by policy reform on the part of governments. As a core component of the World Economic Forum's Global Challenge Initiative on Employment, Skills and Human Capital, the Future of Jobs project aims to bring specificity to the upcoming disruptions to the employment and skills landscape in industries and regions—and to stimulate deeper thinking and targeted action from business and governments to manage this change.

The 2020 focus of the Report was chosen so as to be far enough into the future for many of today's expected trends and disruptions to have begun taking hold, yet close enough to consider adaptive action today, rather than merely speculate on future risks and opportunities.

The industry analysis presented in the Report will form the basis of dialogue with industry leaders to address industry-specific talent challenges, while the country and regional analysis presented in this Report will be integrated into national and regional public-private collaborations to promote employment and skills.

TECHNOLOGY AND INNOVATION REPORT 2018

Publication: Harnessing Frontier Technologies for Sustainable Development
Publisher: United Nations Conference on Trade and Development (UNCTAD)
Publication Date: 2018



THE 2030 Agenda for Sustainable Development sets ambitious global goals, demanding unprecedented actions and efforts across multiple interconnected social, economic and environmental issues. Science, technology and innovation (STI) must play a central role in the achievement of these goals.

The process of creative destruction initiated by technological progress can help to transform economies and improve living standards by increasing productivity, reducing production costs and prices, and helping to raise real wages.

Harnessing frontier technologies – combined with action to address persistent gaps among developed and developing countries in access and use of existing technologies, and to develop innovations (including non-technological and new forms of social innovation) – could be transformative in achieving the Sustainable

Development Goals and producing more prosperous, sustainable, healthy and inclusive societies.

They offer the prospect of solutions and opportunities for sustainable development that are better, cheaper, faster, scalable and easy to use. The extent of the developmental impact of technological advances has already been seen in the transformative effects of information and communication technologies (ICTs) in many low-income economies, while the potential to increase the environmental sustainability of development is evident in recent advances in renewable energy.

However, new technologies threaten to outpace the ability of societies and policymakers to adapt to the changes they create, giving rise to widespread anxiety and ambivalence or hostility to some technological advances.

FEATURES AND POTENTIAL OF FRONTIER TECHNOLOGIES

The dramatically accelerating pace of development and adoption of new technologies in recent decades is likely to continue, driven by (a) the cumulative nature of technological change; (b) the exponential nature of technologies such as micro-chips, which have doubled in power every two years for half a century; (c) the convergence of technologies into new combinations; (d) dramatic reductions in costs; (e) the emergence of digital “platforms of platforms” – most notably the Internet; and (f) declining entry costs.

Several frontier technologies show the greatest potential to enable the achievement of the Sustainable Development Goals. Big data analysis can help to manage or resolve critical global issues, create new scientific breakthroughs, advance human health and improve decision-making, by providing real-time streams of information.

The Internet of Things allows the condition and actions of connected objects and machines to be monitored and managed, and allows more effective monitoring of the natural world, animals and people. These two technologies have important applications in health care, agriculture, energy and water management and quality, as well as in monitoring development indicators to assess progress towards the Sustainable Development Goals. Governments should consider developing strategies to harness these technologies towards their development goals.

Artificial intelligence now includes capabilities in image recognition, problem solving and logical reasoning that sometimes exceed those of humans. Artificial intelligence, particularly in combination with robotics, also has the potential to transform production processes and business, especially in manufacturing.

In addition to offering some potential carbon savings by reducing the need to transport components, 3D printing can offer benefits in health care, construction and education.

Extraordinary advances in biotechnology allow very specific gene editing for human medicine, making personalized treatments possible for certain conditions in combination with artificial intelligence and big data, as well as for genetic modification of plants and animals. Nanotechnology – the manufacture and use of materials at an infinitesimal scale – has important applications in water supply (water purification), energy (battery storage), agriculture (precise management of the release of agrochemicals), ICT (reducing the size of electronic components) and medicine (delivery mechanisms for medication).

Renewable energy technologies allow the provision of electricity in remote and isolated rural areas inaccessible to centralized grid systems, while drones could revolutionize the delivery of supplies, enable precision agriculture and replace humans in dangerous tasks. Small-scale customized satellites will soon be affordable for more developing countries, businesses and universities, allowing monitoring of crops and environmental damage.

THE CRITICAL ROLE OF SKILLS TO COMPLEMENT FRONTIER TECHNOLOGIES

Research capacity, however, is only one aspect of the capabilities needed for the exploitation of new technologies. Also important are generic, core and fundamental skills that are complementary to new technologies – such as literacy, numeracy and basic academic skills – together with basic financial and entrepreneurial skills and, increasingly, basic digital and even coding skills. Internet access is also critical. Besides advanced cognitive skills, such as STEM, inherently human skills and aptitudes are also gaining increasing importance, as they are difficult for robots and machines to emulate. The geographical distribution of **science, technology, engineering and mathematics (STEM)** graduates is also very unequal, with two thirds of them being in Asia – mainly in India (29.2 per cent) and China (26 per cent) – only 5.2 per cent in Latin America and less than 1 per cent in Africa. This partly reflects a share of STEM in tertiary education well above the global average in Asia, especially China. These include various behavioral, interpersonal and socio-emotional skills, creativity, intuition, imagination, curiosity, risk-taking, open-mindedness, logical thinking, problem-solving, decision-making, empathy and emotional intelligence, communication, persuasion and negotiation skills, networking and teamwork, and the capacity to adapt and learn new abilities.

For most developing countries, the impact of frontier technologies on employment is likely to depend less on their technological feasibility than on their economic feasibility.

Fears about short-term adverse effects of digitalization and automation on employment may be exaggerated, particularly if labour and education policies promote complementarity between skills available in the workforce and new technologies.



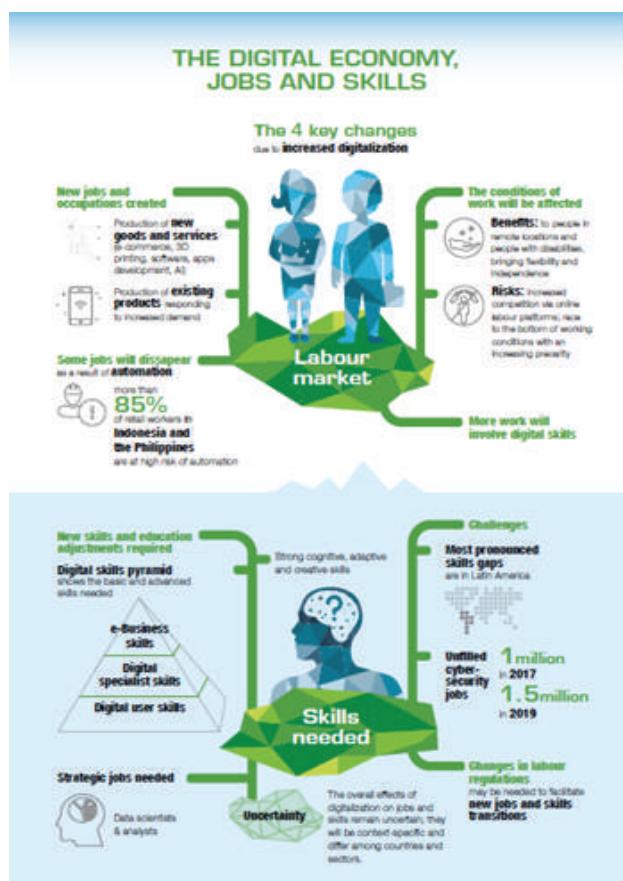
INFORMATION ECONOMY REPORT 2017: DIGITALIZATION, TRADE AND DEVELOPMENT

Publisher: United Nations Conference on Trade and Development
Date: 23 October 2017

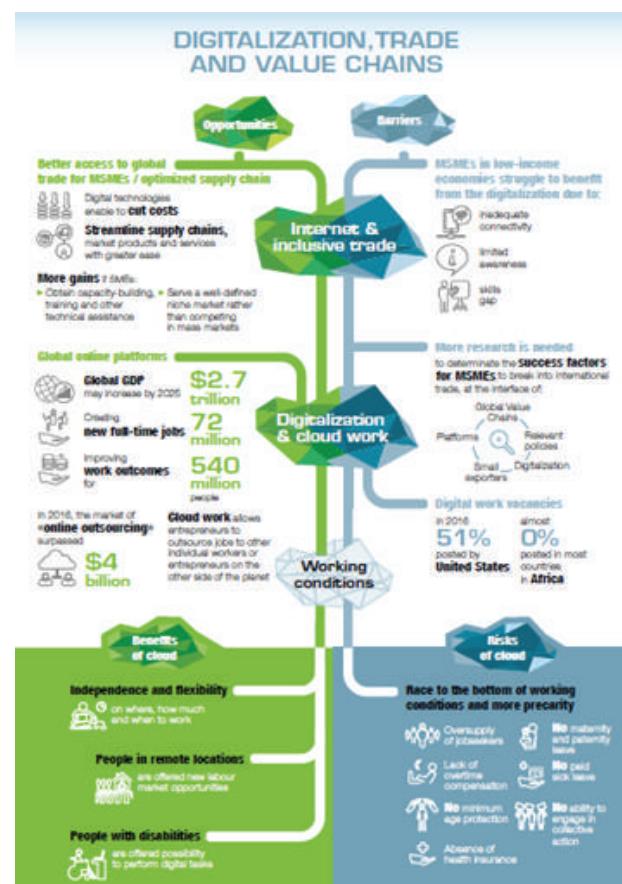
The report has covered vital areas of digital economy. The following are some of the glimpses of the report excerpted from the report.

https://unctad.org/en/PublicationsLibrary/ier2017_en.pdf

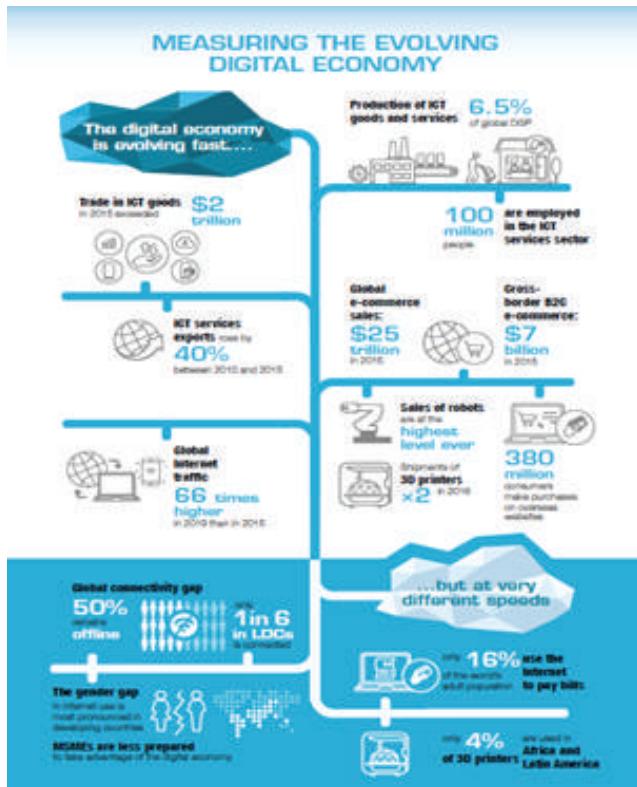
Some Infographs, excerpted from the report, Information Economy Report 2017: Digitalization, Trade and Development



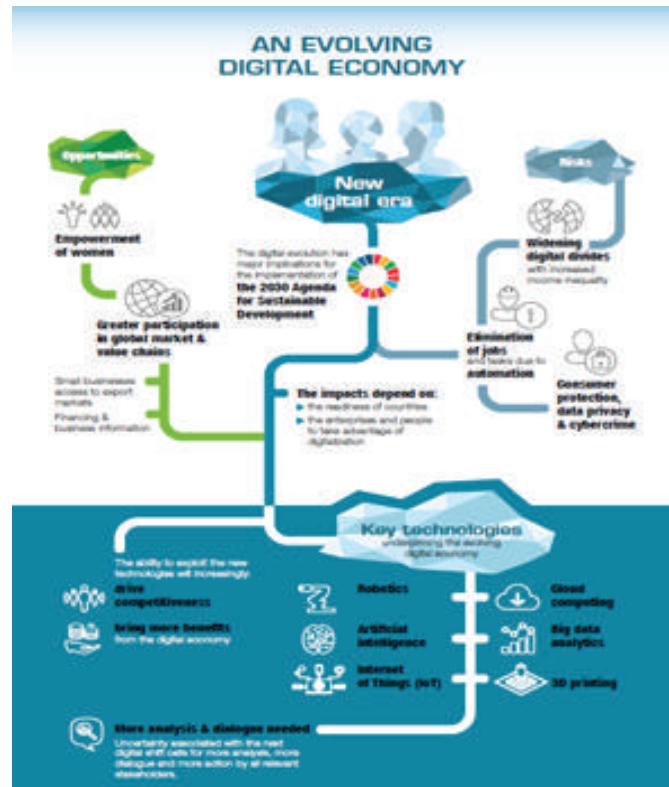
The Digital Economy, Jobs and Skills



Digitization, Trade and Value Chains



Measuring the Evolving Digital Economy



An Evolving Digital Economy

THE DIGITAL ECONOMY, JOBS AND SKILLS

A. HOW WILL DIGITALIZATION TRANSFORM JOBS?

Four sets of changes to the labour market can be expected with increased digitalization (Degryse, 2016): job creation, job destruction, job changes and job shifts. Greater reliance on digital technologies will lead to the creation of new jobs and occupations in various sectors, including for the production of new goods and services or existing products that respond to increased demand. The demand for work can be expected to grow in areas such as data analysis, software and applications (apps) development, networking and artificial intelligence (AI), as well as designing and production of new intelligent machines, robots and 3D printers. For example, with the greater use of IoT, firms will need to hire more product managers, software developers (including for smart phones), hardware designers, data scientists, user experience designers and sales managers. Similarly, there is likely to be job growth in "pure" digital firms. For example, in the United States, the number of employees in e-commerce firms that do not have a physical retail shop rose by 66 per cent between 2010 and 2014, from 130,000 to 210,000.² And in Viet Nam, by August 2015, some 29,000 people were engaged in developing mobile apps (Mandel, 2015). As the digital economy grows, enterprises across sectors are likely to hire more people with skills related to cyber

security. Estimates suggest that there are one million unfilled cyber-security jobs worldwide, and that by 2019 the number will have risen to 1.5 million.

Other areas where the demand for more workers can be expected to increase include the production of new infrastructure, transport equipment, ICT products and complex software (Nübler, 2016). While the implementation of labour-saving technologies may help increase productivity, there is also likely to be scope for expanding work in new ways. For example, reduced health-care costs may boost the demand for more sophisticated medical services, and the automation of some banking services may lead to more customized "relationship banking" (ibid.). Secondly, digitalization will make some jobs obsolete.

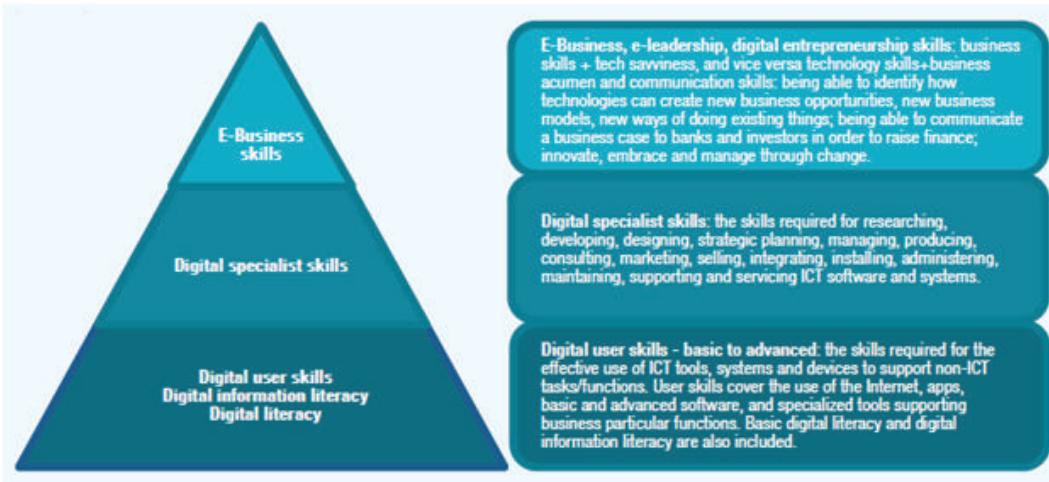
Advances in computerization, software, automation, robots and AI enhance the scope for disruptions to traditional industries, with smart machines taking over functions currently performed by people. For example, according to a 2016 study, 89 per cent of all salaried workers in the Philippines' BPO sector are at high risk of losing their jobs to automation (ILO, 2016). On-site security guards may similarly be replaced by sensors monitored remotely in centres that provide surveillance for multiple sites.

Thirdly, the nature of work will be affected. Digitalization may automate some tasks or activities but not others. An increasing number of tasks that are components of even highly skilled jobs risk becoming automated and/or outsourced. For example, secretarial work was first disrupted when computers reduced the need for assistants. The next disruption may be the shift to digital assistants, further reducing the need for secretarial assistance. The use of digital devices will grow in different jobs, requiring different kinds of skills. Car mechanics routinely run diagnostics on laptops, and truck drivers use GPS devices, including for route optimization, fuel efficiency and fuel prices. The next technology, which is already being rolled out, is connected devices that transmit usage and maintenance data (e.g. of car engines and tyres) directly to the factory and service facilities.

Routine tasks that follow explicit and codifiable procedures, whether they are manually intensive (such as typing) or cognitive intensive (e.g. book-keeping), are more likely to be automated with software (Autor et al., 2003). A profound – and yet unanswered – question is what percentage of tasks in various jobs will ultimately yield to automation, and how much labour will be needed to perform the remaining tasks. Whether a job will continue to exist in a transformed form or disappear altogether, automation will change the traditional division of labour and tasks, affecting all sectors and all levels of skills.

Finally, digitalization will change the conditions of work. Online platforms are matching tasks across the whole skills spectrum (from “counting clicks” to writing articles or coding). As noted in chapter III, these platforms are transforming labour markets by favouring certain types of contracts

The Digital Skills Pyramid



Source: European Commission, 2014; van Welsum and Lanvin, 2012.

(freelance and contract work over regular employment) and enabling the entry of new competitors.

As a result, workers with high levels of social protection find themselves in competition with other workers (in the domestic market or abroad) with low levels of social protection (Degryse, 2016). This has implications for how benefits, health care and pensions are organized, and for the provision of training and continuing education.

C. NEED FOR NEW SKILLS

Whatever the rate of change or ultimate outcome of the process of digitalization, the workers of tomorrow will need skills that enable them to create economic value in a world where many jobs are likely to be replaced by automation, software, AI and robots (Levy and Murnane, 2013). Workers will need to be “racing with the machines” rather than “against them”, finding ways in which their skills complement the tasks that machines can carry out and enable them to use and/or augment AI. People displaced by automation do not necessarily have the skills to perform the tasks that are required in the newly created jobs and tasks.¹⁰ Skills gaps are already visible in the world. A study of emerging economies found that they are particularly significant in Latin America (Melguizo and Perea, 2016).

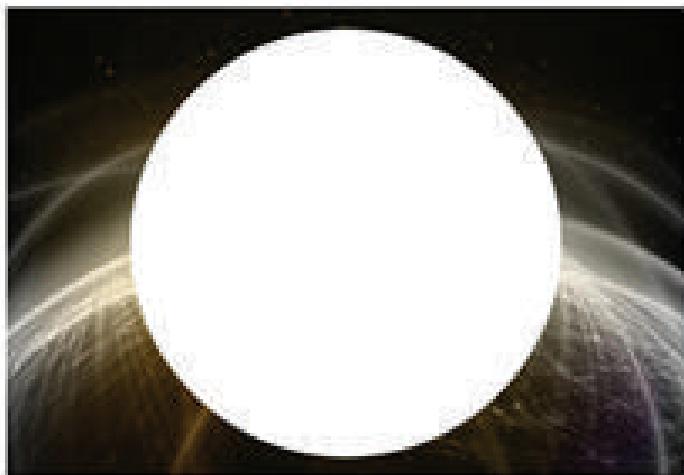
Firms in that region were three times more likely than firms in South Asia, and 13 times more likely than those in the Asia-Pacific region, to experience operational problems due to a shortage of human capital. And in a 2016 survey of 42,000 employers, 40 per cent of the respondents reported difficulties filling vacancies, especially those requiring skilled “trade workers”, IT personnel, sales representatives, engineers and technicians.

Beyond the foundational skills, a higher level of skills is required to build, supply, deploy and manage digital tools and services. Such specialist skills range from those required to roll out, upgrade and repair physical ICT infrastructure (e.g. cables, hardware such as computers, routers and servers) to those possessed by software engineers, apps developers, systems architects and data scientists.

The Global Information Technology Report 2016

Innovating in the Digital Economy

Silja Baller, Soumitra Dutta, and Bruno Lanvin, editors



Insight Report: The Global Information Technology Report 2016: Innovating in the Digital Economy

Publisher: World Economic Forum

Contributors:

Silja Baller, World Economic Forum, Soumitra Dutta
Cornell University and Bruno Lanvin, INSEAD

| | Rank (out of 139) | Value (1–7) |
|---|----------------------|----------------|
| Networked Readiness Index..... | 112 | 3.3 |
| Networked Readiness Index 2015 (out of 143)..... | 109 | 3.3 |
| Networked Readiness Index 2014 (out of 148)..... | 119 | 3.2 |
| Networked Readiness Index 2013 (out of 144)..... | 114 | 3.2 |
| A. Environment subindex..... | 130 | 3.1 |
| 1st pillar: Political and regulatory environment..... | 137 | 2.5 |
| 2nd pillar: Business and innovation environment..... | 107 | 3.7 |
| B. Readiness subindex..... | 98 | 4.1 |
| 3rd pillar: Infrastructure..... | 107 | 2.8 |
| 4th pillar: Affordability..... | 14 | 6.4 |
| 5th pillar: Skills..... | 122 | 3.1 |
| C. Usage subindex..... | 111 | 3.0 |
| 6th pillar: Individual usage..... | 121 | 2.1 |
| 7th pillar: Business usage..... | 119 | 3.1 |
| 8th pillar: Government usage..... | 72 | 3.8 |
| D. Impact subindex..... | 107 | 3.1 |
| 9th pillar: Economic impacts..... | 104 | 2.8 |
| 10th pillar: Social impacts..... | 108 | 3.4 |

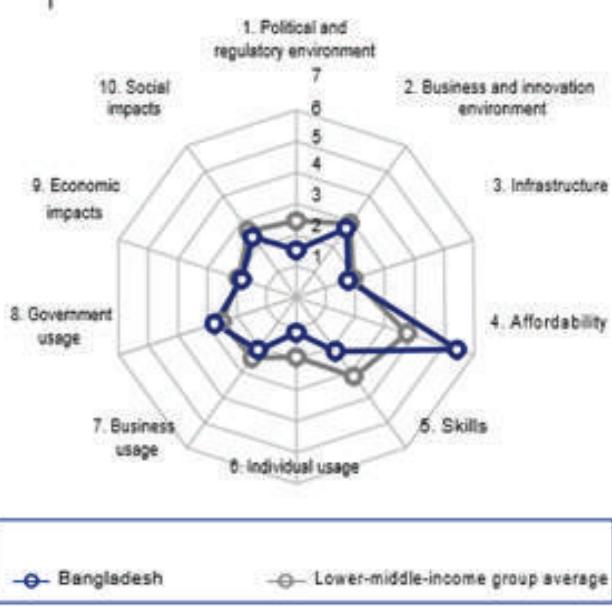
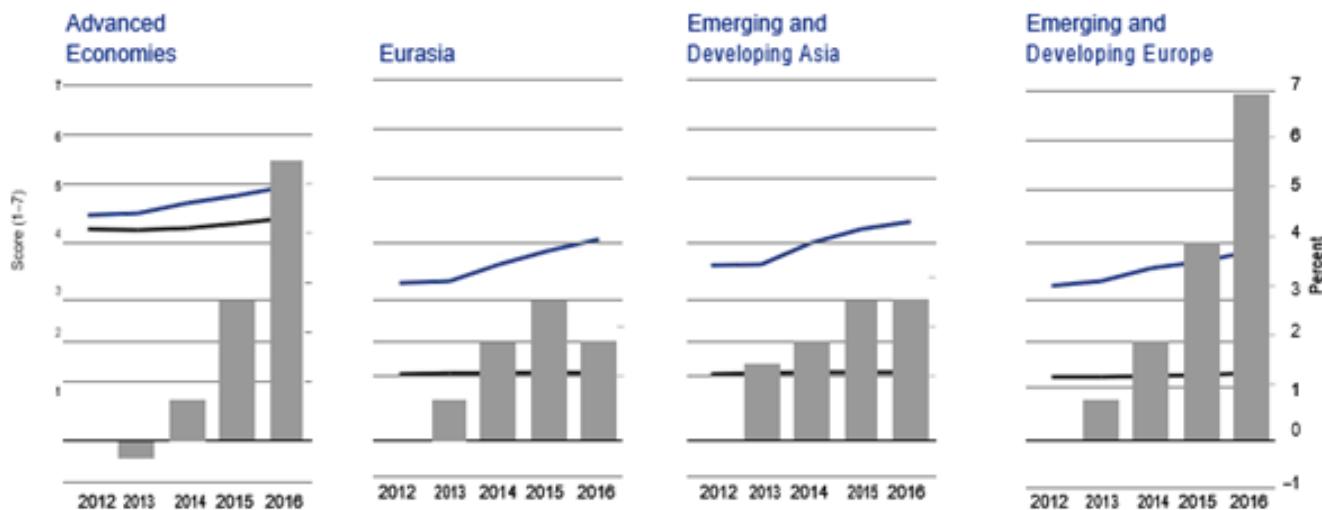


Figure 2: Trends for perceived capacity to innovate and PCT patents per million population, 2012–16



Sources: NRI, 2012–2016 editions. Based on Executive Opinion Survey data and World Intellectual Property Organization (WIPO) PCT data, sourced from the Organisation for Economic Co-operation and Development (OECD) Patent Database.



"Reimagining the Digital Era"

DIGITAL TRANSFORMATION AGENDAS & INITIATIVES WITHIN THE ASIA PACIFIC ECONOMIES

SEPTEMBER 2017

**ASOCIO and WITSA Report:
Digital Transformation Agendas & Initiatives
within the Asia Pacific Economies
(September 2017)**

ASOCIO and its research partner WITSA have together published this research paper named 'Digital Transformation Agendas & Initiatives within the Asia Pacific Economies'.



Bangladesh was among the twelve countries covered as a part of this research.

Countries in Asia should co-operate and take advantage of each country's inherent strengths in ICT or digital landscape to effectively collaborate. The ideal way ahead should be to corroborate successful policies / frameworks of one country by other countries in the region. Below are identified (8+1) objectives and associated action steps which have been discussed in this research paper:

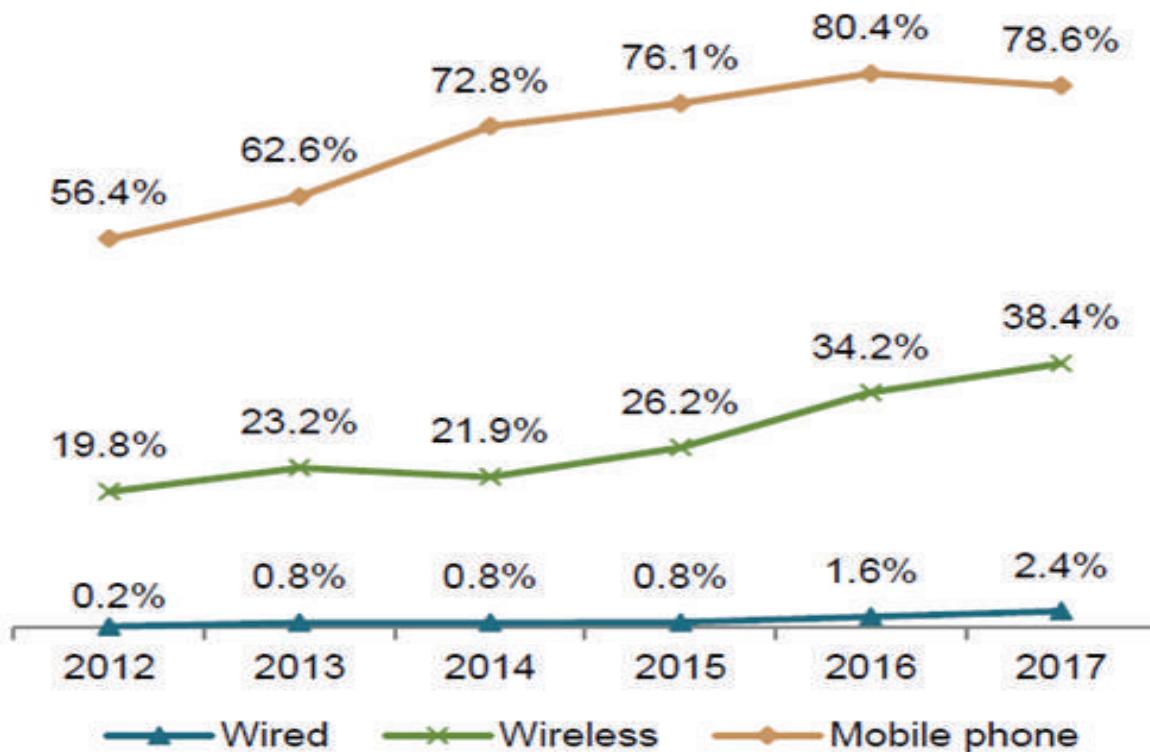
1. Digital Infrastructure: Countries in Asia Pacific must work towards providing 'high-speed internet for all' in today's digital era. For this, establishment of a strategic national broadband roadmap including defined targets with measurable goals is critical in achieving this goal.

2. Human Resource Development: APAC countries should facilitate cross-border ICT learning through graduate exchange programs by enabling graduates to work in other Asian countries. To facilitate digital learning among Asian countries, focus should be on developing collaborative projects between educational institutes and companies.

3. Cyber Security: The countries should formulate strategies to address the regional cyber security needs by establishing a nodal cyber security agency in each of the APAC economies. Co-operation in areas of cyber security and training corporates in deploying best practices in cyber security will also be helpful in achieving desired results.

4. Start-Up Ecosystem: A robust digital ecosystem for start-ups and SMEs is needed through a common platform to nurture talent and encourage regional digital innovation. Developing an APAC Start-up Map to identify different entities in the ecosystem will enable better co-ordination between accelerators, incubators, investors, corporations, universities and public administrations.

5. Cross border investment and digital trade: Expanding the present ASOCIO AEC E-Commerce Alliance to the digital Asia market through Asian economies participation will boost cross border trade. An APAC cross-border trade promotion initiative is also needed to frame standard regulations & policies. Similarly, an ICT Working Committee to discuss cross-border digital trade regulatory issues will be helpful



Source: BTRC, GSMA, World Bank

4 KEY PILLARS OF DIGITAL BANGLADESH

| | |
|--|---|
|  | <p>Developing human resources ready for the 21st century</p> <p>Make the best use of new technologies to build world-class skills in all areas of study especially mathematics, science and English Language.</p> |
|  | <p>Connecting citizens in ways most meaningful to them</p> <p>Ensuring access to the Digital Bangladesh for all citizens, poor or rich, literate or illiterate, urban or rural through development of a sustainable channel.</p> |
|  | <p>Making a productive and competitive market through use of digital technology</p> <p>Using ICT to provide access to market, ICT export through e-transactions, e-commerce and e-procurement, and empowering business to support the development of the ICT industry</p> |
|  | <p>Taking services of the Government to citizens' doorsteps</p> <p>Using ICT to execute authority and function to enforce laws, regulations, or rules with the ultimate objective is to serve the citizen.</p> |

IMPACT SECTORS

Agriculture

Health

Land

Administration

Local Government

Social Safety Nets

Parliament

Commerce and Investment

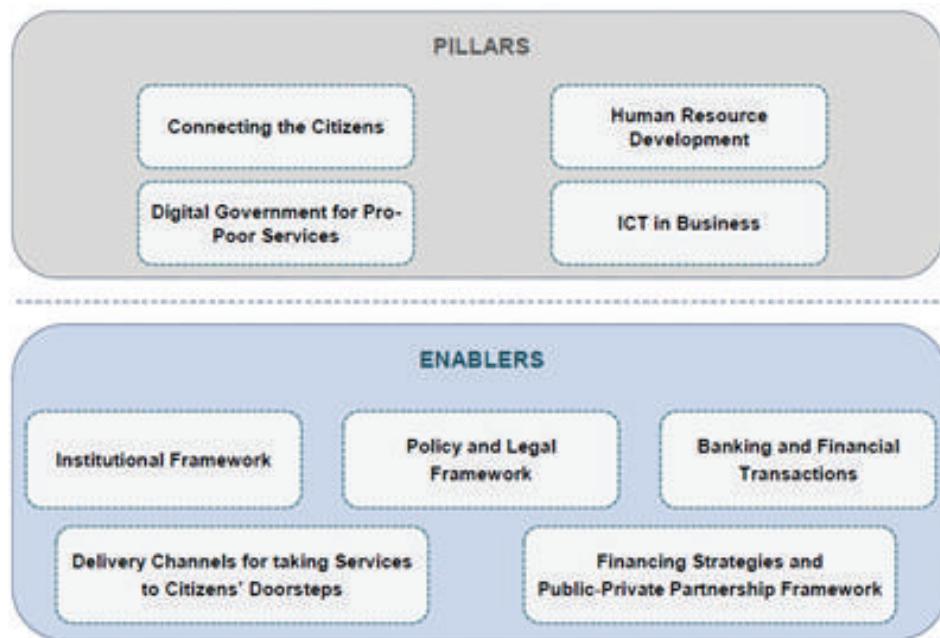
Civil Service

Disaster Management, Environment and Climate Change

Law Enforcement and Judiciary

Source: ACHIEVING DIGITAL BANGLADESH BY 2021 AND BEYOND

**Recommendations for
APAC Digital Transformation
Action Plans, prescribed
in the report:**

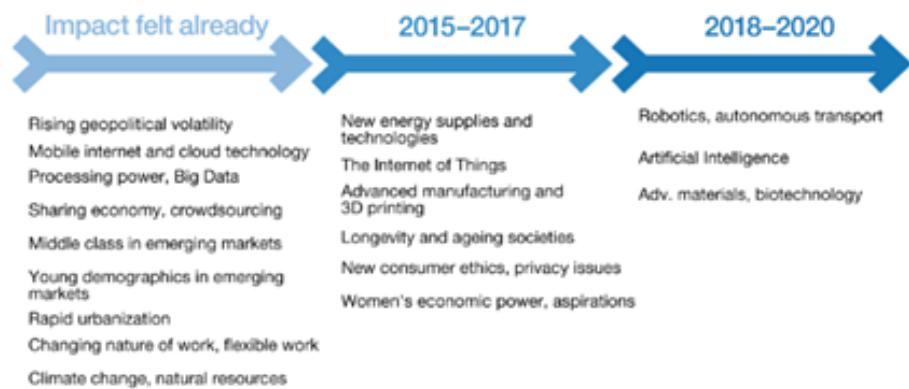


- Create an 'Asia Digital Hub', which will be a common platform, aimed at nurturing talent and encouraging innovation in order to build a more sustainable regional digital economy. It will also include an 'Asia Accelerator Program' aimed at promoting regional digital innovation by encouraging not only national but also cross-border business possibilities.
- Encourage private companies to develop incubation programmes for start-ups across Asia through a favorable ecosystem.
- Establish "Start-up Incubation & Mentorship" programme through corporate-educational institutions tie-up to identify and groom high potential start-ups.
- Build an APAC Start-Up Map to identify every concerned entity in the start-up ecosystem.
- Enable cross-border graduate exchange programmes aimed at leveraging each country's inherent ICT strengths.
- Develop an 'Asian Tech Universities Alliance' to promote digital learning among countries in Asia
- Relax the visa requirements for highly skilled individuals wanting to work in the digital sector in Asian countries.
- Design curriculum and online courses for key digital skills at a regional level to bridge knowledge gaps in collaboration with educational institutes and the private sector.
- Form a regional human resource development fund (HRDF) targeted at building local digital talent for industrial revolution 4.0.
- Expand the present ASOCIO AEC E-Commerce Alliance to Digital Asia market by encouraging participation from other Asian economies.
- Establishing APAC cross-border trade promotion initiatives to frame standard regulations & policies across the APAC region to promote digital trade.
- Create a national level e-commerce development strategy framework.
- Encourage cross-border FDI by industry leaders in each sub-segment of ICT.
- Review existing plans and bottle necks, and accordingly devise a strategic collaboration model for faster implementation.
- Establish a PAN Asian Smart City Alliance to monitor the progress of smart city initiatives implementation in identified cities. Committee will suggest best practices for smart city implementation by taking examples from current projects.
- Suggest minimum standards and benchmarks for smart city implementation at country level for faster planning and implementation for other cities.
- Make Fintech industry one of the key national digital growth agendas for Asian economies to drive greater financial inclusion.
- Setting up of APAC "Fintech Innovation Lab" for incubation and funding support to innovative Fintech startups.
- Establish an IoT alliance to support the creation of an industry-driven IoT ecosystem at the APAC level.
- Adopt and integrate new technologies into the existing ICT infrastructure at the national level
- An APAC digital agriculture trading platform to be established to bridge the gap between the producer and direct buyer.
- Online education platform to be developed for disseminating all educational e-resources including textbooks, audio, video, periodicals, etc.
- Establish an 'Asia Cyber Security Core Committee' to monitor and devise proactive strategies towards resolving regional issues
- Establish a Computer Emergency Response Team (CERT) in each of the APAC economies to co-operate in areas of cyber security.
- Endeavour to define key metrics to be considered and benchmarked across all Asian economies to support the evidence and policy actions.
- Develop regional initiatives such as Digital Transformation Index, maturity modeling, certification, etc. for sharing digital transformation progress across countries.



CHAPTER 5 REVIEW OF FOURTH INDUSTRIAL REVOLUTION AND ITS IMPACT ON JOB MARKET

Time to impact industries' business models



Source: Future of Jobs Report, World Economic Forum

Technology is a gift of God. After the gift of life is perhaps the greatest of God's gift. It is the mother of civilizations, of arts and sciences”

- Freeman Dyson

The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a

fusion of technologies that is blurring the lines between the physical, digital, and biological spheres¹⁵.

We have to embrace the fourth industrial revolution which is characterized by fusion of technology and marked by emerging technologies as Artificial Intelligence, Robotics, Quantum Computing etc. As a Middle Income Country, Bangladesh needs to be prepared in this era.

Niall Dunne Chief Executive Officer, Polymateria Limited tells in an article, 'How technology will change the future of work' that “.....the pace of technological change in the time I've been in work

¹⁵<https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

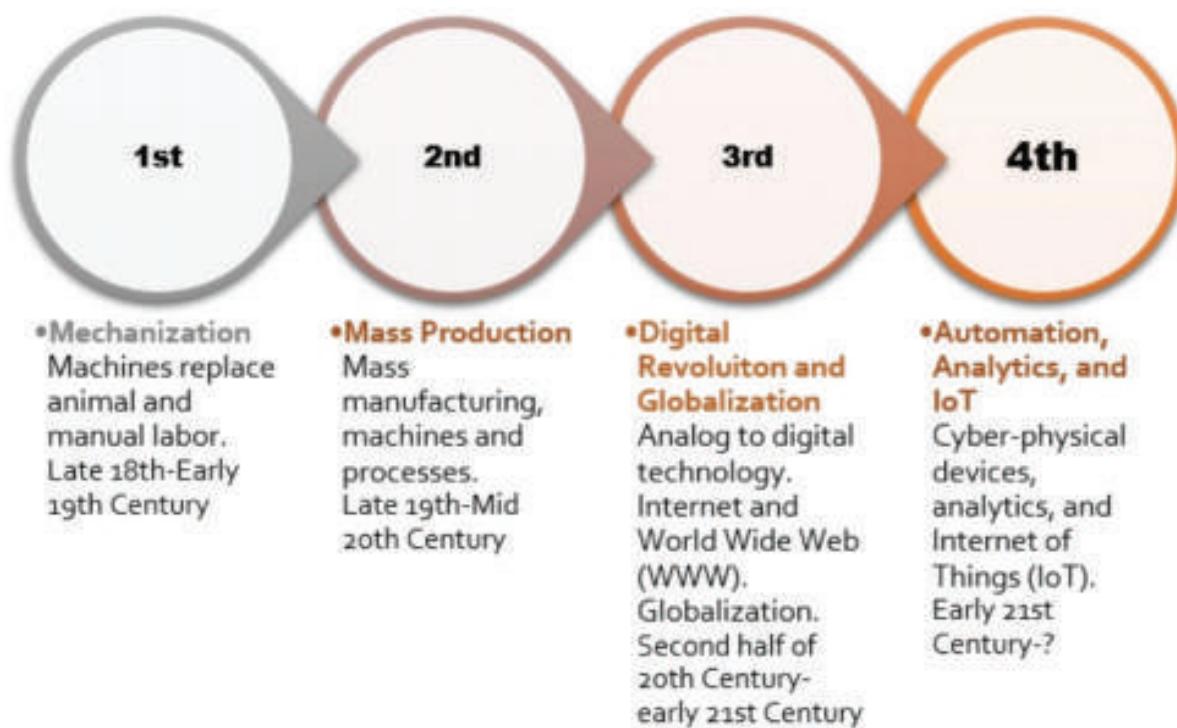
is only a shadow of what we will see over the next 15 to 20 years. This next wave of change will fundamentally reshape all of our careers, my own included. It's estimated that some 65% of children entering primary schools today will likely work in roles that don't currently exist. We expect the pace of change in the job market to start to accelerate by 2020. Office and administrative functions, along with manufacturing and production roles, will see dramatic declines accounting for over six million roles over the next four years. Conversely, business and financial operations along with computer and mathematical functions will see steep rises."

Excerpt of the impact of Fourth Industrial Revolution:

In this section, we have tried to present views of renowned tech professionals who have talked on fourth industrial revolution, emerging technologies. Impact on the future of jobs. For this, we have analyzed different books, web links, TED Talks etc.

Building on the first Industrial Revolution which used water and steam power to mechanize production, mass production and the third, which used electronics and information technology to automate production; the 4th Industrial Revolution is taking automation to new levels, blurring the lines between the physical, digital, and biological spheres and using technologies to perform tasks previously carried out by humans, ranging from piloting vehicles to 'rules-based' jobs in areas such as accounting and law. A Citi and Oxford University joint report in 2016 estimated that 57% of jobs across the OECD are at risk of automation, the Financial Times reported in 2016 that between 2000 and 2010, of all the jobs lost in the US, over 85% were lost to new technologies, and the Bank of England estimated that two thirds of all jobs are capable of being automated within 20 years¹⁷.

- **The Impacts of the Fourth Industrial Revolution on Jobs and the Future of the Third Sector¹⁶**



Source: 2025: How Will We Work? How Will Your Job Change? <https://www.td.org/insights/2025-how-will-we-work-how-will-your-job-change>

¹⁶http://www.nicva.org/sites/default/files/d7content/attachments-articles/the_impact_of_the_4th_industrial_revolution_on_jobs_and_the_sector.pdf

¹⁷http://www.nicva.org/sites/default/files/d7content/attachments-articles/the_impact_of_the_4th_industrial_revolution_on_jobs_and_the_sector.pdf

Researchers at Oxford University published a widely referenced study in 2013 on the likelihood of computerization for different occupations. Out of around 700 occupations, here are the top 30 most risky occupations having a 98-99 per cent chance of being automated in the future:

| | | |
|---|--|--|
| 1 Telemarketers | 11 Library Technicians | 21 Etchers and Engravers |
| 2 Title Examiners, Abstractors, and Searchers | 12 Data Entry Keyers | 22 Packaging and Filling Machine Operators and Tenders |
| 3 Sewers, Hand | 13 Timing Device Assemblers and Adjusters | 23 Procurement Clerks |
| 4 Mathematical Technicians | 14 Insurance Claims and Policy Processing Clerks | 24 Shipping, Receiving, and Traffic Clerks |
| 5 Insurance Underwriters | 15 Brokerage Clerks | 25 Milling and Planning Machine Setters, Operators, and Tenders, Metal and Plastic |
| 6 Watch Repairers | 16 Order Clerks | 26 Credit Analysts |
| 7 Cargo and Freight Agents | 17 Loan Officers | 27 Parts Salespersons |
| 8 Tax Preparers | 18 Insurance Appraisers, Auto Damage | 28 Claims Adjusters, Examiners, and Investigators |
| 9 Photographic Process Workers and Processing Machine Operators | 19 Umpires, Referees, and Other Sports Officials | 29 Driver/Sales Workers |
| 10 New Accounts Clerks | 20 Tellers | 30 Radio Operators |

On the other hand, the following list comprises the top 30 most safe occupations with a 0.66 per cent or less probability of being computerized based on current technology.

| | | |
|--|---|--|
| 1. Recreational Therapists | 11. Dietitians and Nutritionists | 21 Elementary School Teachers, Except Special Education |
| 2. First-Line Supervisors of Mechanics, Installers, and Repairers | 12. Lodging Managers | 22 Medical Scientists, Except Epidemiologists |
| 3. Emergency Management Directors | 13 Choreographers | 23 Education Administrators, Elementary and Secondary School |
| 4. Mental Health and Substance Abuse Social Workers | 14 Sales Engineers | 24 Podiatrists |
| 5. Audiologists | 15 Physicians and Surgeons | 25 Clinical, Counseling, and School Psychologists |
| 6. Occupational Therapists | 16 First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators | 26 Mental Health Counselors |
| 7. Orthotists and Prosthetists | 17 Instructional Coordinators | 27 Fabric and Apparel Patternmakers |
| 8. Healthcare Social Workers | 18 Psychologists, All Other | 28 Set and Exhibit Designers |
| 9. Oral and Maxillofacial Surgeons | 19 First-Line Supervisors of Police and Detectives | 29 Human Resources Managers |
| 10. First-Line Supervisors of Fire Fighting and Prevention Workers | 20 Dentists, General | 30 Recreation Workers |

The “fourth industrial revolution” is upon us and, according to the World Economic Fund, it is set to drastically disrupt business modes, labour markets, and economies across the world. In fact, in a report released this week, the Swiss foundation gave a conservative estimate of 7.1 million jobs that could vanish due to redundancy and automation by 2020.

Some 2.1 million jobs will be created and marginally offset that loss – but the 5 million remaining, mostly white collar jobs, will see themselves performed by one or more machine. What can we do to protect employment? The WEF survey recommends “re-skilling” employees as the best way to counteract job loss.

That is, teaching workers to work with machines rather than against them. This isn’t much different than the way workers in the 18th and 19th centuries were retrained to use their new factory machines – except that many of today’s machines will be developed to use themselves. Perhaps the most jarring estimate from the report is that 65 percent of today’s primary school children will find themselves in jobs that don’t exist yet. Most of these children will be at the whim (or careful planning) of current industry leaders once the students graduate and enter the workforce. But, as these disruptive technologies develop at increasing rates, some of these students will be the very engineers of the yet unknown jobs their peers will one day work.

(<https://emerj.com/ai-future-outlook/the-fourth-industrial-revolution-to-automate-5-million-jobs-in-5-years/>)

The Future of Jobs: The Impact of the 4th Industrial Revolution on the Next Generation¹⁸

How the 4th Industrial Revolution is impacting the public & private sector

The Fourth Industrial Revolution is changing the way we live, work and think. It’s bringing with it the rapid advancement of technologies, especially those related to advanced robotics, artificial intelligence, and machine learning. As technology becomes invisible it shapes the lives of young adults and workers across the globe, erasing borders and allowing people to work from anywhere. Work is no longer a place you go, and requires interdisciplinary thinkers that can be creative, think critically and solve problems as they arise. These are just some of the top 10 skills the World Economic Forum has identified as being essential for success over the next decade. The 4th industrial revolution is here to stay.

Technologies like smartphones, 3G/4G/Wi-Fi and high-speed internet, combined with cloud computing has made it easier for organizations to create diverse cross-functional teams that are co-located and creating together across the globe. By 2020, the concept of technology companies will disappear as technology becomes ingrained as part of the DNA of how every successful organization operates. If agility, efficiency and augmented intelligence with your own data is not part of how you create value for your customers and users, chances are you’re falling behind the next wave of breakthroughs within your industry.

The Skills Gap

As the need for the future skills economy evolves to become more interdisciplinary with critical soft skills becoming essential, organizations will need to adopt a new approach to learning. The public sector needs to consider how to better prepare students for future work-integration based on the skills-of-the-future today.

Higher education and organizations both need to prepare the next generation for the mindset of lifelong learning. Lifelong learning can take many forms including attending events such as confer

ences, team workshops, innovation challenges, as well as taking skills courses and certifications.

This shift also needs to take into account how we assess a prospective employee’s qualifications. No longer is a degree sufficient, now the future employer will recognize the individual’s portfolio of work, which may include startup pitches, code projects or creative designs that can take on many forms from data visualizations to illustrations.

Following are some of his words from the TED Talk video

In a TED Talk, economist Andrew McAfee suggests that, yes, probably, droids will take our jobs -- or at least the kinds of jobs we know now. In this far-seeing talk, he thinks through what future jobs might look like, and how to educate coming generations to hold them.¹⁹

What will future jobs look like? | Andrew McAfee

We are going to see more and more things that look like science fiction and fewer and fewer things that look like jobs.

Our cars are very quickly going to start driving themselves, which means we are going to need fewer truck drivers, we are going to hook up Siri up to Watson and use that to automate a lot of the work that’s currently done by customer service representatives and trouble-shooters and diagnosers and we were already taken R2D2, painting him orange, and putting him to work carrying shelves around warehouses which means we need a lot fewer people to be walking up and down those aisles. Now, the age of technological unemployment is at hand starting with the Luddites smashing looms in Britain just about two centuries ago.

“.....just in the past few years, our machines have started demonstrating skills they have never, ever had before: understanding, speaking, hearing, seeing, answering, writing, and they’re still acquiring new skills.” So, when I look around, I think the day is not too far off at all when we are going to have androids doing a lot of the work that we are doing right now. It is a world that Erik Brynjolfsson and I are calling ‘the new machine age’.

The jobs we'll lose to machines -- and the ones we won't | Anthony Goldbloom²⁰

Machine learning is not just for simple tasks like assessing credit risk and sorting mail anymore -- today, it's capable of far more complex applications, like grading essays and diagnosing diseases. With these advances comes an uneasy question: Will a robot do your job in the future? In a TEDTalk, the founder and CEO of Kaggle, a Silicon Valley start-up, talked about the following issues on machine age and employability.

In 2013, researchers at Oxford University did a study on the future of work. They concluded that almost one in every two jobs have a high risk of being automated by machines. Machines can excel at frequent, high volume tasks. The fundamental limitations of machine learning is that it needs to learn from large volumes of past data. Now human don't. We have the ability to connect seemingly disparate threads to solve problem we have never seen before.

¹⁸<https://www.reimagine-education.com/15-future-jobs-impact-4th-industrial-revolution-next-generation/>

¹⁹https://www.youtube.com/watch?v=cXQrbxD9_Ng

²⁰<https://www.youtube.com/watch?v=gWmRkYsLzB4>

CONCLUSIONS

CONCLUSIONS

We stand on the edge of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In this phenomenon, the transformation will be unlike anything we have experienced before. The rise of fourth industrial revolution, known as Industry 4.0, is an integrated processes of transformation that makes it possible to gather and analyze data across machines, enabling faster, more flexible, and more efficient processes to produce higher-quality goods at cheaper. This manufacturing revolution facilitates increasing productivity, shift economics of scale, foster rapid industrial growth, and modify the working patterns of the workforce.

The Survey Report attempts to focus on different areas of ICT job market and its dimensions like demography of ICT employees, recruitment, training of ICT professionals in Bangladesh & academic collaboration, demand of different domains of ICT employment outlook, supply side of core and soft skills, gap analysis.

In the era of fourth industrial revolution, while technical skills are becoming more and more specialized, employers look for candidates that have the perfect blend of both soft and technical skills. Hard or technical skills takes ICT professionals far, but some of the most important skills contributing for becoming a successful ICT professional are seemingly unfocused. "Soft" skills, such as the ability to communicate, managing time, presentation, problem solving attributes, domain knowledge, being able to negotiate conflict, concentrating ethics, adopting innovation, work well in teams, are also invaluable to the expansion of ventures, especially at the managerial and executive levels of any organizations and most vital skills required for ICT based organization. Moreover, emphasis has been placed in this report on development of Soft Skills as tasks that involve repetitive work are increasingly being replaced by growing and emerging technical fields. As reported, Soft-skills of humans are becoming more and more important as these are skills that computers are not capable of doing.

Addressing the Fourth Industrial Revolution, our higher education institutes have lot of responsibilities and scopes to perform. Focusing IR 4.0, we need to assess the areas for concentrating since the future of job will depend the innovative discipline or subjects as 65 percent of today's primary school children will find themselves in jobs that don't exist yet.

As a higher education institute, our students should be offered innovative learning methods like blended learning, flipped classroom method and need to give the highest priority in experiential learning (education that would have direct linkage with industry). To embrace the IR 4.0, there is no alternative in higher education, but to provide practical learning. With this, the student will learn in which areas they should build their career and they will be conversant.

Teachers should also have responsibilities to make effective environment for the students. Along with conducting conventional method of providing learning tools, they should encourage and stimulates students to think out of the box. Only taking classes, examining answer sheets are not enough as in coming years, core values and domain knowledge will reign.

Values are nourished and created by the parents and at home. So, in developing the core values the parents play the most vital role. Considering the global ICT development, parents should know the domain and guide their children to grab the positive aspects of technological development and how to use the good features of the technology.

Technological advancement at this position, is boon for us and we cannot think a moment without applying technology in our sphere of daily life. At this era of fourth industrial revolution, we cannot drive anyone for the success without appraising ICT domain; whatever the position you are in like medical professionals, entrepreneurs, lawyer etc. Everybody needs to be equipped with ICT knowledge and need to develop their skills aligning its development as robotics, artificial intelligence, human machine interactions etc are progressing in rapid pace and it is high time we should adopt and ensure technology based eco-system and we need to go in right direction to trail the pathway. Uber, Ola, Amazon, Netflix, and Tesla are some of the examples, which tend to think us in embracing technological revolution

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Annex 1

LIST OF RESPONDING ORGANIZATIONS

Survey Work of ICT Job Market in Bangladesh
(Duration: January, 2018 to September, 2018)

| SI | Company Name | Membership |
|-----------|---------------------------------------|------------------------------|
| 1 | 10 Minute School | IT Enable Service |
| 2 | 3C Solution Ltd | BCS |
| 3 | 88 innovations Ltd | Software and Web |
| 4 | Aamra Companies | BASIS |
| 5 | AB it Solution | OTHERS |
| 6 | Access Telecom Limited | BASIS |
| 7 | ACME IT Ltd. | Support and service provider |
| 8 | Addie soft | BASIS |
| 9 | Advance Data Communications Ltd | Support and service provider |
| 10 | Advance Power Solutions | Support and service provider |
| 11 | AGD IT Solution Ltd | E-CAB |
| 12 | Agni systems Ltd | ISPAB |
| 13 | AIG Distributions and consultancy Ltd | OTHERS |
| 14 | Akankha group | Non ICT |
| 15 | Akash Technology Ltd | Support and service provider |
| 16 | Akib technology | BCS |
| 17 | Akij Group | Non ICT |
| 18 | Akr technology | BASIS |
| 19 | Alo Communication Ltd | ISPAB |
| 20 | AMIRA MEDICAL HEALTH SERVICES LTD. | Non ICT |
| 21 | Ananda Computer | BASIS |
| 22 | Anontex Group | Non ICT |
| 23 | Anower Group Limited | Non ICT |
| 24 | Anower Khan Modern Medical Hospital | Non ICT |
| 25 | Anwer Securities Ltd | Non ICT |
| 26 | Appolo tour & Travel | Non ICT |
| 27 | APSIS | BASIS |
| 28 | ARA Technologies Ltd. | Software & web |
| 29 | ARISTOPHARMA LTD | BASIS |
| 30 | Arobil limited | E-CAB |
| 31 | Ars global it | OTHERS |

| SI | Company Name | Membership |
|-----------|---|------------------------------|
| 32 | ASB ICT Limited | Software & web |
| 33 | ATN Bangla Ltd. | Non ICT |
| 34 | Auleek Limited | BASIS |
| 35 | Aurora Tech solution | Support and service provider |
| 36 | Avis technology ltd | BASIS |
| 37 | Azolution software & Engineering ltd | BASIS |
| 38 | B.H.S. Fashions Ltd. | Support and service provider |
| 39 | Bangla CAT | Non ICT |
| 40 | Bangla insider ltd | BASIS |
| 41 | Bangla Phone Ltd. | ISPAB |
| 42 | Bangladesh Advanced Technologies Ltd. | BCS |
| 43 | Bangladesh Agriculture Department Corporation | Govt org |
| 44 | Bangladesh Bank | Govt org |
| 45 | Bangladesh Bureau Of Educational Information and Statistics | Govt org |
| 46 | Bangladesh Computer Council | Govt org |
| 47 | Bangladesh Computer Samity | Govt org |
| 48 | Bangladesh Forest Department | Govt org |
| 49 | Bangladesh Jute Mills Corporation | Govt org |
| 50 | Bangladesh Meteorological Department Ministry of Defence | Govt org |
| 51 | Bangladesh Shipping Corporation | Govt org |
| 52 | Bangladesh System technologies ltd | BASIS |
| 53 | Bangladesh Telecommunications Company | Govt org |
| 54 | BANGLALION COMMUNICATIONS LIMITED | BCS |
| 55 | BANGLANET TECHNOLOGIES LIMITED | BCS |
| 56 | BANSDoC | Govt org |
| 57 | BASE ltd | BCS |
| 58 | BDCom Ltd. | BASIS |
| 59 | BDjobs.com | BASIS |
| 60 | BDtask | BASIS |
| 61 | Belencer (Hypertag IT) | OTHERS |
| 62 | Best Business Bond Ltd. | BASIS |
| 63 | Beyond Inovations &Technology Ltd. | BASIS |
| 64 | bkash Limited | Non ICT |
| 65 | Blaze Tech | BASIS |
| 66 | Brain &life Hospital | Non ICT |
| 67 | BRB Hospital | Non ICT |
| 68 | Bridge Systems Solutions | Support and service provider |
| 69 | Business Automation Limited | BCS |

| SI | Company Name | Membership |
|-----------|------------------------------------|------------------------------|
| 70 | Byte Technology ltd | Support and service provider |
| 71 | Cannon Bangladesh | Support and service provider |
| 72 | Captcha software Solutions | Support and service provider |
| 73 | CEFALO | BASIS |
| 74 | Cetalo Bangladesh Ltd. | Software & web |
| 75 | China Yaohua Electric Co. (BD) Ltd | Support and service provider |
| 76 | Cloud solution ltd | BASIS |
| 77 | Cloudly Infotech ltd | BCS |
| 78 | Cloudly infotech ltd | BASIS |
| 79 | CNS Technologies | Support and service provider |
| 80 | CNYH | Support and service provider |
| 81 | Comfort Diagnostic ltd | Non ICT |
| 82 | Computer Archives | BCS |
| 83 | Computer City | BCS |
| 84 | Computer plant | OTHERS |
| 85 | Computer Solutions inc. | Support and service provider |
| 86 | computer source ltd | BASIS |
| 87 | ComTrade | BCS |
| 88 | Connect BD Ltd. | BASIS |
| 89 | Constant MD | Support and service provider |
| 90 | Copmuter Network Systems Ltd." | BASIS |
| 91 | Cordial Design Ltd. | OTHERS |
| 92 | Core ict limited | Support and service provider |
| 93 | CPA IT LTD | BASIS |
| 94 | Crave | OTHERS |
| 95 | Creative IT institutes | E-CAB |
| 96 | Creative Media Limited | BASIS |
| 97 | Crystal Technology Bangladesh ltd | BCS |
| 98 | CS Infotech Ltd. | Software & web |
| 99 | CSL Software Resoures Ltd. | BASIS |
| 100 | Cyber CFO and MCC Ltd. | OTHERS |
| 101 | Cygnus innovation ltd | BASIS |
| 102 | Daffodil International University | Non ICT |
| 103 | Daffodil Online | BCS |
| 104 | Daffodil PC | BASIS |
| 105 | Daraz.com | E-CAB |
| 106 | Data edge | ISPAB |
| 107 | Data Grid | ISPAB |

| SI | Company Name | Membership |
|-----------|--------------------------------|------------------------------|
| 108 | Data Head Private Ltd. | BASIS |
| 109 | Databiz software | BASIS |
| 110 | DataSoft | BCS |
| 111 | DaySpring Ltd. | BASIS |
| 112 | Delta Software Ltd. | BASIS |
| 113 | Denary Computing Limited | Software & web |
| 114 | Develop it limited | Support and service provider |
| 115 | Development Design Consultants | BASIS |
| 116 | DEVNET Limited | BASIS |
| 117 | Dewan ict | Software and Web |
| 118 | Dexterous Engineering | Support and service provider |
| 119 | Dhrubo host tech | Software and Web |
| 120 | DIGI Solution | BCS |
| 121 | Digital Network Communications | BASIS |
| 122 | Dird group | Non ICT |
| 123 | DNS Software Ltd | BCS |
| 124 | Dolphin Computers Ltd. | BCS |
| 125 | Doodle Inc. | OTHERS |
| 126 | Drick ICT Ltd. | Support and service provider |
| 127 | DS Innovetors Ltd. | Software and Web |
| 128 | Eastern University | Non ICT |
| 129 | Efficient Power Limited | OTHERS |
| 130 | eGeneration Ltd. | BASIS |
| 131 | Ekattor.tv | Non ICT |
| 132 | Electro CRAFT Corporation Ltd. | BASIS |
| 133 | Emem System Limited | OTHERS |
| 134 | Era info tech ltd | BASIS |
| 135 | Eskayef Pharmaceutical ltd | Non ICT |
| 136 | esoftarena | Software & web |
| 137 | Euro Bangla IT | BASIS |
| 138 | Excel Technologies Ltd | BCS |
| 139 | Exel Technology | Support and service provider |
| 140 | Extent it LTD | E-CAB |
| 141 | EySoft IT Solution | BASIS |
| 142 | Ezze Technology ltd | BASIS |
| 143 | Famous Vision Ltd | OTHERS |
| 144 | FAS Capital Management Ltd. | Support and service provider |
| 145 | Fastrack solutions | BCS |

| SI | Company Name | Membership |
|-----------|--|------------------------------|
| 146 | Fedex Express | Non ICT |
| 147 | Fifo tech | BACCO |
| 148 | Finder GPS Tracking | Support and service provider |
| 149 | Flora Ltd. | BASIS |
| 150 | Foresight IT Limited | Support and service provider |
| 151 | Fortune Tech Limited | BASIS |
| 152 | FourD Communication | BASIS |
| 153 | Freemig Bangladesh Ltd. | Non ICT |
| 154 | Friends Builders Ltd | Non ICT |
| 155 | Fujifilm | Non ICT |
| 156 | Fusion net | ISPAB |
| 157 | G series | Non ICT |
| 158 | Gakk Media (BD) Ltd | BASIS |
| 159 | Gazi Cement Mills Ltd. | Non ICT |
| 160 | General Automation Ltd. | BASIS |
| 161 | Genesis Systems Ltd. | Support and service provider |
| 162 | Genuity Systems Ltd. | BASIS |
| 163 | Getco | Non ICT |
| 164 | Gigabyte Bangladesh | E-CAB |
| 165 | Global Brand Pvt. Ltd | BCS |
| 166 | Global it LTD | Support and service provider |
| 167 | Gluonous Technology ltd | Software and Web |
| 168 | Grameen Intel Social Business | BASIS |
| 169 | Graphiccscool Computer | OTHERS |
| 170 | Gravity | OTHERS |
| 171 | Green lighting | OTHERS |
| 172 | Green Power limited | Support and service provider |
| 173 | Greenlife Hospital | Non ICT |
| 174 | Gurukul Institute of IT | Non ICT |
| 175 | Hamdard Laboratories (waqf) Bangladesh | Non ICT |
| 176 | Harun Eye Foundation | Non ICT |
| 177 | Hi-Tech online Service | Support and serviceprovider |
| 178 | HTS Corporation Ltd | E-CAB |
| 179 | IBCS-PRIMAX | BCS |
| 180 | Ibn sina Hospital | Non ICT |
| 181 | ICT career | Support and service provider |
| 182 | ICT Express Ltd. | Support and service provider |
| 183 | Idea network and communication | Support and service provider |

| SI | Company Name | Membership |
|-----------|---|------------------------------|
| 184 | Ideas IT Ltd. | BCS |
| 185 | Impex Computer | BCS |
| 186 | Incepta Pharmaceuticals Ltd | Non ICT |
| 187 | INFINITY Technology Informational Ltd. | BASIS |
| 188 | info care | Software and Web |
| 189 | Info link | Support and service provider |
| 190 | Ingenium BD corporate House | Software and Web |
| 191 | Initvent innovative it Venture | Software and Web |
| 192 | Innovizz | Support and service provider |
| 193 | Inpace Communication | BCS |
| 194 | Integra Technologies Ltd. | Support and service provider |
| 195 | INT'L TURKISH HOPE SCHOOL | Non ICT |
| 196 | iPay Systems Ltd. | BASIS |
| 197 | IPSITA computer pvt ltd | BCS |
| 198 | Ipvision canada inc | Support and service provider |
| 199 | IT Care Bd | BCS |
| 200 | it park bd | BCS |
| 201 | ivive labs | Software and Web |
| 202 | IXORA SOLUTION LTD. | BCS |
| 203 | Jagori Technologies | BASIS |
| 204 | Jamuna Bank | Non ICT |
| 205 | Janata Bank Ltd. | Govt org |
| 206 | Jibondhara ltd | BASIS |
| 207 | JobdBDB.com | Non ICT |
| 208 | JTC Group | Non ICT |
| 209 | Knit asia ltd.(New Asia Group) | Non ICT |
| 210 | kona SL | BASIS |
| 211 | Lab aid Diagnostic | Non ICT |
| 212 | LabAid Pharmaceuticals Ltd | Non ICT |
| 213 | LAMS IT Ltd. | Software & web |
| 214 | LEADS Corporate Ltd | Support and service provider |
| 215 | Link3 Technology Ltd. | BASIS |
| 216 | Link-Up Technology Ltd. | Software & web |
| 217 | Local Government Engineering Department | Govt org |
| 218 | Logic Software Ltd. | BASIS |
| 219 | Make Future it | Software and Web |
| 220 | Mamtech Ltd | BASIS |
| 221 | Maple Tech | Software and Web |

| SI | Company Name | Membership |
|-----------|--|------------------------------|
| 222 | Mediasoft Data System ltd | BASIS |
| 223 | Medisys | BASIS |
| 224 | Mega logic and technology | Software and Web |
| 225 | Merto Coverage | BCS |
| 226 | Mesh Stocks | Non ICT |
| 227 | MetLife | Non ICT |
| 228 | Metronet Bangladesh Limited | BCS |
| 229 | MF Asia Ltd. | BASIS |
| 230 | Micro gallery | OTHERS |
| 231 | Micro gates IT | Support and service provider |
| 232 | Micropack Ltd. | Support and service provider |
| 233 | Millennium information solution ltd | BASIS |
| 234 | Millinium Info. Software Limited | BASIS |
| 235 | Ministry Of Home Affirs Immigration & Passports Department | Govt org |
| 236 | Mobality Itap pay | Support and service provider |
| 237 | Monower Associates | Support and service provider |
| 238 | Mott MacDonald | Support and service provider |
| 239 | MRC Studio bangladesh | BASIS |
| 240 | Multi Graphics | Support and service provider |
| 241 | Multi link | Support and service provider |
| 242 | Multimode Ltd. | BASIS |
| 243 | Music Industries Owners Association | Non ICT |
| 244 | MySoft Limited | Support and service provider |
| 245 | Mysoftheaven(BD) Ltd. | BASIS |
| 246 | Nano IT Ltd. | BASIS |
| 247 | nano tech | BCS |
| 248 | Nascenia Ltd | BASIS |
| 249 | Nebulas it limited | Support and service provider |
| 250 | Neurogen technology | Software and Web |
| 251 | New Horizons | BCS |
| 252 | New Vision solution ltd | OTHERS |
| 253 | Next Online Limited | BACCO |
| 254 | Next Tech | BCS |
| 255 | NG Technologies ltd | Support and service provider |
| 256 | Nice Power it solution ltd | BCS |
| 257 | Nobo IT | Software & web |
| 258 | Nogor Solution Limited | BASIS |
| 259 | Nokkhotro Lab | Non ICT |

| SI | Company Name | Membership |
|-----------|------------------------------------|------------------------------|
| 260 | NRB Jobs Limited | BASIS |
| 261 | Numiric technology | BCS |
| 262 | OMEGA EXIM LIMITED | BCS |
| 263 | One Pharma ltd | Non ICT |
| 264 | One Simtech ltd | OTHERS |
| 265 | One stop service & solution | Support and service provider |
| 266 | Onix Computers System | E-CAB |
| 267 | Onnorokom Software Limited | BASIS |
| 268 | Optimize IT | Software & web |
| 269 | Oriental Service AV (BD) Ltd. | BCS |
| 270 | Outsource Experts Ltd. | BASIS |
| 271 | Oxyword Limited | Non ICT |
| 272 | Paeap | Software & web |
| 273 | PANACEA System Ltd. (Duplicate) | BASIS |
| 274 | Panaroma computer | BCS |
| 275 | Pandora Associates Ltd. | BCS |
| 276 | Paper Leaf | Non ICT |
| 277 | People Development Community (PDC) | Support and service provider |
| 278 | PHOENIX SOFTWARE | BASIS |
| 279 | Pondit | BASIS |
| 280 | Premier Bank ltd | Non ICT |
| 281 | Pridessy IT Limited | Software & web |
| 282 | Prime Tech Solution Ltd. | BASIS |
| 283 | Primeasia University | Non ICT |
| 284 | PTI system | Software and Web |
| 285 | R4 technology and network | Support and service provider |
| 286 | Rainbow Software Limited | BCS |
| 287 | RANKS ITT Limited | ISPAB |
| 288 | Rasa Technologies | BCS |
| 289 | RB | Support and service provider |
| 290 | Retail Technologies Limited | BCS |
| 291 | REVE Systems Ltd. | BCS |
| 292 | RICHMAN INFORMATICS | BCS |
| 293 | Rosetta Technologies | Software & web |
| 294 | Roxy Paints | Non ICT |
| 295 | RYANS IT Limited | BCS |
| 296 | S. S. Technology | Support and service provider |
| 297 | Saint Bangladesh | Non ICT |

| SI | Company Name | Membership |
|-----------|---|------------------------------|
| 298 | Samorita Hospital | Non ICT |
| 299 | Satcom it Limited | Support and service provider |
| 300 | Satcom IT Ltd | BASIS |
| 301 | Savvy tech Mart | Software and Web |
| 302 | SBYA | OTHERS |
| 303 | Scarlet Technology | Support and service provider |
| 304 | Security 365 | Support and service provider |
| 305 | Shadow Color Limited | OTHERS |
| 306 | Shamol Bangla Media Ltd | OTHERS |
| 307 | Silicom Orchard Ltd. | Software & web |
| 308 | Singer Bd. Ltd. | Non ICT |
| 309 | Skill Development & Technical Institute | Non ICT |
| 310 | Skytouch Apartment ltd | Non ICT |
| 311 | Smart Living technologies ltd | Non ICT |
| 312 | Smart Software inc | Software and Web |
| 313 | Smart Technologies (BD) ltd | BACCO |
| 314 | SN engineering | Support and service provider |
| 315 | Snowtex | Support and service provider |
| 316 | Soft IT Security | Support and service provider |
| 317 | SOFT TECH | BCS |
| 318 | Softnet BD | OTHERS |
| 319 | Software Grid | Software & web |
| 320 | Sonali Bank | Govt org |
| 321 | South Bangla Computers | Support and service provider |
| 322 | Southtech Systems Limited | BASIS |
| 323 | Spankle Blue Ribbons ltd | OTHERS |
| 324 | Spectrum Engineering Cosortium Ltd. | BASIS |
| 325 | Spondon it | BASIS |
| 326 | Square hospital | Non ICT |
| 327 | SSL Wireless | E-CAB |
| 328 | Standard group ltd | BASIS |
| 329 | Star Computer Systems Limited | BASIS |
| 330 | Star Tech & Engineering | BCS |
| 331 | State University Of Bangladesh | Non ICT |
| 332 | Stock Bangladesh Limited | BASIS |
| 333 | Sunflower Computer Limited | BCS |
| 334 | Surprize IT | Support and service provider |
| 335 | Surround Apps | Software and Web |

| SI | Company Name | Membership |
|-----------|--|------------------------------|
| 336 | Sycorax | Support and service provider |
| 337 | Symphony soft tech ltd | BASIS |
| 338 | Synteech Solution Ltd | Support and service provider |
| 339 | Sys Computers Ltd | BCS |
| 340 | Sysnova | BASIS |
| 341 | Systech Digital Ltd. | BASIS |
| 342 | System International Engineering | Support and service provider |
| 343 | TBSL Technology and Business Solutions | BASIS |
| 344 | Tech Hill | BCS |
| 345 | Tech Spark it Ltd | Software and Web |
| 346 | Tech Today Ltd. | BCS |
| 347 | Techno BD | Software & web |
| 348 | Techno Heaven Company Ltd. | Software & web |
| 349 | Technostar limited | BCS |
| 350 | Technoweb IT Limited | Software & web |
| 351 | Techsol ltd bd | BASIS |
| 352 | Teletalk Bangladesh Limited | Govt org |
| 353 | The ACME Laboratories Ltd | Non ICT |
| 354 | The Ibd Sina Pharmaceutical Ltd | Non ICT |
| 355 | Third Eye NC Ltd | Non ICT |
| 356 | Together Initiative Ltd. | BASIS |
| 357 | Tomato Web (Pvt.) Ltd. | ISPAB |
| 358 | Top Ten Group | Non ICT |
| 359 | Toyota Bangladesh (Navana) | Non ICT |
| 360 | UNIFOX | BASIS |
| 361 | UNIQUE Business System Ltd. | BCS |
| 362 | Unisoft System limited | Software & web |
| 363 | United News of Bangladesh (UNB) | Non ICT |
| 364 | US Software Ltd | BASIS |
| 365 | Uster Fiber Limited | OTHERS |
| 366 | UUMOO | Support and service provider |
| 367 | UY systems Ltd | BASIS |
| 368 | Uys Lab | BASIS |
| 369 | Valley ICT | OTHERS |
| 370 | Value Plus Computer System Ltd. | Software & web |
| 371 | VERBAL | OTHERS |
| 372 | Vision Group | Non ICT |
| 373 | W3 Engineering Ltd | BASIS |

| SI | Company Name | Membership |
|-----------|---|------------------------------|
| 374 | Walton Group | Non ICT |
| 375 | WE | BASIS |
| 376 | Webcode Ltd | Support and service provider |
| 377 | Weltouch Appareals Ltd | Non ICT |
| 378 | Wintel limited | BACCO |
| 379 | WIT Bangladesh | BCS |
| 380 | World Information Technology Foundation | Software and Web |
| 381 | Worldwide Machineries Ltd. | Non ICT |
| 382 | Wouetmix.IT | OTHERS |
| 383 | Zanala Bangladesh Limited | BASIS |
| 384 | ZS Solutions Ltd. | BASIS |
| | | |

Enumerators

| SI | Name | DIU Student ID | Department |
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| 3 | Mahbub Alam | 151-35-848 | Department of Software Engineering, DIU |
| 4 | Rasheduzzaman Rashed | 153-35-1305 | Department of Software Engineering, DIU |
| 5 | Asif Rahman | 151-35-1020 | Department of Software Engineering, DIU |
| 6 | Shihab Nayem | 151-35-989 | Department of Software Engineering, DIU |
| 7 | Saiful Islam | 151-35-865 | Department of Software Engineering, DIU |
| 8 | Nurul Amin Sabbir | 151-35-1026 | Department of Software Engineering, DIU |
| 9 | Masum Rana | 151-35-1029 | Department of Software Engineering, DIU |
| 10 | Abul Hakam | 152-35-1218 | Department of Software Engineering, DIU |
| 11 | Rabbi Bipu | 152-35-1199 | Department of Software Engineering, DIU |
| 12 | Syeda Farhana Akter Shila | 152-35-1139 | Department of Software Engineering, DIU |
| 13 | Ashraful Islam Sheiblu | 152-35-1129 | Department of Software Engineering, DIU |
| 14 | Shamir Chandra Dey | 152-35-1188 | Department of Software Engineering, DIU |
| 15 | Mazed Mourshed | 152-35-1215 | Department of Software Engineering, DIU |
| 16 | Mahmuda Nasrin Mukti | 151-35-1017 | Department of Software Engineering, DIU |
| 17 | Shawon Islam | 151-23-4120 | Department of T Engineering, DIU |
| 18 | Forhad Hossain | 151-11-4413 | Department of Business Administration, DIU |
| 19 | Tawhidur Rahman Tanim | 151-35-964 | Department of Software Engineering, DIU |
| 20 | Omar Faruk Khan | 152-35-1170 | Department of Software Engineering, DIU |
| 21 | Arifa Khatun | 151-35-1091 | Department of Software Engineering, DIU |
| 22 | Umma Hasanat Tripty | 152-34-410 | Department of Nutrition and Food Engineering, DIU |
| 23 | Razu Ahammed | 143-33-22237 | Department of Electrical and Electrical Engineering, DIU |
| 24 | Selim Hossain | 161-15-7351 | Department of Computer Science and Engineering, DIU |
| 25 | Arshadina Umara Najib | 152-11-927 | Department of Business Administration, DIU |
| 26 | Tanver Mehede | 151-35-1090 | Department of Software Engineering, DIU |
| 27 | Tanvir Hossain | 173-35-550 | Department of Software Engineering, DIU |
| 28 | Jahin Tasnim Ratri | 151-35-1114 | Department of Software Engineering, DIU |
| 29 | Mokter Hossain Akaash | 152-11-4626 | Department of Business Administration, DIU |
| 30 | Zaman Wahid | 151-35-953 | Department of Software Engineering, DIU |
| 31 | Azizul Hakim | 152-15-6033 | Department of Computer Science and Engineering, DIU |
| 32 | Ummul Wara Habiba | 153-35-1310 | Department of Software Engineering, DIU |
| 33 | Kabir Hossain | 152-35-1266 | Department of Software Engineering, DIU |
| 34 | Abdur Rahim Dulal | 162-27-307 | Department of Real Estate Engineering, DIU |
| 35 | Habibur Rahman | 151-11-4289 | Department of Business Administration, DIU |
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| 38 | Tanjimul Farhan | 151-11-4416 | Department of Business Administration, DIU |
| 39 | Md. Raiyan Ferdous Shakil | 151-11-4410 | Department of Business Administration, DIU |
| 40 | Abdul Bari Shah | 143-11-4091 | Department of Business Administration, DIU |
| 41 | Latifa Akter Lina | 171-35-2086 | Department of Software Engineering, DIU |
| 42 | Md. Hridoy Rahman | 171-35-2000 | Department of Software Engineering, DIU |
| 43 | Tanvir Azad | 171-35-1853 | Department of Software Engineering, DIU |
| 44 | Salma Jahan Mimi | 171-35-1832 | Department of Software Engineering, DIU |
| 45 | Md. Abrar Foysal Irfan | 161-15-7031 | Department of Computer Science and Engineering, DIU |
| 46 | Md. Rasheduzzaman Rashed | 153-35-1305 | Department of Software Engineering, DIU |
| 47 | S.M. Rizwan Islam Rhythm | 161-15-7048 | Department of Computer Science and Engineering, DIU |
| 48 | Israt Jahan Ananna | 143-11-4187 | Department of Business Administration, DIU |
| 49 | Kazi Motnour | 171-15-8649 | Department of Computer Science and Engineering, DIU |
| 50 | Md. Hadaitul Islam Toha | 172-35-2156 | Department of Software Engineering, DIU |
| 51 | Mahathin Md. Arnab | 161-15-7330 | Department of Computer Science and Engineering, DIU |
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| 53 | Adnan Rahman | 143-11-4233 | Department of Business Administration, DIU |
| 54 | SazistaTanzim | 141-35-644 | Department of Software Engineering, DIU |
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| 56 | Surovi Akter Trishna | 151-35-875 | Department of Software Engineering, DIU |
| 57 | Mehedi Hasan | 151-35-847 | Department of Software Engineering, DIU |
| 58 | Farzana Akter | 151-35-1075 | Department of Software Engineering, DIU |
| 59 | Alomgir Hossain | 151-35-920 | Department of Software Engineering, DIU |
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| 62 | Rafika Sultana | 151-35-1050 | Department of Software Engineering, DIU |
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| 64 | Md. Nour-E- Yaztani Chowdhury | 151-35-914 | Department of Software Engineering, DIU |
| 65 | Mazharul Islam Chaudhury | 151-35-897 | Department of Software Engineering, DIU |
| 66 | Faisal Ahmed Tusar | 151-35-867 | Department of Software Engineering, DIU |
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| 70 | Shariar Mostak Emon | 151-35-962 | Department of Software Engineering, DIU |
| 71 | A. U. M. Thuin | 151-35-892 | Department of Software Engineering, DIU |
| 72 | Sadia Kabir | 151-35-948 | Department of Software Engineering, DIU |
| 73 | Md. Robin khan | 151-35-908 | Department of Software Engineering, DIU |
| 74 | Md. Ashik Iqbal | 142-35-713 | Department of Software Engineering, DIU |



SPECIAL THANKS

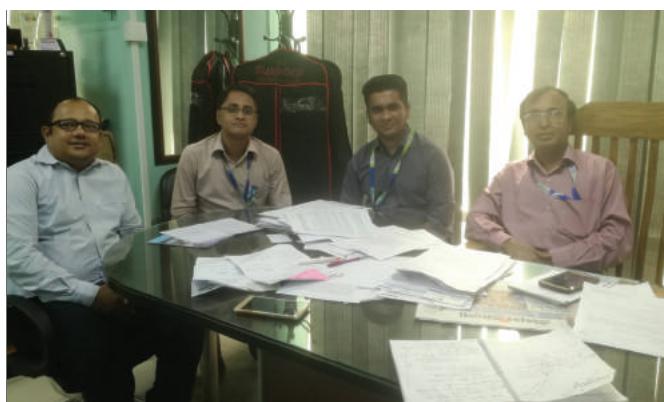
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Media Coverages

The collage includes the following media sources:

- The Financial Express**: Private initiative launches study on ICT job market
- New Nation**: DIU hosts study on ICT job market in Bangladesh
- Education 24**: Study on ICT job market launched at DIU
- Bangladesh Post**: Study on ICT job market in Bangladesh launched
- BD Zoom**: Study on ICT job market in Bangladesh launched
- BD News**: Study on ICT job market in Bangladesh launched
- Business Standard**: Study on ICT job market in Bangladesh launched
- Khaleej Times**: Study on ICT job market in Bangladesh launched
- Shambad**: Study on ICT job market in Bangladesh launched
- Chittagong Today**: Study on ICT job market in Bangladesh launched
- FE Report**: A study on ICT Job Market in Bangladesh will be conducted to collect information for preparing an effective work plan for the sector's development.

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